# ATTITUDES AND PERCEPTIONS OF OFF-HIGHWAY VEHICLE RIDERS TOWARDS TWO BEHAVIORS IN THE NORTHEAST UNITED STATES



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Funded by the USDA McIntire-Stennis Program

November, 2008

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## EXECUTIVE SUMMARY

The goal of this study is to provide information to Off-Highway Vehicle (OHV) riders and natural resource managers about the perceptions of OHV riders towards two intended 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).

To accomplish this goal, a mail survey of 811 members of the New England Trail Riders Association (NETRA) was completed in the fall of 2007. The questionnaire consisted of 112 questions about OHV rider demographics, personal riding experiences, riding locations, perceptions of management strategies, and attitudes and intentions concerning the two behaviors. Of the 811 questionnaires mailed, 380 were completed and returned and 22 were undeliverable, yielding a qualified response rate of 48%.

Respondents averaged 44 years of age (n = 345) and indicated that they had been riding OHVs for an average of 25 years (n = 379); 97% were male and 3% were female (n = 380). Most respondents (99%) rode Off-Highway Motorcycles (OHMs); 25% rode ATVs and 17% drove jeeps and/or SUVs for recreational purposes. In 2007, respondents rode OHMs on an average of 46 days, ATVs on 27 days, and 4-wheel-drive vehicles for recreational purposes on 38 days. The majority of respondents rode with either friends (91%) or members of an OHV club (67%). The majority of respondents (85%) found out about riding areas from friends and/or family members. Large percentages of respondents rode their OHVs on private, state, or OHV club lands (89%, 71%, and 60%, respectively), with moderate percentages riding on federal lands (42%) or lands owned by counties, townships, villages, or cities (41%). The two most prevalent concerns of respondents were that limited areas for riding were concentrating use in legal riding areas, leading to crowding and safety concerns (41%), and that land closures were causing an increase in riding in areas where OHVs are not permitted (25%).

Seventy-one percent of the respondents reported that they had assisted or were planning to assist with projects related to trail maintenance on public and/or private lands. Respondents preferred educational management strategies (e.g., informing them about regulations at trailheads) over strategies related to the enforcement of regulations (e.g., ticketing). Questions related to attitudes towards the two behaviors revealed that OHV riding is an important activity for the average respondent, that he/she understands what will happen (i.e., negative social and environmental impacts) if he/she engages in either of the two behaviors, and that he/she does not look favorably upon other riders who engage in either of the two behaviors. Results pertaining to the intentions of riders towards the two behaviors indicate that the average respondent intends to ride OHVs legally, but has a lower perception of the intentions of other OHV riders.

Results indicate that several policy and management strategies could be considered in the future to ensure quality OHV riding experiences that maintain the natural resource base and provide quality recreational experiences for other users. Modifying existing OHV-related policies on public lands, improving trail access and connectivity, conducting educational programs for new and young OHV riders, and engaging OHV riders in trail maintenance on public lands should be implemented through cooperative efforts between natural resource managers and OHV clubs.

## INTRODUCTION

Between 1999 and 2004, an estimated 39.7 million people (16 years and older) participated in off-highway vehicle (OHV) riding within United States (Cordell, Betz, Green, & Owens, 2005). In the northeastern United States, between 1999 and 2004, an estimated 13.4 million people (aged 16 or older) participated in OHV use. OHV use increased nearly 42% during this timeframe in the United States. 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 a high population density and limited available acres of public land tend to magnify issues related to recreational use.

As pressure on public lands in the northeast continues to increase for activities such as OHV use, new strategies for providing recreational access for all users and for maintaining the natural resource base are needed. Increased collaboration between riders and forest/natural resource managers for trail maintenance and management is one such strategy. Specifically, managers and OHV riders will need to work together to maintain the natural resource base for current and future users of all types, and to provide quality riding experiences for OHV riders. In order to enhance collaboration between these groups, an understanding of the attitudes and behaviors of OHV riders is needed.

The goal of this study is to provide information to OHV riders and natural resource managers regarding the attitudes and perceptions of OHV riders towards two intended 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). To accomplish this goal, a mail survey of 811 members of the New England Trail Riders Association (NETRA) was completed in the fall of 2007.

The Theory of Planned Behavior, an established model for examining the relationships between recreation-related beliefs, attitudes, and intended behaviors (Ajzen, 1991; Hrubes, Ajzen, & Daigle, 2001), provided the framework for the study. The Theory of Planned Behavior suggests that behaviors stem from intentions that are influenced by attitudes and beliefs concerning the behaviors. By understanding OHV rider attitudes, riders' perceptions of these two behaviors will be clarified for both the riding community and resource managers, enabling collaborative efforts between the two groups to develop in the future.

For the purpose of this study, OHVs are defined as motorized vehicles used on trails or off-highway (i.e., on dirt roads). These vehicles include 4-wheel drive jeeps or sport utility vehicles (SUVs) 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; snowmobiles were not included in this study. OHV use of both dirt roads and trails was included.

## METHODS

A mail survey of members of the New England Trail Riders Association (NETRA) was conducted in 2007. The sample population comprised 811 NETRA members, 125 of which were from each state with the exception of Maine (which had a total of 54 members, all of whom were surveyed) and New Jersey (7 members, all of whom were surveyed). The survey mailing was overseen by the NETRA Board of Directors to ensure the confidentiality of its members.

