WISCONSIN ALL TERRAIN VEHICLE OWNERS: RECREATIONAL MOTIVATIONS AND ATTITUDES TOWARD REGULATION

by

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Abstract

Between October and November of 2006, a mail survey was sent to 1000 people who registered an All Terrain Vehicle (ATV) in Wisconsin. The survey measured a range of variables including riding habits, site preferences, recreational motivations, attitudes towards regulation, environmental value orientations, willingness to pay and demographics. In total, 519 surveys were successfully completed and returned with a final useable response rate of 57%. Multivariate analysis revealed that there are three major subgroups of recreational users on public land: 20.7% who use their ATV in support of another activity such as hunting or fishing, 37.5% who use their ATV to explore trails and 15.7% who use their ATV to experience thrill and excitement. Additional multivariate analysis revealed that public land users support for regulation is best predicted by intrinsic factors including environmental value orientations, age, concern for others and self-identification with their ATV. External influences such as respondents' ATV club membership and past participation in a safety course had no influence on support for regulation. Univariate results indicated that on average 83.9% of respondents trailer their ATV less than 125 miles to ride, 75.8% ride at least some of the time on their own land and 29.3% do not ride on public land. In addition, 26.4% agreed that they would rather ride a snowmobile if there is snow and 65.3% indicated they prefer to ride completely off trail or on user created trails. Respondents had a mean age of 46.49 years old, 85.2% live in an area with less than 20,000 people, 19.6% have completed a Wisconsin DNR safety course and 8.7% belong to an ATV club.

Table of Contents

List of Figures

List of Tables

Introduction

American public resources agencies are charged with many responsibilities of which two stand out as particularly important. First, they are required to provide goods and services to the current population. Second, they are responsible for ensuring a supply of the same public resources for future generations. As cornerstones of the public trust doctrine, agencies have continually struggled to reconcile the often-contradictory demands of each.

In fulfilling the first responsibility, agencies must balance the conflicting needs, meanings and goals of the people to whom goods and services are being provided. This requires both an extensive, scientific understanding of the resource as well as an extensive, scientific understanding of the population. Furthermore, ever-shifting societal trends require public resource providers to continually assess and evaluate both past and emerging demands of the public. In failing to do so, agencies run the risk of providing goods and services that few people want or neglecting those that are in high demand. Yet, the inequitable distribution of influence often conflates true societal demand with the wishes of a vocal minority. Accurate understanding of societal demand is therefore imperative to ensuring the equitable allocation of scarce public resources.

To fulfill their responsibility in preserving the long-term viability of their resources, agencies sometimes need to manage public access to public resources for the public's own good. This is often accomplished through a combination of two policies: directly limiting access through law enforcement and by encouraging people to moderate their own behavior. While direct limitation is often quite effective, it can be costly and poorly

received by those whose access to the resource is being limited. This presents a significant challenge to agencies with limited budgets and poor public images, greatly increasing the importance of the public's willingness to modify their own behavior. Consequently, understanding the factors that promote or hinder this willingness is imperative to the long-term preservation of public resources.

Among contemporary conservation issues, the management of All Terrain Vehicles (ATV) exemplifies the public land agency responsibility to balance the provision of goods and services with long-term stewardship. First, the nature of ATV stakeholders has continually evolved and shifted as technological advances and increases in popularity have altered their usage. Further complicating understanding of this complex set of stakeholders is the active and vocal advocacy of some user groups. As a result, the demands and needs of all ATV users have often been difficult to assess and meet. Second, the power, versatility and maneuverability of ATVs have contributed to ecological damage and social conflict undermining the long-term viability of both ecological and recreational resources. Consequently, public land agencies have developed rules and regulation intended to minimize the ecological and social impacts of ATV use. As with any user group, support for these restrictions has varied greatly. Managing ATVs on public land is perhaps without equal in illustrating the challenges faced by public resource agencies that supply opportunities for recreation.

This study was undertaken with two major goals: 1) to expand the scientific understanding of public land ATV users and 2) to provide specific information usable to those engaged in public land ATV management. This work is comprised of four main

parts. Part One explores the recreational motivations of ATV users with the goal of identifying unique demands of stakeholder sub-groups. The primary goal of this section is to accurately define current demand for ATV recreation on public land. Part Two examines factors that either promote or hinder user support for ATV management. The primary goal of this section is to identify opportunities for long-term preservation of recreational resources. Each of these two parts has been written in a format designed for individual submission to two separate peer-reviewed, scholarly journals. Since each of these journals has different requirements, each part contains its own reference section. Part Three is an account of additional major findings not included in the first two parts. Finally, Part Four presents conclusions drawn from the previous three sections. Appendices include raw results from the survey, a copy of items included in the survey mailing and a map of the respondents in relation to Wisconsin ATV trails.

Wisconsin ATV owners were chosen as subjects for this study given their proximity and familiarity to the researcher. ATVs were chosen from the broader population of Off Highway Vehicle users because of ATV's numerical predominance, combined with their logistical accessibility, makes them the best candidates for studying off-highway vehicle use on public lands. Finally, a mail survey was chosen as the primary tool of this study because it provided for the most cost-effective, direct and unmediated interaction with the subjects.

Part 1 - Recreational Motivations of Wisconsin ATV Users

Motorized access on public lands has always been a double-edged sword. On one side, it allows people to access wild and natural places helping them escape the increasingly modern world. On the other side, motorized access brings the increasingly modern world to wild and natural places. As Aldo Leopold (1925, p.129) pointed out, "Motor cars are of course the very instruments which have restored to millions of city dwellers their contact with the land and with nature. For this reason and to this extent they are a benefaction to mankind. But even a benefaction can be carried too far." Allowing easy access to remote places, the automobile was critical to the development of outdoor recreation. (Sutter, 2002; Wellman and Probst, 2004) Some early motorists used their automobiles to reach remote hunting and fishing grounds, others outfitted their automobiles as early mobile campers and others used their automobiles to drive for leisure through the nation's new national parks, parkways and forests. Consequently, the difficulty in accommodating these varied uses and motivations has situated motorized access as one of the most challenging issues in the management of outdoor recreation on public lands. (Sutter, 2002)

As the automobile redefined outdoor recreational use at the beginning of the twentieth century, Off Highway Vehicles (OHV) are doing the same at the beginning of the twenty-first. The versatility and utility of OHVs has likewise resulted in increased conflicts among recreational users and increased ecological damage to previously remote places. Holsman (2004, p. 417) summarized this simply by stating that OHV use "is poised to become the most contentious issue in the outdoor recreation arena if it isn't already." To

meet the needs of this new stakeholder group, it necessary to understand the recreational experiences they are seeking from public lands. By understanding these recreational demands, managers will be better prepared to assess their own capacity to supply recreational opportunities that do not diminish resource viability.

Background

In 1960, "off-highway motorized recreation was not even on the 'radar' as a recreational activity." (Cordell et al, 2005) Yet by 1972, use of jeeps, dirt bikes, dune buggies and other vehicles had increased to the point that President Nixon issued Executive Order 11644 directing federal land agencies to develop policies regarding the use of off highway vehicles. (Havlick, 2002) In the 1970's, snowmobiles and dirt bikes were the most prevalent OHV subcategories limiting most recreational use to areas with sufficient snowfall or to those users skilled and daring enough to ride a dirt bike. It was not until the invention of All-Terrain Vehicles (ATV) that OHV recreation began to drastically increase. Initially, sales of the early three-wheeled ATVs were limited because of safety concerns. Manufacturers eventually responded to governmental pressure in 1988 to stop production of three-wheeled ATVs and produce only the new, more stable four-wheeled ATV. While this was intended for safety, it effectively became a governmental endorsement of four-wheeled ATVs. (Havlick, 2002) These events triggered a dramatic expansion in sales. Between 1995 and 1999, American ATV sales nearly doubled from 277,800 to 545,900 and grew to 799,400 by 2003. (Cordell et al, 2005) In Wisconsin alone, public land ATV registrations more than quadrupled from 56,000 in 1993 to over 230,000 in 2006. (WDNR, 2007) By 2005, ATVs accounted for over 70% of all OHV use. (Cordell et al, 2005)

For many outdoor recreationists, OHV use provides “the same sort of sport and mechanized intimacy with the landscape that early motorists prized.” (Sutter, 2002, p.257) For these users, the old maxim holds true that 'the journey matters most, not the destination'. With high participation in nearly all outdoor activities (Cordell et al, 2005), it is difficult to discern where the OHV user's journey ends and their destination begins. On one hand, OHV use may be an activity in and of itself like the early motor-tourists enjoyed along the Yellowstone Trail or Blue Ridge Parkway. For these users, the OHV is a primary component of their activity. (English, Kocis and Hale, 2004) On the other hand, there are those for whom OHVs are merely a secondary component that allows, simplifies or enriches a separate pursuit. A user might use their OHV as transport to remote fishing holes, a hunter might use their OHV to transport big game carcasses or a physically challenged OHV user might use their OHV for bird watching. However, these primary/secondary categories represent ends of a spectrum and do not assess the full scope of recreational activities undertaken within all OHV use. It is this range and variation of use that make OHV stakeholders so difficult to understand and approach. Dombeck, Wood and Williams (2003) suggest “by working with communities of interest and communities of place, OHV users and public land agencies can achieve mutually agreeable policies that protect the land.” For this to occur, we must better understand different OHV stakeholder groups.

Conceptual Framework

Conflict between management and user can occur when rules and regulations interfere with recreational users' goals or expectations. (Schreyer, 1990) Therefore, understanding users' motivations for recreation should help managers anticipate potential responses to their decisions. To measure these motivations, the 'experiential approach' to leisure motivation research provides a well-tested and effective model. (Manfredo, Driver and Tarrant, 1996) This research tradition has theorized that achievement of a desired psychophysical state motivates a person to seek a specific recreational experience. (Driver, 1976) Under this model, two users engaging in similar activities could potentially be seeking different psychophysical states. This is important because seemingly minor rule changes may not affect one user while directly conflicting with the motivations of the other.

Previous research provides some insight to the general characteristics of OHV users. Some studies indicate that a need for excitement, thrills and a challenging ride are primary motivations. (Rogers, 1999; Schuett, 1998) Others have found that a large number of users use their vehicles to assist with hunting. (Nelson, Lynch and Stynes, 2002; Fischer et al 2001) Finally, other research indicates that OHV users have a strong affinity for natural environments. (Crimmins, 1999; Schneider and Schoenecker, 2005; WI Dept of Tourism, 2003) A review of ATV magazines, club websites, manufacturer advertisements, previous user research as well as comments submitted to governmental rule making and stakeholder meeting records (USDA, 2000, 2005, 2005a) revealed eight meaningful motivations. Six of them (Sociability, Safety, Nature, Adventure, Autonomy, Excitement) have previously been identified in the Recreation Experience Preference

(REP) scales. (Driver, 1983) Two additional relevant motivations (Wildness, Utility) were identified that were not present in the REP scales yet developed for this study. Addition of new items in this manner is encouraged by the author of the REP scales. (Driver, 1983)

One unique feature of ATV riding that quickly appeared from the literature is that it can be both a means to escape society as well an activity undertaken in very large groups. The first motivation, sociability, was chosen to assess the extent to which users' riding is a group versus individual pursuit. A recurrent concern expressed by motorized users is that vehicular travel allows safe access to backcountry areas, particularly for older and less athletic users. Therefore, users' motivation to avoid danger was selected as a relevant motivation. The utility of ATVs was selected as a motivation that could indicate the secondary use of ATVs in support of separate recreational activities. From most sources, the general desire to be in a natural setting was a common reason given for using ATVs on public lands. However, this motivation lacks specificity. Therefore, the motivation to be in wild areas was also selected as a factor that could differentiate the general desire to be around natural features from the more specific desire to be in wild, undeveloped places. Another common justification for ATV use is that it allows people with limited time to experience new, remote places on public lands. The motivation for users to fulfill adventure was chosen to explore this observation. The motivation to undertake autonomous behavior was identified as a means to determine how strongly users were driven to escape rules, laws and social norms. Finally, much of the advertising and literature pertaining to ATV use stress the excitement it facilitates. Therefore, the motivation to experience excitement was chosen for study. While there

are certainly many more motivations that influence ATV user behavior, these factors were chosen because each was specifically relevant to ATVs as well as potentially meaningful to those involved in ATV management and planning. No other motivations identified in the literature review met these criteria.

A common trait in previous studies is that OHV riding is treated as a single activity. However, by homogenizing a highly diverse group of users, it is difficult to assess the often contradictory recreational goods and services demanded by them. Four *a priori* sub-groups were identified from the literature. First, there are ATV owners who use their ATV primarily to help with work and chores. Second, there are those who use their ATVs primarily to assist with other activities such as hunting and fishing. Third, some users engage in ATV riding primarily for the sake of riding in a natural setting. Finally, there are those who primarily ride ATVs for the thrill or rush of excitement it allows. Identification of these groups was based on evidence from many sources, but was particularly influenced by the observation that ATV manufacturers market ATVs explicitly for these specific four uses. This was justified by the assumption that manufacturers would be the best poised to understand and address sub-groups, if they in fact exist. The primary hypothesis of this study is that these *a priori* sub-groups of ATV users are separable by users' recreational motivations. Identifying these sub-groups may help facilitate management decisions by identifying more specific recreational experiences sought by public land stakeholders.

Methods

Data Collection

In the fall of 2006, an eight-page mail survey was distributed to 1000 people who registered an All Terrain Vehicle for public land use in the state of Wisconsin. The sample population was randomly drawn from an ATV registration mailing list purchased from the Wisconsin Department of Natural Resources. The survey was administered through three first class mailings: a full survey with a stamped return envelope, followed by a thank you/reminder postcard, followed by a second full survey mailing to those who had yet to respond. (Dillman, 1991) Eighty-two surveys were returned with undeliverable addresses, incomplete surveys or with respondents who no longer owned an ATV. In total, 519 surveys were returned with at least 60% of the survey completed, amounting to a final response rate of 57%.

Statistical tests for non-response bias were conducted comparing demographic data drawn from the ATV registrations as well spatial information gathered from GIS address encoding. Using information provided in the registration records, respondents were compared to non-respondents on information such ATV brand, ATV production year and registrant age. These tests revealed only one significant difference showing that respondents were slightly older on average (3.46 years) than non-respondents. This type of age difference is often expected in mail surveys. (Fowler, 2002) Addresses of the sample population were also coded to a latitude/longitude coordinate using a geo-coding process in ArcMap 13.0. They were subsequently assigned to the census block containing their address coordinate and the distance of each registrant from the nearest

Wisconsin ATV trail was calculated. This allowed the demographic data of population density, ethnic makeup, family composition and income to be assigned to each registrant. Significant differences in these categories may have indicated that respondents were biased toward certain socio-economic groups. However, no statistically significant differences were found between respondents and non-respondents on any of the spatial criterion.