The questionnaire consisted of 112 questions about OHV rider demographics, personal riding experience, riding locations, and perceptions of management strategies, attitudes, and intended behaviors. Questions used to elicit the complex components of management preferences, attitude, and intended behavior were modified from prior works (Rogers, 1985; Bright & Manfredo, 1996; Ajzen, 2001; Ajzen & Driver, 1992; Hines, Hungerford, & Tomera, 1987) to reflect the specific characteristics of OHV use and its relationship to natural resource management. Respondents were asked to indicate their agreement or disagreement with statements related to attitudes and intended behaviors using a five-point scale (e.g., -2 = strongly disagree, -1 = disagree, 0= neutral, 1 = agree, 2 = strongly agree); a similar five-point scale was used for statements related to management preferences (i.e., -2 = strongly not favored, 0 = neutral, 2 = strongly favored).

Prior to mailing, the questionnaire was reviewed internally, by volunteer readers who are OHV riders, and by members of the NETRA Board of Directors. Based on review comments, changes were made and the review process was repeated. Following review, a pilot study of 20 members of the Sunday Rock ATV Club (none of whom were NETRA members) was completed using a short version of the survey. Minor revisions were made based on the results of the pilot study.

Implementation of the survey consisted of four separate mailings to participants. A modified Tailored Design Method (Dillman, 2007) was used for the mailings. The first and third mailings consisted of a cover letter, the questionnaire, and a pre-paid self-addressed envelope; the second and fourth mailings were reminder postcards. All mailings used first-class US mail to ensure the return of undeliverable envelopes, and were mailed at 14-day intervals. Completed questionnaires were returned with postage-paid envelopes.

A one-page non-response survey was sent to 100 non-respondents randomly selected from the original sample to check for non-response bias. Comparisons between non-respondents and respondents were made using two-independent-sample t-tests for mean response to several key questions related. Two-independent-sample z-tests were used to identify significant differences between the proportions of respondents by type of OHV used.

Descriptive statistics (e.g., mean, median, standard error) were calculated for each question. An exploratory principal components factor analysis with varimax rotation was used to explore how statements from the questionnaire should be grouped into factors for each attitude component. Factor groupings were then compared to the original groupings proposed through prior research (Bright & Manfredo, 1996). A confirmatory factor analysis was then used to confirm these factor groupings. Confirmatory factor analysis results were considered satisfactory (i.e., fit was deemed acceptable) when a Comparative Fit Index (CFI) of 0.9 or greater, and a root mean-square error of approximation (RMSEA) of 0.05 or less were obtained (Hair, Anderson, Tatham, and Black,

1998; p. 656). Cronbach's alpha scores of 0.7 or greater were used to establish the reliability (i.e., internal consistency) of factors (Hair et al., 1998).

Following the completion of the survey, a focus group session was held in the spring of 2007 with ten members of the Sunday Rock ATV club in South Colton, New York. Detailed notes were taken during the two-hour session regarding the participants' concerns about ATV use, their preferences about management, and their perceptions concerning the two behaviors under study. Comments that received consensus among all participants were summarized, and used to clarify comments made by survey respondents.

## RESULTS

### Response Rate

Of the 811 questionnaires distributed to the sample of NETRA members, 380 were completed and returned and 22 were undeliverable, yielding a qualified response rate of 48%. While respondents were distributed nearly equivalently between most states, low response rates were obtained from Maine and New Jersey (8% and 1%, respectively, of the total qualified sample of 789) due to the low number of individuals from these states in the initial sample. Aggregate data (i.e., for all states combined) are presented for most results presented in this report, with the exception of results concerning the respondents' state of residence and lands used for OHV riding.

Twenty-eight questionnaires were returned from the 100 non-response questionnaires mailed for a response rate of 28%. Comparisons between non-respondents and respondents (n = 380) were made using two-independent-sample t-tests for mean response to questions related to attitude, and two-independent-sample z-tests for proportions of respondents by type of vehicle and ownership of the land used for riding ($p \leq 0.05$). When type of vehicle used was compared, the only significant difference identified was that for respondents who rode an ATV (7% of non-respondents rode an ATV as compared to 26% of respondents; $p = 0.045$). A significant difference was also identified for the type of land used for riding, with fewer non-respondents riding on Federal lands (25% of non-respondents and 42% of respondents; $p = 0.046$). While attitude questions regarding the two behaviors showed no significant differences, a significant difference was identified between non-respondents and respondents for general attitude towards OHVs (non-respondents had a slightly more positive mean attitude of 1.82 as compared to 1.65 for respondents; $p = 0.042$).

### OHV Rider Demographics

OHV riders were asked to characterize themselves and their OHV-based recreation histories. Respondents were an average of 44 years of age (n = 345) and indicated that they had been riding OHVs for an average of 25 years (n = 379). Respondents were 97% male and 3% female (n = 380). Table 1 displays the state of residence of respondents.

**Table 1.** State of residence of respondents (n = 377).

| State | Number of respondents | Percent of respondents | State | Number of respondents | Percent of respondents |
|---|---|---|---|---|---|
| CT | 52 | 14% | NJ | 3 | 1% |
| MA | 54 | 14% | NY | 69 | 18% |
| ME | 32 | 8% | RI | 46 | 12% |
| NH | 68 | 18% | VT | 53 | 14% |

## OHV Rider Vehicles and Participation

OHV riders were asked to characterize the vehicle type(s) they operated in 2007, the types of land on which they operated, with whom they participated in OHV riding, their sources for riding information, and the requirements of their sport (e.g., obtaining permits, paying user fees, registering their OHVs). Tables 2 through 6 display results related to OHV rider experiences in 2007. Most respondents (99%) were Off-Highway Motorcycle (OHM) riders; 25% rode ATVs and 17% drove jeeps and/or SUVs for recreational purposes in 2007 (Table 2). In 2007, respondents rode OHMs on an average of 46 days, ATVs on an average of 27 days, and 4-wheel drive vehicles for recreational purposes on 38 days. The majority of respondents rode with either friends (91%) or members of an OHV club (67%; Table 3). Most respondents indicated that they were required to register their OHV with the state's Department of Motor Vehicles prior to a day of riding on public lands; 27% were also required to obtain a riding permit and 25% were required to pay a user fee (Table 4). The majority of respondents (85%) found out about riding areas from friends and/or family members (Table 5). Large percentages of respondents rode their OHVs on private, state, or OHV club lands (89%, 71%, and 60%, respectively), with moderate percentages riding on federal lands (42%) or lands owned by counties, townships, villages, or cities (41%). The types of lands used for riding by state of residence of respondents are shown in Table 6.