The primary hypothesis of this study is that ATV users can be categorized into *a priori* sub-groups based on differences in recreational motivations. Discriminant Analysis is suitable for testing this because it can provide "separation of one group along one function… unrelated to separation along a different function." (Stevens, 2002, p.286) This will provide a means to understand which motivations best discriminate between each PRIMARY USE category while simultaneously identifying the discriminatory strength of each variable.

Measurement of Independent Variables

Each of the following recreational motivation variables were measured twice in the survey: 1) as a 1-8 rank ordering with 1 being the most important and 2) as a 1-4 importance rating scale with 4 being the most important. Unsure was coded as zero. All of the wording for each of these questions, except for UTILITY and WILDNESS are drawn directly from the Recreation Experience Scales developed by Driver. (1983) The motivations and survey questions that measured them are as follow:

SAFETY: 1) To be near help if needed, 2) To avoid the unexpected

SOCIABILITY: 1) To be with friends, 2) To be with members of my group

UTILITY: 1/2) To pursue another activity such as hunting, fishing, camping, etc.

NATURALNESS: 1) To be in a natural setting, 2) To be close to nature

WILDNESS: 1)To go to wild and unchanged places, 2) To see wild and untouched places

ADVENTURE: 1)To discover something new, 2) To experience new and different things

AUTONOMY: 1) To be free to make my own choices 2) To be my own boss.

EXCITEMENT: 1) To experience excitement, 2) To have thrills

A limitation of rank ordering questions is that they do not measure the intensity of the ranking. (Carroll and Lovejoy, 2005) For example, a respondent who cares deeply for an issue might rank the selections with a high importance on all of them. Conversely, another respondent might rank the selections in the exact same order yet placing low importance on all of them. Rank ordering has no capacity to discriminate between the two respondents' apparently equivalent rankings that are, in actuality, quite different. However, it is possible to compensate for this limitation if the variables are measured twice, once as a rank order and once as an importance rating. By doing this, each ranking can be weighted by its associated importance rating. (Carroll and Lovejoy, 2005) In this survey, each rank order response was reverse-coded and multiplied directly by its associated rating. The result was an Importance Weighted Ranking (IWR) that ranged from a no-importance/lowest-ranking measurement of 1 IWR to a highly-important/highest-ranking measurement of 32 IWR.

Measurement of Dependent Variables

If motivations are independent variables in the 'experiential approach,' then behavior can be seen as the dependent variable. (Driver, 1976) Given the dispersed nature of ATV use, it is logistically prohibitive to directly observe ATV user behavior without biasing study toward one type of user. Therefore, survey respondents were asked to identify the *a priori* 'PRIMARY USE' of their ATV.

1. A work vehicle to help with jobs and chores [Coded: WORK]
2. A recreational vehicle to help with hunting or fishing [Coded: HUNT]
3. A recreational vehicle for exploring trails and lands [Coded: TRAIL]
4. A recreational vehicle for excitement or thrills [Coded: THRILL]

Respondents were also provided with a write-in fifth option of "other." Only two respondents chose this response, both writing that plowing snow was the PRIMARY USE of their ATV. Both of these were coded as WORK. To clarify the intention of this question, the preceding question was asked in the same format, but directed respondents to select *all* manners in which they rode their ATV.

Respondents were also asked a range of questions regarding their riding behavior and preferences as well as their attitudes toward regulation. Likert scale measurements were used for several of these variables and answers were coded with 2='Strongly Agree', 1='Agree', 0='Unsure', -1='Disagree' and -2 ='Strongly Disagree.' SPSS 14.0.1 for Windows was used to conduct all statistical analysis.

Results

The most common PRIMARY USE among respondents that ride ATVs on public land was TRAIL at 37.7% (n=134). This was followed by WORK at 26.2% (n=93) and HUNT at 20.5% (n=73). The least common PRIMARY USE was THRILL at 15.4% (n=55). Respondents expressed significant variation in motivations based on their chosen PRIMARY USE. (Figure 1) For instance, those choosing HUNT as their PRIMARY USE had Importance Weighted Rankings (IWR) for UTILITY of 25.47 IWR as opposed to 8.35 IIWR for THRILL. Conversely, THRILL users scored UTILITY 8.39 IWR while scoring EXCITEMENT 21.39 IWR. TRAIL users did not have one particularly prominent motivation, but they did have the highest IWR scores of all groups on SOCIABIILITY, NATURE and ADVENTURE. The WORK users were very close to the between-group means of most motivations.

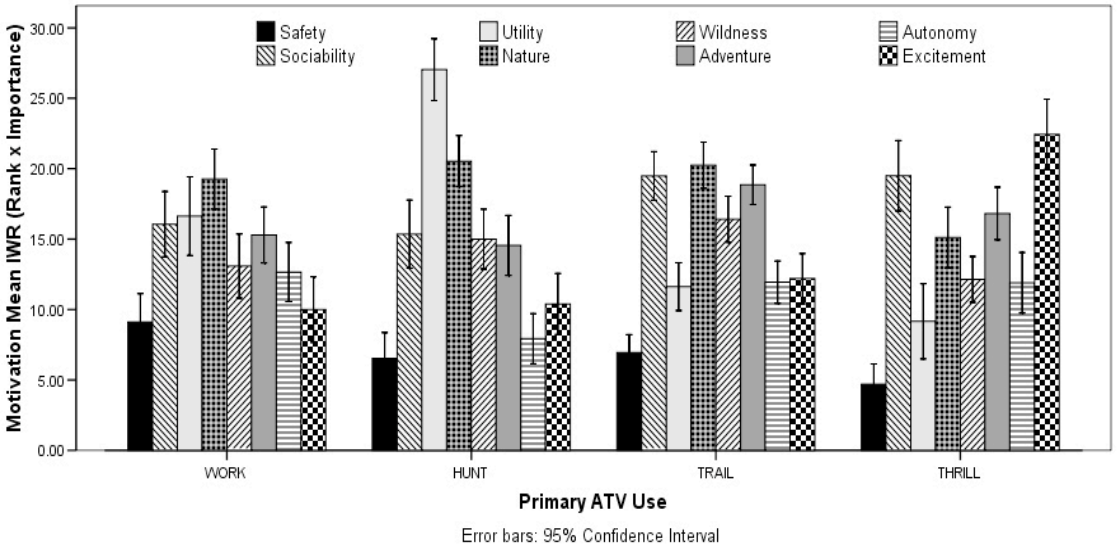

Figure 1 - Motivation Profiles by Primary Use

Variation in the between-group means was highly significant for all motivations with the exception of SAFETY. A notable result is that each PRIMARY USE category has at least one similar motivational IWR with every other PRIMARY USE category. (Table 1) Further analysis is necessary to understand the motivational convergence and divergence between these groups.

Table 1 - Recreational Motivation Importance Weighted Rank

	Group Mean Importance Weighted Rank					Wilks'		
Motivation	ALL	WORK	HUNT	TRAIL	THRILL	Lambda	F	Sig.
Safety	6.25	7.72	5.46	6.28	4.79	0.980	2.384	0.069
Sociability	16.34	14.27	13.77	18.33	18.41	0.954	5.704	0.001
Utility	14.68	15.35	25.47	10.89	8.39	0.739	41.585	0.000
Nature	18.17	17.39	18.65	20.10	14.21	0.955	5.599	0.001
Wildness	13.18	11.25	13.34	15.34	11.04	0.957	5.252	0.001
Adventure	15.24	13.77	13.05	17.29	15.66	0.957	5.255	0.001
Autonomy	10.14	11.28	6.96	10.79	10.89	0.960	4.866	0.002
Excitement	11.59	8.72	8.35	11.28	21.39	0.812	27.188	0.000

Discriminant Function Analysis

The IWR score for each of the eight motivations was selected as an independent variable. PRIMARY USE was selected as the grouping variable. Three discriminant functions were necessary to separate PRIMARY USE categories according to their IWRs. (Table 2) The Chi-square test for difference between means for each function indicates that although the discriminating capacity decreased by the third function, each function retains a highly significant discriminating effect.

Table 2 - Functions Used in Analysis

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	0.504	239.723	24	0.000
2 through 3	0.770	91.565	14	0.000
3	0.930	25.482	6	0.000

The Eigenvalues also show the diminishing yet significant effects with Function 1 explaining 65.0% of the variance and Function 2 explaining another 25.6%. (Table 3) While it explains a much smaller amount than the first two, Function 3 still accounts for 9.3% of the variance. Taken together, these three functions explain 100.0% of the variance between categories.

Table 3 - Eigenvalues of Functions

Function	Eigenvalue	% of Variance	Cumulative %
1	.527	65.0	65.0
2	.208	25.6	90.7
3	.076	9.3	100.0

The result of these three functions can be observed in their effect on each group's centroid position relative to the others. Function 1 creates much separation between HUNT on one side and TRAIL and THRILL on the other. (Figure 2) Function 2 separates THRILL from TRAIL and creates further separation between TRAIL and HUNT. Finally, Function 3 discriminates WORK from the other three categories.

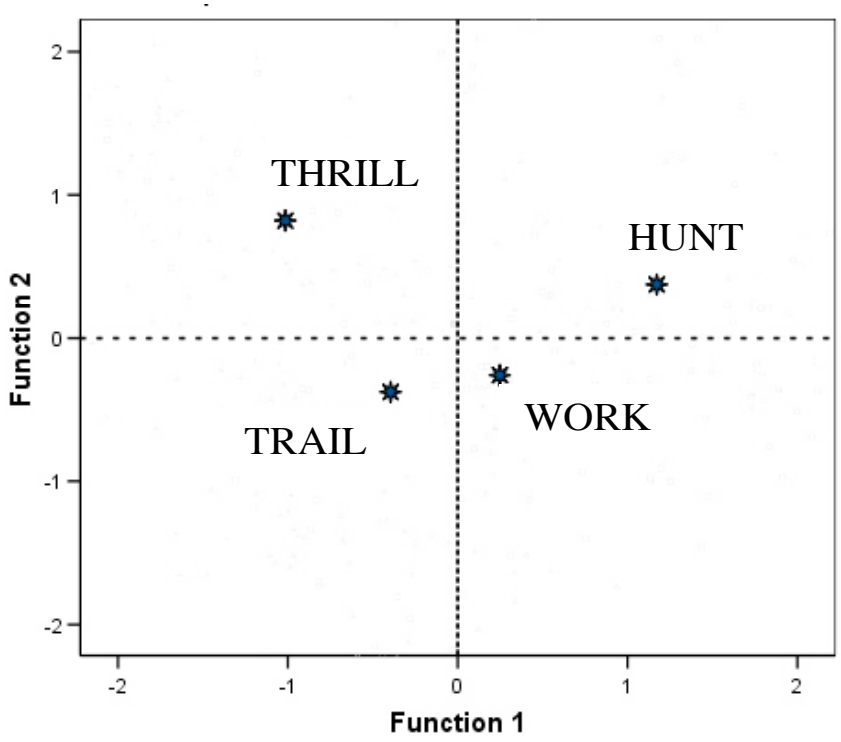

Figure 2 - Group Centroids Between Functions 1 and 2

The smaller effect of Function 3 can be seen in the separation of group centroids in Function 3. (Table 4) Given its smaller Eigenvalue, function three does not have as strong of an effect as the first two functions. However, it completes a model that distinctly discriminates between each PRIMARY USE category.

Table 4 - Functions at Primary Use Group Centroids

PRIMARY USE	Functions at Group Centroid		
	1	2	3
WORK	0.248	-0.257	-0.423
HUNT	1.172	0.379	0.191
TRAIL	-0.395	-0.374	0.226
THRILL	-1.015	0.822	-0.091

In addition to its separable functions, discriminant analysis also provides correlation coefficients between each variable and each function. In this model, the variable UTILITY is very highly correlated with Function 1 and discriminated well between HUNT and THRILL users. (Table 5) The second function is highly correlated with EXCITEMENT and thus discriminated between THRILL and TRAIL. Finally, the third function is mostly strongly correlated with WILDNESS and NATURE. WORK is negatively associated with this function showing that these users are less motivated by the appeal of nature.

Table 5 - Correlations Between Variables and Functions

Motivation	Function		
	1	2	3
Utility	.801(*)	0.252	0.160
Excitement	-0.518	.657(*)	0.033
Wildness	-0.014	-0.241	.656(*)
Nature	0.085	-0.362	.469(*)
Adventure	-0.226	-0.177	.385(*)
Sociability	-0.270	-0.037	.362(*)
Autonomy	-0.217	-0.193	-.342(*)
Safety	0.035	-0.240	-.317(*)

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
*. Largest absolute correlation between each variable and any discriminant function

These results were tested to measure the discriminant analysis' predictive capacities by classifying each respondent into one of the four PRIMARY USE categories based solely on their motivation IWR score. *A priori* probabilities were used to assist determination of group membership. Overall, this procedure classified 58.3% of the original cases correctly. (Table 6) It was particularly good at identifying HUNT (70.3%) and THRILL (55.4%) users succeeding more than three times better than the *a priori* distribution. This procedure was also quite successful at predicting TRAIL membership (67.9%),

succeeding nearly twice as often as the *a priori* distribution. For the WORK users (36.6%), this classification procedure was not very effective. With less successful classification rates, Stevens (2002) indicates that the cost of misclassification must be considered. In this case, there may be a hidden benefit in the misclassification of WORK users. Presumably, those selecting WORK as their PRIMARY USE do not use their ATVs to work on public lands, but are likely engaging in one of the other three uses. In this case, the misclassification rates of WORK users into the other three categories are very similar to their *a priori* distributions. This might provide a rough estimation of how WORK users' behave differently when riding public land.

Table 6 - Discriminant Function Classification Table

PRIMARY USE	Predicted Group Membership				a priori
	WORK	HUNT	TRAIL	THRILL	
WORK	**36.6**	21.5	29.0	12.9	0.261
HUNT	16.2	**70.3**	10.8	2.7	0.207
TRAIL	14.2	10.4	**67.9**	7.5	0.375
THRILL	7.1	8.9	28.6	**55.4**	0.157

58.3% of original grouped cases correctly classified.
54.1% of cross-validated grouped cases correctly classified.