**Table 2.** OHV respondents' vehicles and vehicle use in 2007 (n = 377). Many respondents indicated the use of more than one type of vehicle, creating overlap between vehicle categories.

| What types of OHVs did you ride in 2007? | Number of respondents indicating vehicle | Percent of respondents | Average number of days on which vehicle was used |
|---|---|---|---|
| Off-highway motorcycle (i.e., dirt bike) | 373 | 99% | 46 |
| ATV (i.e., 4-wheelers and 6-wheelers) | 95 | 25% | 27 |
| 4-wheel drive jeep, automobile, or SUV | 63 | 17% | 38 |

**Table 3.** Riding partners of respondents (n = 377).

| Who do you normally go riding OHVs with? | Number of respondents indicating person | Percent of respondents |
|---|---|---|
| Friends | 341 | 91 % |
| Members of an OHV or other club | 252 | 67 % |
| My children | 162 | 43 % |
| Other relatives (not including spouse or children) | 78 | 21 % |
| Spouse or significant other | 60 | 16 % |

**Table 4.** Riding requirements (n = 377).

| Which of the following were you required to do in 2007 before riding on government-owned lands[a]? | Number of respondents indicating item | Percent of respondents |
|---|---|---|
| Obtain a riding permit for riding on some public lands | 100 | 27 % |
| Pay a user fee before riding on some public lands | 95 | 25 % |
| Read a brochure that discusses why it's important for the environment to stay on trails when riding an OHV | 24 | 6 % |
| Listen to a government employee talk about why it's important for the environment to stay on trails when riding an OHV | 7 | 2 % |
| Register my OHVs with the state department of motor vehicles | 269 | 71 % |

[a] "Government-owned lands" refers to lands owned by federal, state, and local governments.

**Table 5.** Information sources for OHV trails (n = 377).

| How did you initially obtain information about the trails that you ride on? | Number of respondents indicating item | Percent of respondents |
|---|---|---|
| From friend(s) or family member(s) | 320 | 85 % |
| Government agency website | 49 | 13 % |
| Government agency brochure and/or map | 39 | 10 % |
| OHV riding club website | 153 | 41 % |
| OHV riding club brochure and/or map | 133 | 35 % |

**Table 6.** Lands used for OHV riding by state of residence of respondents in 2007. The results for New Jersey are omitted due to the low number of responses (n = 3). Respondents did not necessarily ride in their state of residence.

| State of residence | n | On what types of land did you ride OHVs in 2007? | Number of respondents indicating item | Percent of respondents | Average number of rides on land type |
|---|---|---|---|---|---|
| CT | 52 | Private | 42 | 81% | 19 |
| | | State | 36 | 69% | 17 |
| | | Club/Organization | 32 | 62% | 16 |
| | | Federal lands | 30 | 58% | 10 |
| | | County, township, village, or city | 17 | 33% | 18 |
| MA | 54 | Private | 45 | 83% | 29 |
| | | State | 44 | 82% | 23 |
| | | Club/Organization | 31 | 57% | 14 |
| | | Federal lands | 20 | 37% | 12 |
| | | County, township, village, or city | 22 | 41% | 20 |
| ME | 32 | Private | 31 | 97% | 47 |
| | | State | 20 | 62% | 8 |
| | | Club/Organization | 12 | 38% | 18 |
| | | Federal lands | 6 | 19% | 17 |
| | | County, township, village, or city | 18 | 56% | 58 |
| NH | 68 | Private | 58 | 85% | 18 |
| | | State | 51 | 75% | 8 |
| | | Club/Organization | 40 | 59% | 11 |
| | | Federal lands | 40 | 59% | 10 |
| | | County, township, village, or city | 30 | 44% | 13 |
| NY | 69 | Private | 64 | 93% | 34 |
| | | State | 50 | 72% | 13 |
| | | Club/Organization | 54 | 78% | 20 |
| | | Federal lands | 32 | 46% | 7 |
| | | County, township, village, or city | 24 | 35% | 16 |
| RI | 46 | Private | 42 | 91% | 23 |
| | | State | 36 | 78% | 26 |
| | | Club/Organization | 26 | 56% | 12 |
| | | Federal lands | 12 | 26% | 20 |
| | | County, township, village, or city | 18 | 39% | 18 |
| VT | 53 | Private | 52 | 98% | 30 |
| | | State | 28 | 53% | 14 |
| | | Club/Organization | 31 | 58% | 22 |
| | | Federal lands | 19 | 36% | 18 |
| | | County, township, village, or city | 26 | 49% | 17 |

**Issues and Concerns of Respondents**

Respondents were asked to write in the three most important issues (in their opinion) facing OHV riders today. The most common responses were the lack of legal riding areas (64% of respondents), public land closures to OHVs (26%), and negative perceptions of OHVs and riders due to noise (25%; Table 7). In addition, respondents were asked to identify concerns that they have about OHV riding on public lands in the northeast United States. The two most prevalent concerns were that limited areas for riding were concentrating use in legal riding areas, leading to crowding and safety concerns (41%), and that land closures were causing an increase in riding in areas where OHVs are not permitted (25%; Table 8).