Subsequent Results

Having established that the observed *a priori* sub-groups of ATV users are separable by recreational motivation, it is then possible to compare these groups on their behavior and attitudes. First, each PRIMARY USE category expressed distinctly different usage of public land. Of the four groups, TRAIL users are the most dependent on the availability of public land riding on it 71% of the time. (Table 7) They are followed by THRILL users who also ride a majority (58%) of the time on public land. Conversely, HUNT (47%) and WORK (36%) users ride less than half of the time on public land. TRAIL

(21%) and THRILL (14%) users have higher rates of membership in ATV clubs. On the other hand, HUNT (3%) users rarely join clubs while WORK (7%) users are slightly more active.

Table 7 - Public Land Riding and ATV Club Membership Between Primary Use Groups

PRIMARY USE	n	Percent Riding on Public Land				ATV Club Membership		
		%	SD	F	Sig	%	$\chi^2(3)$	Sig
WORK	93	36%	18.267	50.42	0.000	3%	18.557	.000
HUNT	74	47%	22.878			7%		
TRAIL	134	71%	21.502			21%		
THRILL	56	58%	24.821			14%		

Each group expressed preferences for different riding experiences. (Table 8) HUNT users have the strongest preference (41.1%) of all groups for riding completely off-trail. Conversely, TRAIL users have little interest (11.9%) in riding completely off-trail and prefer to ride on either user-created or properly maintained trails. THRILL users are more similar to TRAIL users with 19.6% preferring to ride completely off-trail. WORK users fall in between with 31.2% preferring to ride off trail.

Table 8 - Riding Preferences Between Primary Use Groups

PRIMARY USE	On or Next to Roads	On Maintained Trails	On User Created Trails	Cross Country/ Off-Trail
WORK	7.5%	32.3%	29.0%	31.2%
HUNT	0.0%	27.4%	31.5%	41.1%
TRAIL	3.7%	35.8%	48.5%	11.9%
THRILL	1.8%	33.9%	44.6%	19.6%

χ^2 (9)=34.314, p≤.000

A large majority of respondents were supportive of the USDA Forest Service's slogan, "riding is a privilege, not a right" with 92.6% agreeing or strongly agreeing with the statement. There were no significant differences between groups. Users were asked whether they agreed that it is their "right to ride *where* they want on public land." Overall, each group disagreed with this statement, but significant differences appeared between PRIMARY USE categories. (Table 9)

Table 9 - Attitudes Toward Regulations Between Primary Use Groups

Question	PRIMARY USE	Mean*	F	Sig	N	SD
It is my right to ride ***where*** I want on Public Lands	WORK	-0.78			92	1.098
	HUNT	-0.61			72	1.157
	TRAIL	-1.04	3.94	0.009	134	0.913
	THRILL	-0.58			55	1.049
	ALL	-0.81			353	1.049
It is my right to ride ***how*** I want on Public Lands	WORK	-0.80			92	1.061
	HUNT	-0.79			72	0.963
	TRAIL	-0.88	2.76	0.042	134	0.974
	THRILL	-0.42			55	1.117
	ALL	-0.77			353	1.026
Some ATVs are too loud and too fast	WORK	0.98			92	1.099
	HUNT	0.83			71	1.146
	TRAIL	0.84	11.20	0.000	134	1.105
	THRILL	-0.09			54	1.336
	ALL	0.73			351	1.199

*2=Strongly Agree, -2=Strongly Disagree

TRAIL users were strongest in their disagreement with their mean response falling between disagree and strongly disagree. Alternatively, WORK, HUNT and THRILL users expressed more uncertainty with their mean responses between unsure and disagree. Users were asked if it was their "right to ride *how* they want on public lands." As with the previous question, a majority within all groups disagreed with this statement, but to a lesser degree than before. Again, TRAIL users most strongly disagreed with this

question while THRILL users were the least certain. HUNT and WORK group responses fall between the two extremes. Finally, users were asked if they thought that "some ATVs are too loud and too fast." HUNT, WORK and TRAIL respondents agreed with this statement with their mean response nearing 'agree.' THRILL users expressed a slight disagreement with this statement.

Discussion

To summarize, this study shows that three sub-groups of ATV users, HUNT, TRAIL and THRILL can be predicted by recreational motivations. Each of these has distinctly different recreational motivation profiles and should be considered separate stakeholders. The fourth proposed category, WORK, rides public land infrequently and are most likely behaving as one of the other three groups when they do. Understanding these groups and their associated recreational motivations will help public managers assure that the opportunities they are providing are in demand by users. In addition, these results indicate that the motivational profiles between groups are not easily reconcilable. Therefore, management strategies, regardless of their intent are likely to be unpopular with at least one of the stakeholder sub-groups. Each group will be briefly summarized.

TRAIL users are the largest group comprising 38% of all users. TRAIL users are motivated strongly by a desire to be with friends and family in a natural setting that they can explore. They are also strongly supportive of regulation. They prefer to ride on some sort of trail, join ATV clubs at the highest rate and ride the most of all groups on public land. This suggests that TRAIL users prefer a more social and organized

recreational experience. For this reason, management will likely interfere with their recreational motivations to a lesser degree than other groups. This group is probably the strongest ally of managers in promoting ATV use that minimizes conflict and ecological damage. While this group is the most organized, it must be remembered that they are still a minority and do not necessarily represent the goals of all users.

HUNT users are the second largest group. They ride public lands nearly half (47%) of the time and are most motivated to ride an ATV because of its usefulness. To this group, riding an ATV is a secondary pursuit. While they express support for regulations limiting noise and speed, they are less supportive of restrictions that limit access. They rank sociability low and prefer to ride completely off trails. As opposed to TRAIL users, HUNT users indicate a desire for a loosely organized activity away from development. This is presumably because they are seeking less developed and less populated areas in which they can pursue game or other more solitary experiences. Consequently, the impact of this group will likely occur more often in ecologically sensitive areas away from sites developed specifically for ATV recreation. For HUNT users, access limitation will interfere most with their motivational goals.

THRILL users are the smallest group comprising only 15% of all users. They have the strongest motivation for excitement and place a high value on sociability. Of all groups, they expressed the most opposition to regulations. Taken together, these traits indicate that THRILL users most likely have riding motivations that are only satisfied by high speed and excitement. For this group, speed and noise regulation will interfere most with their motivational goals. Riding fast and in groups, THRILL users are likely responsible

for a disproportionate amount of ecological damage and interactivity conflict. However, support for this assertion would depend on direct observation.

The primary purpose of ATV regulations has been to minimize conflict and ecological damage. To accomplish this, public land management agencies have attempted to enforce noise, speed and access regulations with varying degrees of support from ATV users. (USDA, 2005) The results of this study indicate support may be a determined by divergent user perspectives. For instance, a speed regulation that trail users would view as a minor behavioral limitation might undermine the primary motivation for a thrill-seeking user. Additionally, limiting ATVs to specifically designated trails might be perfectly acceptable to trail and thrill users, but interfere with hunting user's motivations. This is not to suggest, by any means, that these limitations are unjust, unfair or unnecessary. It is simply to suggest that a deeper stakeholder understanding might help managers better anticipate public reactions to resource protective activities.