**Table 7.** Most important issues facing OHV riders today (n = 373). Only issues mentioned by ten or more respondents are included.

| In your opinion, what are the three most important issues facing OHV riders today? | Number of respondents indicating item | Percent of respondents |
|---|---|---|
| Lack of legal riding areas or trails. | 235 | 63% |
| Public land closures; land used by OHVs disappearing. | 97 | 26% |
| Negative perception of motorized recreation by non-riders due to noise. | 92 | 25% |
| Negative public/agency perception of dirt bikes and the impacts they cause. | 87 | 23% |
| Improper behavior of some riders leading to negative public perceptions (need for rider education). | 60 | 16% |
| Difficulty in finding legal places to ride. | 50 | 13% |
| Negative environmental & social impacts associated with riding (e.g., trash, dealing with other users). | 47 | 13% |
| Expenses associated with riding (registration fees, law suits, trail construction costs, fines). | 47 | 13% |
| Unsafe, overcrowded riding areas. | 43 | 12% |
| Anti-OHV politicians/legislation. | 40 | 11% |
| Overregulation of OHV riding due to a lack of caring about riders by public agencies & legislators. | 39 | 10% |
| Lack of legal places to ride leading to trespassing. | 38 | 10% |
| Concerns about OHV registrations (difficulty registering motorcycles; registration fees not used for the benefit of OHVs). | 32 | 9% |
| Environmental damage caused by ATVs leading to negative perceptions of OHMs. | 16 | 4% |

**Table 8.** Concerns about OHV riding (n = 330). Only concerns mentioned by ten or more respondents are included.

| What concerns do you have about OHV riding on public lands in the northeast United States? | Number of respondents indicating item | Percent of respondents |
|---|---|---|
| Limited public space for OHV use concentrating use too much in legal riding areas (safety and crowding concerns). | 134 | 41% |
| Land closures to OHVs, resulting in more illegal activities. | 84 | 25% |
| The need for riders to respect wildlife and other riders in order to prevent more land closures to OHVs. | 37 | 11% |
| The decreasing tolerance for motorized recreation by the public and politicians. | 31 | 9% |
| Enforcement of rules and regulations is needed to improve the public's perception of OHV riding. | 25 | 8% |
| Increasing registration fees | 24 | 7% |
| Damage caused by ATVs leading to negative public perceptions of OHMs. | 24 | 7% |
| The disappearance of open space for riding. | 23 | 7% |
| The need to register all OHVs. | 21 | 6% |
| Increases in numbers of riders is causing increased impacts and negative perceptions of riding, resulting in more land closures. | 20 | 6% |
| The lack of legal riding areas causing illegal behaviors. | 17 | 5% |
| Negative public perception of motorized recreation due to noise. | 16 | 5% |

**Participation in Trail Maintenance**

OHV riders were asked to characterize their participation in trail work and/or maintenance. Of those returning surveys, 71% (265 respondents) reported that they had assisted or were planning to assist with projects; 29% (109) stated that they had not done so. However, for those who had not done so, 94% indicated that they would be willing to do so in the future (n = 108). Individuals who reported participation in some sort of trail work or maintenance in 2007 were also asked to describe the type of land on which they had worked. Sixty-one percent of respondents indicated that they had worked on private lands, 26% on OHV club lands, 25% on state lands, 9% on federal lands, and 3% on other types of lands (n = 377).

**Management Preferences**

OHV riders were asked to indicate their level of preference for various management approaches. Table 9 provides results pertinent to both behaviors. Overall, the means for each of the types of management indicate that respondents prefer educational management strategies (e.g., informing them about regulations at trailheads) over strategies related to the enforcement of regulations (e.g., ticketing).

**Table 9.** Management preferences of OHV riders that apply to the behaviors of riding on trails on which OHVs are prohibited, and developing and/or using unauthorized trails.

| Behavior to which management strategy applies | Type of management | Number of responses (n) | Average[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, etc…) while riding | 375 | 1.5 |
| | Educating OHV riders about how easy it is to make minor changes in their actions during a ride that can reduce negative impacts | 374 | 1.5 |
| | Informing OHV riders at trail access areas of regulations concerning the public trails on which OHV use is permitted | 374 | 1.5 |
| | Listing regulations at all or most access areas so that OHV riders can easily identify public trails designated for public use | 376 | 1.6 |
| Riding on trails on which OHVs are prohibited | Educating OHV riders about the amount of negative impacts that will occur if they ride on public trails where OHV use is prohibited | 372 | 1.2 |
| | Educating OHV riders about the high probability that negative impacts will occur if they ride on public trails where OHV use is prohibited | 373 | 1.2 |
| | Informing OHV riders of the dollar amount of the fine they will receive if they break regulations that prohibit riding on certain public trails | 375 | 1.0 |
| | Informing OHV riders of the high probability that they will be ticketed if they break regulations that prohibit riding on certain public trails | 375 | 1.0 |
| Creating and/or using unauthorized trails | Educating OHV riders about the amount of negative impacts to natural resources caused by the development and/or use of unauthorized trails | 376 | 1.2 |
| | Educating OHV riders about the high probability that negative impacts to natural resources will occur if they develop and/or use unauthorized trails | 376 | 1.1 |
| | 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 | 374 | 1.0 |
| | Informing OHV riders of the high probability that they will be ticketed if they break regulations concerning the development and/or use of unauthorized trails | 374 | 1.0 |

[a] Means are based on a five point scale of -2 (strongly not favored) to 0 (neutral) to 2 (strongly favored).

**Attitudes Towards Behaviors**

Attitudes of the respondents were broken down into five different attitude components according to previous research (Bright & Mandfredo, 1996) and the results of the factor analysis. Tables 10 through 12 present the averages for these components on a scale of -2 (strong disagreement) to 0 (neutral) to 2 (strong agreement). Overall, respondents had very high and positive attitudes concerning OHV riding (component mean of 1.6), OHVs (1.7), and their knowledge of OHVs (1.6; Table 10). Positive and moderate attitudes were identified for respondents' perceptions of the outcomes of both behaviors (component mean of 1.2 for the behavior of operating an OHV on trails where OHVs are prohibited; 0.9 for the development and/or use of unauthorized trails; Tables 11 and 12). Negative and moderate attitudes were identified towards the use of OHVs for the behaviors by other riders (component means of -0.8 for operating an OHV on trails where OHVs are prohibited and -0.6 for the development and/or use of unauthorized trails; Tables 11 and 12) and the emotional response of respondents towards the two behaviors by other riders (component means of -0.6 for operating an OHV on trails where OHVs are prohibited and -0.6 for the development and/or use of unauthorized trails). Overall, OHV riding is an important activity for the average respondent, the average respondent understands what will happen (i.e., negative social and environmental impacts) if they engage in either of the two behaviors, and the average respondent does not look favorably upon other riders engaging in either of the two behaviors.

**Table 10.** Attitudes of OHV riders that apply to both behaviors.

| Attitude component | Statement used on questionnaire | Number of responses (n) | Statement average | Component average |
|---|---|---|---|---|
| Attitudes towards OHV riding in general[a] | It's important that other people have the opportunity to ride an OHV on public land if they wish. | 371 | 1.7 | 1.6 |
| | It's important to permit OHV use in public natural areas in the northeastern United States. | 370 | 1.6 | |
| | OHV riding experiences should be permitted on public lands in general. | 372 | 1.6 | |
| Attitudes towards personal experience with OHVs [a] | Riding an OHV is a very enjoyable experience. | 374 | 1.9 | 1.7 |
| | I know a great deal about OHVs in general. | 373 | 1.5 | |
| | I know a lot about the positive and negative impacts associated with OHV use. | 374 | 1.5 | |
| | I have extensive experience with riding OHVs. | 374 | 1.7 | |
| Attitudes towards OHVs[b] | In general, is your attitude towards OHVs positive, negative, or neither? | 372 | 1.6 | 1.6 |
| | In general, do you like, dislike, or have no opinion about OHVs? | 372 | 1.7 | |
| | Do you think OHVs in general are good, bad, or neither? | 372 | 1.4 | |

[a] Means are based on a five point scale of -2 (strongly disagree) to 0 (neutral) to 2 (strongly agree).

[b] Means are based on a five point scale of -2 (strongly negative/dislike/bad) to 0 (neutral) to 2 (strongly positive/like/good).

**Table 11.** Attitudes of OHV riders that apply to the behavior of "operating an OHV on trails where OHVs are prohibited."

| Attitude component | Statement used on questionnaire | Number of responses (n) | Statement average | Component average |
|---|---|---|---|---|
| Perceptions of the outcomes of this behavior[a] | I know that riding an OHV on public trails where OHVs are prohibited can result in conflicts between OHV riders and other trail users. | 373 | 1.6 | 1.2 |
| | I know that riding an OHV on public trails where OHVs are prohibited can result in trail erosion. | 374 | 1.1 | |
| | I think that riding an OHV on public trails where OHVs are prohibited is never okay, even in areas with few other OHV-riding opportunities. | 374 | 0.8 | |
| | I know that riding an OHV on public trails where OHV use is prohibited could result in me being ticketed. | 373 | 1.3 | |
| | I care that riding an OHV on public trails where OHVs are prohibited could result in harm to the environment and/or the disturbance of other users. | 373 | 1.2 | |
| Attitudes towards the use of OHVs for this behavior[b] | Do you think that OHV use of public trails where OHV use is prohibited is good, bad or neither? | 368 | -0.7 | -0.8 |
| | Do you have a negative, positive, or neutral opinion of other OHV riders who use public trails where OHV use is prohibited? | 371 | -0.8 | |
| | Do you approve, disapprove, or have no opinion about other OHV riders who use public trails where OHV use is prohibited? | 372 | -0.8 | |
| Emotional responses towards this behavior[c] | In general, how willing or unwilling are you to have other OHV riders use public trails on which OHV use is prohibited? | 369 | -0.6 | -0.6 |
| | In general, how annoyed or pleased are you with having other OHV riders use public trails on which OHV use is prohibited? | 369 | -0.7 | |
| | In general, how unenthusiastic or enthusiastic are you for having other OHV riders use public trails on which OHV use is prohibited? | 370 | -0.7 | |

[a] Means are based on a five point scale of -2 (strongly disagree) to 0 (neutral) to 2 (strongly agree).

[b] Means are based on a five point scale of -2 (strongly negative/disapprove/bad) to 0 (neutral) to 2 (strongly positive/approve/good).

[c] Means are based on a five point scale of -2 (strongly unwilling/annoyed/unenthusiastic) to 0 (neutral) to 2 (strongly willing/pleases/enthusiastic).