"One reason why… natural resource professionals are so vulnerable to social criticism is a function of their often conflicting roles [as] long-term resource protectors and providers of goods and services for citizens living today." (Kennedy, Dombeck and Koch, 1998, p.16) In failing to understand this dual role, "managers risk charges of unwise policy on the one hand and pandering to the wishes of elite constituencies on the other." (Bryan, 2000, p.20) To avoid this, we need to clearly define what resources we are protecting and what goods and services we are providing. Furthermore, we need to clearly understand the stakeholders to whom we are providing these goods and services. If OHV

use is becoming the most disruptive issue in public land policy, then it is imperative we fully understand the goods and services that OHV users are seeking.

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Part 2 - Wisconsin ATV User Support for Regulation

American public land management agencies have long been challenged to accommodate rising demand for outdoor recreation while minimizing conflict and ecological damage. This task has been further complicated by improvements to outdoor recreation equipment and All Terrain Vehicles (ATV) enabling users to cover much greater territory in much shorter time periods. (Shultis, 2001) Coupled with growing demand, more people are now able to reach previously remote lands in much greater densities. (Havlick, 2002) Increased dispersal of outdoor recreation undermines the effectiveness of already limited law enforcement and leaves self-regulation as the primary constraint to recreational use. (Wellman and Probst, 2004) In response, managers have supported the development and implementation of education and awareness campaigns designed to promote voluntary compliance. (Gramman, Donifeld and Kim 1995) However, the success of these efforts relies heavily on the receptivity of users to the message. (Christensen and Cole, 2001) Furthermore, there is little, if any research available documenting the efficacy of these efforts. Understanding the factors that promote or hinder users' receptivity to self-regulation can help focus educational efforts and estimate user compliance. This study identifies and quantifies several factors that influence users' support for regulation. Second, this study tests whether or not exposure to organizations that promote regulatory compliance influences users' attitudes toward regulation.

Background

In 1972, there were approximately five million Off Highway Vehicles (OHV) in use in the United States. (US National Archives, 1972) This categorization includes off-road

motorcycles, dirt bikes, dune buggies, 4-wheel drive sport utility vehicles and all-terrain vehicles. Their use on public lands was often "for legitimate purposes but also in frequent conflict with wise land and resource management practices, environmental values, and other types of recreational activities." (US National Archives, 1972) By 2004, the number of American OHV users grew considerably reaching nearly 40 million. (Cordell et al, 2005) Among overall OHV growth, expansion of the ATV subcategory has been most dramatic. Between 1995 and 1999, American ATV sales nearly doubled from 277, 800 to 545,900. This number grew to 799,400 comprising over 70% of all OHVs by 2003. (Cordell et al, 2005) In Wisconsin alone, public land ATV registrations more than quadrupled from 56,000 in 1993 to over 230,000 in 2006. (WDNR, 2007a)

The rise in ATV use on public lands has led to increased ecological damage, increased conflict between recreational users and increased safety hazards for both motorized and non-motorized users. (Holsman, 2004; Havlick, 2002) Consequently, many public land management agencies have sought to minimize these consequences through speed and noise limitations, access restriction and mandatory safety courses. As with most highly dispersed activities, actual observance of these rules depends heavily on users' willingness to regulate their own behavior. (Sutinen and Kuperan, 1999) To encourage self-compliance, many federal and state agencies have collaborated with ATV clubs and organizations to promote safe, responsible and ecologically sensitive riding. However, previous research indicates ATV club members comprised only about 10% of all users in Minnesota (Schneider and Schoenecker, 2005) and Utah (Fisher, Blahna and Bahr, 2001). The highest membership rates identified were 20% in West Virginia (Schuett, 1998) If ATV clubs and groups represent a minority of users, the extent to which they speak for

all users is uncertain. Recent public comments further support this, revealing a diversity of opinions among users. This suggests that support for regulation may not be universal. (USDA Forest Service 2000 and 2005) A review of these comments indicated that specific objections to regulation could be generalized into several categories. First, some perceive any attempt to restrict motorized access as an infringement on their rights. Others simply distrust or deny allegations that ATVs can cause negative ecological and social effects. Finally, some perceive access limitation as an elitist attempt to exclude a class of people from public lands. If education and awareness campaigns designed to promote self-regulation are to be successful in changing attitudes, it must be understood how attitudes toward regulation are formulated.

Conceptual Framework

The Theory of Planned Behavior hypothesizes that behavioral intentions are determined by the interaction of three factors. The first of these determinants is the individual's attitudes toward the behavior. Second, behavioral intentions are influenced by social norms regarding that behavior. Finally, behavioral intentions are limited by perceived constraints. (Ajzen and Driver, 1991; Ajzen, 2002) In this theory, attitudes toward a particular behavior are determined by a wide variety of predisposing factors such as values, educational influences and past experiences. (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) Using this framework, there are roughly two general reasons why an ATV user might choose to regulate their own behavior without the presence of law enforcement. First, users may simply have an attitudinal disposition to ride carefully and responsibly. Second, their attitudes may not support self-regulation, but they are swayed

by the influence of social norms. If no combination of these factors is effective, it is not likely that ATV users will feel compelled to obey rules and regulations increasing the importance of law enforcement.

While the Theory of Planned Behavior has been used widely, some have indicated that it may not effectively predict specific behavior. (Bagozzi, 1992) However, this study is exploratory in nature and does not attempt to anticipate unique attitudes toward place and context specific regulations nor does it attempt to evaluate actual behavior. For this purpose, the Theory of Planned Behavior is satisfactory as a general conceptual model. (Bagozzi, 1992)

Past research has identified several factors that contribute to the formation of attitudes toward resource management. First, researchers have hypothesized that biocentric values predict environmentally responsible attitudes and behavior. (Tarrant, Bright and Cordell, 1997; Manfredo, Driver and Tarrant, 1996; Vaske and Donnelly 1999; Zinn 2002) Specifically, how a person responds to 'protection-use' or 'anthropocentric-biocentric' continuums has been shown to effectively predict *general* attitudes toward *general* management principles. (Whittaker et al, 2006) Much of this research is based on the cognitive hierarchy model of human behavior model that posits a value-attitude-behavior casual sequence. Another line of research in environmental social psychology has shown that those more concerned with others are more likely to alter their behavior. (Gramman et al, 1995; Walker, Deng and Dieser, 2005) Finally, research has shown that those who strongly identify themselves with a product type are likely to be loyal to that product or

even to a specific brand. (Sparks, 1992) While there are certainly many other factors that contribute to attitudes, these will be used as a starting point.

Using the Theory of Planned Behavior, management agencies and ATV clubs that promote responsible ATV riding and self-regulation act as social norms. If users have predisposing attitudes that support regulation, their behavioral intentions would reinforced by these norms. (Fishbein and Ajzen, 1975) If users have predisposing attitudes that oppose regulation, their behavioral intentions might be counterbalanced by these norms. Promotion of responsible riding has traditionally come from several directions. First, to promote safety, many states including Wisconsin now require users less than 18 years of age to take an ATV training course. (WDNR 2007b) Similar to hunter safety training, a primary goal of these courses is to prevent accidents. Included in most courses are justifications for regulations, as well as examples illustrating the consequences of unsafe riding. Another prominent source of self-regulatory messages has been ATV clubs. In particular, they have actively promoted programs such as 'Tread Lightly' that encourage outdoor recreational users to minimize the damage and conflict associated with recreational use. While it is difficult to assess the normative effect of these groups, repeated exposure to ideas and concepts often causes recipients to accept the ideas as their own. Effectively, social norms become personal beliefs in this process when a person buys into the message or adopts the group's position. (Wood, 2000) Therefore, groups promoting responsible ATV use will be truly successful if their messages are internalized by ATV users and directly influence their attitudes.