**Table 12.** Attitudes of OHV riders that apply to the behavior of "the development and/or use of unauthorized trails."

| Attitude component | Statement used on questionnaire | Number of responses (n) | Statement average | Component average |
|---|---|---|---|---|
| Perceptions of the outcomes of this behavior[a] | I know that the development and/or use of unauthorized trails by other OHV riders bothers or disturbs other public areas users. | 373 | 1.1 | 0.9 |
| | I know that OHV rider development and/or use of unauthorized trails results in soil erosion and loss of vegetation where the trails are created. | 373 | 0.8 | |
| | I think that developing and/or using unauthorized trails is never okay, even in areas with few other OHV-riding opportunities. | 374 | 0.5 | |
| | I know my development and/or use of unauthorized trails could result in me being ticketed. | 373 | 1.2 | |
| | I care that my development and/or use of unauthorized trails could result in harm to the environment and/or the disturbance of other users. | 373 | 1.0 | |
| Attitudes towards the use of OHVs for this behavior[b] | Do you think that the development and/or OHV use of unauthorized trails by other OHV riders is good, bad or neither? | 371 | -0.7 | -0.6 |
| | Do you have a negative, positive, or neutral opinion of the development and/or use of unauthorized trails by other OHV riders? | 369 | -0.6 | |
| | Do you approve, disapprove, or have no opinion about other OHV riders who develop and/or use unauthorized trails? | 369 | -0.6 | |
| Emotional responses towards this behavior[c] | In general, how willing or unwilling are you to have other OHV riders develop and/or use unauthorized trails? | 369 | -0.6 | -0.6 |
| | In general, how annoyed or pleased are you with having other OHV riders develop and/or use unauthorized trails? | 368 | -0.6 | |
| | In general, how unenthusiastic or enthusiastic are you for having other OHV riders develop and/or use unauthorized trails? | 368 | -0.6 | |

[a] Means are based on a five point scale of -2 (strongly disagree) to 0 (neutral) to 2 (strongly agree).

[b] Means are based on a five point scale of -2 (strongly negative/disapprove/bad) to 0 (neutral) to 2 (strongly positive/approve/good).

[c] Means are based on a five point scale of -2 (strongly unwilling/annoyed/unenthusiastic) to 0 (neutral) to 2 (strongly willing/pleases/enthusiastic).

**Intended Behaviors**

Table 13 displays the results of all questions related to the intended behaviors of the respondents. Questions addressed the two behaviors (i.e., riding on trails where use is unauthorized, and the development and use of unauthorized trails). Resulting means indicate that the average respondent had a moderate intention to behave in accordance with regulations. However, respondents' perceptions of other OHV riders were neutral to low, indicating that the respondents are less positive in their responses concerning the intentions of other riders. Overall, the average respondent intends to ride OHVs legally, but has a lower perception of the intentions of other OHV riders.

**Table 13.** Means of intended behaviors.

| Behavior | Variable | Number of responses | Statement average[a] |
|---|---|---|---|
| Both behaviors | Prior to a day of riding, I plan to stay on OHV-designated trails only | 373 | 1.0 |
| Use of trails on which OHVs are prohibited. | Prior to a day of riding, I never intend to ride on public trails on which OHVs are prohibited. | 370 | 0.9 |
| | I never knowingly use public trails on which OHVs are prohibited. | 373 | 0.6 |
| | Most OHV riders who use public trails on which OHVs are prohibited think the trails are designated for OHV use. | 372 | 0.0 |
| | Most OHV riders who use public trails on which OHVs are prohibited do so on the spur of the moment during a ride, rather than as an action pre-determined before their ride. | 372 | 0.5 |
| Development and/or use of unauthorized trails. | I never intend to use and/or develop unauthorized trails prior to a day of riding | 373 | 0.9 |
| | I never willingly develop and/or use unauthorized trails | 371 | 0.7 |
| | Most OHV riders who use unauthorized trails do not know that these trails are unauthorized (i.e., they think the trails are public). | 373 | 0.4 |
| | Most OHV riders who use unauthorized trails do so on the spur of the moment during a ride, rather than as an action predetermined before the ride | 372 | 0.4 |

[a] Means are based on a five point scale of -2 (strongly disagree) to 0 (neutral) to 2 (strongly agree).

**Focus Group Results**

The ten ATV club members who participated in the focus group session on March 11, 2008 in South Colton, NY provided important information related to the study. The focus group comments receiving full consensus of the participants are included in Table 14. It is important to note that the focus group session participants were all ATV riders. ATV riders were chosen in particular for the focus group session because of the high proportion of OHM riders in the survey sample and the need to obtain more input from the ATV community. The need for additional places to ride and the lack of connectivity between legal riding places were mentioned frequently during the session.

**Table 14.** Comments receiving consensus by focus group participants (n = 10).

| Concept | Comments |
|---|---|
| Concerns related to ATV riding | Need more legal places to ride. |
| | Need to connect legal riding places. |
| | Need to make ATV use safe and legal. |
| | ATV registration fees are not used for trail development and maintenance (frustrating to riders). |
| | Image of ATV riders used by ATV manufacturers (e.g., tearing through terrain) increases negative public perception of the sport and encourages destructive riding practices. Changes in advertising for ATVs is needed. |
| | Conflicting laws regarding ATV use on paved roads in NY (ATVs not permitted but ATVs are permitted when a connection is needed between two trails). |
| | ATVs considered a motor vehicle rather than a recreational vehicle (problems with road use). |
| | Liability concerns exist for the use of private property for riding events. |
| | Frustration over paying club fees but still having no connecting roads open, regardless of extensive club efforts. |
| Management considerations | Damage to trails caused by ATVs can be repaired through maintenance. |
| | Harden surface of trails when possible. |
| | Encourage use of ATVs that are quieter (4-stroke). |
| | Create noise buffers with vegetation adjacent to trails. |
| | Increase trail maintenance to repair trail erosion on a regular basis. |
| | Separate ATV, OHM, and SUV trails because of the different tracks they cut. |
| | Have volunteers willing to do trail maintenance, but need the trails to do it on. |
| | Require use of less aggressive tires where needed. |
| | Host safety programs for new and young riders. |
| | Encourage self-policing by clubs (e.g., safety patrols on club rides). |
| | Install trailhead kiosks, traffic signs, use limitation signs, and trail makers to encourage correct use of riding areas. |
| Behavior of use of trails on which OHVs are prohibited | Discouraged by the club because it continues negative perceptions of ATV riders. |
| Behavior of unauthorized trail development and use | Difficult for ATV riders to go off trail because of vehicle width. |
| | Riders concerned about protecting expensive equipment that could be damaged by going off-trail. |

## DISCUSSION

The attitudes and perceptions of OHV riders participating in this study provide essential clues for riders and natural resource managers seeking to understand key issues relating to OHV riding and its future in the northeastern United States. Detailed information regarding who is riding OHVs, the types of OHVs being operated, riding locations by state and land type, the social structure of riding groups, levels of involvement in trail maintenance, and preferences for management approaches combine to form a better understanding of the northeastern OHV community as represented by this sample of NETRA members. This understanding may enable public land managers to better facilitate riding opportunities for this group of recreationists.

The study revealed that OHV riding is a largely social activity. Large percentages of respondents rode with their friends (97%) and other club members (67%), while moderate percentages of respondents also rode with their significant other (16%), children (43%), and other relatives (21%). The percentage of respondents riding with their spouse or significant other was greater for those who rode both an ATV and OHM (38%) as compared to those who only rode an OHM (9%). A similar but slight difference was also noted for respondents who rode with their children (i.e., 48% of ATV/OHM riders rode with their children as compared to 41% of respondents who only rode OHMs). For most respondents, OHV riding is a highly social activity often done with friends, family, or both. Riding locations that provide opportunities for social interaction among riders (e.g., riding events and group campgrounds) would likely enhance participation in this sport. In addition, because family involvement appears to be an important component of the OHV experience for many riders, it is important that any information provided to riders takes into account the different ages, genders, and educational levels of family members.

The type of land used for riding by respondents indicates some important considerations for OHV riders and land managers. The majority of those who responded to the survey reported riding on private or club owned lands (89%), state lands (71%), and organization-owned lands (60%). The lack of and/or limited amount of available land to ride on was identified as the number one concern of survey respondents. Some respondents indicated that the limited number of legal riding areas was contributing to the increase in the use of OHVs in areas not open to OHVs. In addition, focus group participants identified connectivity between OHV trails as a major problem. Classification of ATVs and OHMs as motor vehicles (rather than as recreational vehicles such as snowmobiles) makes obtaining road access for OHVs difficult in many areas, unless special road use permits are obtained. The lack or limited number of riding areas and poor connectivity between riding areas is likely to become more of a concern in the future as land development in the northeast continues.

The management preferences of survey respondents are also important to note. Educating riders both about reducing social and environmental negative impacts, and about the location of legal riding areas were rated moderately high by respondents, while informing riders about ticketing and enforcement of regulations were rated slightly lower. Engaging OHV riding clubs in trail maintenance and management efforts on public lands could be beneficial to both riders and managers. The majority of survey respondents reported either having already participated or being interested in participating in some type of trail work in support of their sport. This is vital information for resource managers seeking to find assistance for the creation and maintenance of OHV trails and other facilities. Engaging the riding community more in trail and riding area maintenance could also help to reduce trail erosion, improving the public's perception of OHV

riders (another major concern of respondents). In addition, clubs could assist with hosting OHV safety education programs and with self-policing of trails and riding events (some clubs already do these types of activities).

The attitudes of OHV respondents were broken down into five separate components based on previous research (Bright & Manfredo, 1996). Respondents rated their attitudes towards OHV riding in general, their personal experience with OHVs, and OHVs in general high (1.6 to 1.7 on a scale of -2 to 2), indicating very positive perceptions of OHV riding. Attitudes were moderate concerning perceptions of the outcomes (i.e., social and environmental impacts) of both behaviors (an average of 1.2 for operating OHVs on trails where OHVs are prohibited and 0.9 for the development and/or use of unauthorized trails). When asked for input regarding the use of OHVs for the two behaviors by other riders, moderately negative responses were given, indicating that most respondents do not like to see others engaging in these behaviors. In other words, OHV riding is an important activity for the average respondent, the average respondent understands what will happen (i.e., negative social and environmental impacts) if he/she engages in either of the two behaviors, and the average respondent does not look favorably upon other riders engaging in either of the two behaviors.

With regard to the intended behaviors of respondents, the average respondent moderately agreed that he/she did not intend to engage in either of the behaviors prior to a ride. Respondents had different perceptions of the intentions of other riders, however. For riding on trails on which OHV use is prohibited, respondents had a low to neutral response indicating that they had no opinions about the intentions of other riders; a similar response was obtained for the use of unauthorized trails by other riders.

Both focus group participants and survey respondents identified that negative public perceptions of OHVs and OHV riders was a major problem, leading to land closures and anti-OHV policies on public lands. Both groups indicated that inexperienced riders (i.e., those who have not been educated about riding practices that reduce negative environmental and social impacts) may be influencing these negative public perceptions. Educational efforts designed to teach new riders what not to do while riding could benefit all OHV riders in the future by reducing negative impacts on the environment and improving public perceptions of the sport.