Methods

Data Collection

In October and November of 2006, an eight-page mail survey was distributed to 1000 people who registered an All Terrain Vehicle for public land use in the state of Wisconsin. The sample population was randomly drawn from an ATV registration mailing list purchased from the Wisconsin Department of Natural Resources. Survey distribution was comprised of three first class mailings: a full survey with a stamped return envelope, followed by a thank you/reminder postcard, followed by a second full survey mailing to those who had yet to respond. (Dillman, 1991) Of those distributed, 82 surveys were returned with unusable addresses, incomplete surveys or with respondents who no longer owned an ATV. In total 519 surveys were returned with at least 60% of the survey completed amounting to a final response rate of 57%.

Statistical tests for non-response bias were conducted comparing demographic data drawn from the ATV registrations as well spatial information gathered from GIS address encoding. Using information taken from registrations, respondents were compared to non-respondents on information such ATV brand, ATV year, registrant age. These tests revealed only one significant difference showing that respondents were slightly older on average (3.46 years) than non-respondents. This type of age discrepancy is often expected in mail surveys. (Fowler, 2002) Addresses of the sample population were also coded to a latitude/longitude coordinate using a geo-coding process in ArcMap 13.0. This coordinate was then assigned to their appropriate census block and the distance of each registrant from the nearest Wisconsin ATV trail was calculated. This allowed

census attributes of population density, ethnic makeup, family composition and income to be assigned to each registrant. However, no statistically significant differences were found between respondents and non-respondents on any of the spatial criterion.

Measurement of Dependent Variables

In one section of the survey, five questions were asked to quantify how strongly respondents supported or objected to regulation based on their perceptions of rights, estimation of ATV impacts and sensitivity to personal exclusion.

1. It is my right to ride **how** I want on public lands.
2. It is my right to ride **where** I want on public lands.
3. ATV riding on public lands is a privilege, not a right.
4. If you keep my ATV out of an area, it's the same as keeping me out.
5. Some ATVs are too loud and fast.

Respondents were asked to indicate their level of agreement with these statements on a five-point Likert scale from 'strongly agree' to 'strongly disagree.' The scale midpoint was 'unsure.' The first two questions dealt with the objection that restricting access, speed or noise violates the rights of users. Agreement with these was interpreted as opposition to regulation. The third measurement questioned support for the USDA Forest Service slogan that 'ATV riding is a privilege not a right.' Agreement was interpreted as support for regulation. The fourth question addressed the view that access restriction effectively 'locks out' or excludes people from public lands. Agreement was

interpreted as opposition to regulation. Finally, the fifth question addressed concerns that noise and speed effects are overstated. Agreement with this question was interpreted as support for regulation.

Measurement of Independent Variables

A series of nine questions, taken from Vaske and Donnelly (1999) were used to measure respondents on an environmental value orientation continuum. These included five questions to which agreement was interpreted as an anthropocentric value orientation. Agreement with the remaining four was interpreted as a biocentric orientation. These variables were then tested for reliability and combined into a single variable for multivariate analysis.

To measure concern for others, respondents were asked whether they agreed that they were always careful around non-motorized users. Agreement was interpreted as positive concern for others. To assess the level of identification with their ATV, respondents were asked if they felt their ATV is part of them while riding. Agreement with this question was interpreted as positive identification with their ATV.

Respondents were also asked to indicate whether or not they had taken a Wisconsin DNR safety course or if they belong to an ATV club or group. Finally, demographic features were determined in two manners. First age, income and education were directly queried on the survey. Second, residence population density and distance from nearest trail were

determined using the same geo-coding process used in non-response bias testing. All statistical tests and procedures were performed using SPSS 14.0.1.

Results

Dependent Variables Results

In total, 351 respondents who indicated they rode their ATV on public land were used in this analysis. Of these, a majority expressed support for regulation in response to the battery of five attitudinal questions. However, there was significant variation in responses within and between these five questions. To identify potential subgroups within these responses, a two-step cluster analysis was performed. This process yielded two simple cluster groups from a maximum possible number of clusters of fifteen. For each of these two clusters, mean responses to the five dependent variable questions were compared using Analysis of Variance (ANOVA). (Table 10) The differences between the two cluster groups were highly significant on every question. Furthermore, responses for each cluster were directionally consistent in that one group expressed strong support for regulation on all questions while the other expressed weak support for regulation on four questions and even weakly opposed regulation on another. These groups will be regarded as 'Strong Support" and "Weak Support" respectively.

The two questions that generated the greatest difference regarded the right to ride *where* and *how* a user wants on public lands. In each case, the *strong supporters* did not believe it was their right, while *weak supporters* were nearly neutral. The next greatest difference was in the belief that some ATVs are too loud and fast. Again *strong*

supporters agreed that some ATVs are too loud and fast while *weak supporters* were neutral. Similar differences appeared to a lesser degree in the remaining two questions.

Table 10 - Attitudes Toward Regulations Between Clusters

To what extent do you agree with the following statements?	Support Cluster	Mean	SD	N	F	Sig.
1) It is my right to ride how I want on public lands.	Weak	-0.07	1.17	145	169.703	0.000
	Strong	-1.26	0.50	206		
2) It is my right to ride where I want on public lands.	Weak	-0.07	1.17	145	189.493	0.000
	Strong	-1.33	0.51	206		
3) ATV riding on public lands is a privilege, not a right.	Weak	1.21	1.07	145	44.634	0.000
	Strong	1.76	0.45	206		
4) If you keep my ATV out of an area, it's the same as keeping me out.	Weak	0.48	1.17	145	49.207	0.000
	Strong	-0.44	1.22	206		
5) Some ATVs are too loud and fast.	Weak	0.01	1.33	145	120.222	0.000
	Strong	1.24	0.77	206		

Likert Scale -2=Strongly Disagree, 2=Strongly Agree

Independent Variable Results

Overall, respondents indicated strong biocentric value orientations disagreeing with the first five anthropocentric questions and agreeing with the last four biocentric questions. However, when the mean response to these questions from the Strong and Weak cluster groups were compared using ANOVA, statistically significant differences were revealed on six of the nine questions. (Table 11) For each, *strong supporters* were more biocentric than their *weak supporter* counterparts. Tests for reliability (Cronbach's alpha=.741) among these nine questions, recoded for directional consistency, indicated an acceptable level of consistency to generalize them into one question. For each respondent, a mean response to all nine questions was calculated. This mean value will be used for subsequent modeling.