It is important to note some limitations of this study. First of all, the survey included only NETRA members. OHV riders who are within other organizations or not in any riding-related organization may have different perspectives on the concepts included in this study. Organization members may also receive more information about safe and legal riding opportunities through club newsletters and list serves than riders who are not in OHV clubs. Second, the high percentage of survey respondents using OHMs should be noted. There are likely differences in attitudes and perceptions between riders who use OHMs as compared to those who only use other types of vehicles (e.g., ATVs and SUVs). Third, obtaining a clear understanding of the average number of rides by OHV riders on each type of land (e.g., private, state, federal) is difficult in the northeast since riders frequently ride across different types of lands during a single day of riding. This overlap between types of lands used by OHV riders needs to be considered when interpreting results related to the average number of rides on each type of land (e.g., one ride on federal land and one ride on state land may have actually taken place during a single day). Finally, due to the low number of respondents from New Jersey and moderate number from Maine, this study is not representative of riders within these states.

## CONCLUSION

In conclusion, it is essential that OHV clubs and natural resource managers work closely together in the future to ensure quality OHV riding experiences while maintaining the natural resource base and providing quality recreational experiences for other users. Several policy and management strategies could be considered. First, the lack of public access in several states is a problem for OHV riders and managers alike. According to the respondents of the survey, the limited amount of public access for OHV riding may be leading to increased crowding at legal riding areas, safety concerns related to crowding, and an increase in illegal riding (i.e., some riders may feel that they don't have a choice but to ride illegally due to the lack of public access). A lack of connectivity between riding areas may be exacerbating the access problem, making it difficult for OHV riders to easily complete a route without illegally riding on the road. The use of dual sport OHMs (which can legally ride on paved roads) may be one solution to this problem for some OHM riders, but is not applicable to ATVs and other OHMs. Policy changes (e.g., designating ATVs and non-street-legal OHMs as recreational vehicles, or opening some important access roads and trails to OHVs) could reduce this problem.

Second, the need for education about safe riding (especially for young and new riders) was noted both by survey respondents and focus group participants. Educational programs organized and supported by OHV rider groups and sponsored by management agencies could teach new riders about how to reduce OHV-related impacts on the environment and on the recreational experiences of other users, and about the safe use of OHVs. Existing educational resources and workshops (such as those offered by the National Off-Highway Vehicle Conservation Council; NOHVCC, 2008) could be adapted for local use by OHV clubs with assistance from natural resource managers.

Third, the design of trails for different types of vehicles needs to be considered. As indicated by focus group session participants, use of the same trails by ATVs, OHMs, and SUVs is not preferred by riders due to the different track made by the different vehicles. Trail widths are also of important consideration as wider trails are required for ATV use and SUVs, while narrower trails are often preferred by OHMs. Alternative trail designs that suit different vehicles, the use of trail hardening and one-way trails where feasible, and creating separate trails for different types of vehicles should be considered to enhance riding experiences.

Finally, in these times of government agency budget reductions, engagement by OHVs riders in the maintenance of public riding areas is essential in order to maintain OHV trails, promote safe use of public riding areas, and limit erosion. Overall, an increased level of collaboration is needed between OHV riders and natural resource managers in the future in order to ensure quality recreational experiences on public lands in the northeast for all users, and to maintain the natural resource base on which these quality experiences are dependent.

## ACKNOWLEDGMENTS

The authors wish to thank the Board of Directors of NETRA for their assistance with this study. Specifically, thanks to Len Howard, Jerry Shinners, and Jim and R.J. Sherman for their extensive help with the mailing and review of the survey, to the members of the Sunday Rock ATV Club for their participation in the focus group session and review of the survey, to all the NETRA

members who participated in the survey, to the many natural resource managers throughout the northeast who provided input into this study, and to the National Off-Highway Vehicle Conservation Council for the use of two of the photos on the front cover (i.e., right and left photos). Thanks to the USDA McIntire-Stennis Program for funding this research project.

## REFERENCES

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology,* 52, 27-58.

Ajzen, I., & Driver, B.L. (1992). Application of the Theory of Planned Behavior to leisure choice. *Journal of Leisure Research,* 24(3), 207-224.

Bright, A. D., & M. J. Manfredo. (1996). A conceptual model of attitudes toward natural resources issues: A case study of wolf reintroduction. *Human Dimensions of Wildlife, 1* (1): 1 - 21.

Cordell, H. K., Betz, C. J., Green, G., & Owens, M. (2005). *Off-highway vehicle recreation in the United States, regions, and states: A national report from the National Survey on Recreation and the Environment.* USDA Forest Service, Southern Research Station.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method (2nd ed.).* Hoboken, NJ: John Wiley and Sons, Inc.

Hair, J. F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate data analysis* (fifth edition). Prentice Hall: Upper Saddle River, NJ.

Hines, J., Hungerford, H., & Tomera, A. (1987). Analysis and synthesis of research on environmental behavior: A meta-analysis. *Journal of Environmental Education*, 18, 1-8.

Hrubes, D., Ajzen, I., & Daigle, J. (2001). Predicting hunting intentions and behavior: An application of the Theory of Planned Behavior. *Leisure Sciences, 23,* 165-178.

Maddux, J.E. & Rogers, R.W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology,* 19, 469-479.

National Off-Highway Vehicle Conservation Council (NOHVCC). (2008). Tools and materials. Available online at "www.nohvcc.org/education/tools.asp".

Rogers, R.W. (1985). Attitude change and information integration in fear appeals. *Psychological Reports,* 56, 179-182.