Table 11 - Environmental Values Between Clusters

To what extent do you agree with the following statements?	Support Cluster	Mean	SD	N	F	Sig.
1) The primary value of forests is to generate money and economic self reliance for communities.	Weak	-0.33	1.07	144	6.542	0.011
	Strong	-0.62	1.06	204		
2) The primary value of forests is to provide timber, grazing land and minerals for people who depend on them for their way of life.	Weak	0.06	1.11	144	2.512	0.114
	Strong	-0.14	1.17	204		
3) Forests are valuable only if they produce jobs and income for people.	Weak	-0.87	1.02	144	6.554	0.011
	Strong	-1.12	0.80	205		
4) Nature's primary value is to provide products useful to people.	Weak	-0.28	1.08	144	13.678	0.000
	Strong	-0.70	1.02	205		
5) The value of forests exists only in the human mind. Without people, forests have no value.	Weak	-0.88	0.97	144	4.239	0.040
	Strong	-1.08	0.90	205		
6) Forests have as much right to exist as people.	Weak	1.03	0.97	144	3.273	0.071
	Strong	1.20	0.84	205		
7) Nature has as much right to exist as people.	Weak	1.02	0.99	144	9.766	0.002
	Strong	1.32	0.79	204		
8) Wildlife, plants and people have equal rights to live and develop.	Weak	0.90	1.03	144	2.389	0.123
	Strong	1.06	0.92	204		
9) Forests have value, whether people are present or not.	Weak	1.31	0.72	144	10.601	0.001
	Strong	1.53	0.57	205		
Combined Biocentric Value Orientation	Weak	0.53	0.52	144	15.718	0.000
	Strong	0.74	0.43	204		

Likert Scale -2=Strongly Disagree, 2=Strongly Agree
The first five items were reverse coded in reliability analysis and reduction to Combined Biocentric Value Orientation variable.
Cronbach's Alpha=.741

As expected, nearly all respondents agreed that they are careful around non-motorized users. However, the between group ANOVA revealed significant differences with *strong supporters* expressing more concern for others than *weak supporters*. (Table 12) In addition, a majority of *weak supporters* expressed a connection between themselves and their ATV. Again, between cluster ANOVA revealed significant differences with *weak*

supporters agreeing to a greater degree than *strong supporters*. This suggests *weak supporters* have a greater level of identification with their ATV than *strong supporters*.

Table 12 - Concern for Others and ATV Identification Between Clusters

To what extent do you agree with the following statements?	Support Cluster	Mean	SD	N	F	Sig.
I am always careful around non-motorized users.	Weak	1.52	0.60	145	5.751	0.017
	Strong	1.67	0.53	206		
When riding, I feel that my ATV is part of me.	Weak	0.93	0.85	145	6.079	0.014
	Strong	0.69	0.94	206		

Likert Scale -2=Strongly Disagree, 2=Strongly Agree

Overall, 21.4% of all respondents reported they had participated in a Wisconsin Department of Natural Resources ATV safety training course. This included 19.3% of *weak supporters* and 22.8% of *strong supporters*. (Table 13) These differences were not statistically significant indicating that participation in an ATV safety course does not influence support for general regulation.

Table 13 - Safety Course Participation Between Clusters

	Weak Support		Strong Support	
Have you a Wisconsin DNR safety course?	n	%	n	%
No	117	80.7%	159	77.2%
Yes	28	19.3%	47	22.8%

χ^2 (1)=.622, p=.430

Of all respondents, 12.3% reported that they were active members of an ATV club or organization. (Table 14) This includes 11.0% of *weak supporters* and 13.1% of *strong supporters*. As with the safety course, these differences were not statistically significant.

This indicates that membership in an ATV club does not influence support for general regulation.

Table 14 - ATV Club Membership Between Clusters

Are you currently a member of an ATV club or group?	Weak Support		Strong Support	
	N	%	N	%
No	129	89.0%	179	86.9%
Yes	16	11.0%	27	13.1%

χ^2 (1)=.340, p=.560

Along with the previous conceptual frameworks, demographic characteristics of the two clusters were tested for significant difference using ANOVA or Chi Square test for association. Among these, only age produced any significant differences with *strong supporters* being 4.2 years older than *weak supporters*. (Table 15) Given the previously mentioned non-response age bias, *weak supporters* could be slightly underrepresented in this study.

Table 15 - User Age Between Clusters

What is your Age?	Support Cluster	Mean	SD	N	F	Sig.
User Age	Weak	41.83	12.97	145	10.594	0.001
	Strong	46.04	11.04	202		

Multivariate Results – Logistic Regression

A logistic regression model was chosen to measure the influence of the independent variables on the dichotomous dependent variable. (Hosmer and Lemeshow, 2000)

Initially, all variables were entered into a backward stepwise logistic regression model. This confirmed that neither participation in a safety course nor ATV club membership had a significant influence on support for regulation. These two variables were excluded from the final regression to avoid artificial inflation of the model's predictive capacity and R^2. (Table 16) The final logistic regression model showed that all four remaining variables (biocentric values, self-identification with the ATV, concern for others and age) significantly contributed to a model capable of predicting 66% of the cases (χ^2 (4)=42.181, p<.001, Nagelkerke's R^2=.155). However, the Nagelkerke's R^2=.155 indicates that there are likely many other variables not tested that influence support for regulation.

Table 16 - Logistic Regression Results

Variable	B	S.E.	Wald	Sig.	Odds Ratio
Biocentric Values	0.934	0.226	17.105	0.000	2.544
ATV Identity	-0.364	0.140	6.797	0.009	0.695
Concern for Others	0.523	0.212	6.103	0.013	1.687
Age	0.031	0.010	9.489	0.002	1.031

The results show that biocentric values have the strongest influence on support for regulation. The odds ratio indicates that a Likert scale change of 1 toward the biocentric end of the value continuum equates to a 2.544 times increase in the odds that the respondent is a *strong supporter* of regulation. Likewise, a Likert scale change of 1 towards greater concern for others results in a 1.687 increase in the odds that the respondent is a *strong supporter*. Conversely, a Likert scale change of 1 toward greater identification with an ATV results in a .695 decrease in the odds that the respondent is a

strong supporter of regulation. Finally, age has a significant effect with an increase of about 20 years of age doubling the odds that the respondent is a *strong supporter*.

Table 17 - Summary of Independent Variable Effects

Independent Variable	Anticipated Effect on Regulation Support	Between Cluster Difference	Predictive Capacity
H_1 Biocentric Value Orientation	Positive	Significant	Significant
H_2 Concern for Others	Positive	Significant	Significant
H_3 ATV Identity	Negative	Significant	Significant
H_5 Completion of Safety Course	Positive	Insignificant	Insignificant
H_6 ATV Club Membership	Positive	Insignificant	Insignificant

Discussion

The two goals of this study were: 1) to identify and quantify factors that influence users' support for regulation and 2) to test whether or not exposure to organizations that promote regulatory compliance influences users' attitudes toward regulation. Using the Theory of Planned Behavior as a conceptual model, results indicate that factors intrinsic to the respondent affected attitudes toward regulations while external factors had no influence. On one hand, there are those internally motivated to support and obey regulations because they strongly agree with them in principle. On the other hand, there are those who support is less certain because they agree less with the regulations in principle. While external influences may be reinforcing the attitudes of those willing to supportive of regulation, they do not influence those who are less supportive.

The first goal of this study was to determine what factors contribute to the formation of attitudes toward regulation. Biocentric values, concern for others and increased age contributed positively, while identification with an ATV contributed negatively.

Unfortunately for managers, all of these factors are intrinsic to the users and largely beyond managerial control. However, these factors might indicate opportunities for further educational efforts. First, messages supporting self-regulation might be designed to demonstrate how riding responsibly directly benefits those less concerned with the environment. Unfortunately, overcoming users identification with their ATVs might be quite daunting since it would directly confront the images promoted by some ATV manufacturers. Regrettably, certain companies advertise ATV riding behavior that would be considered irresponsible or illegal on public lands. (Holsman, 2004) Instead of trying to break users' identification with their ATV, prospects may be better for working with companies to promote an ATV riding identity that incorporates responsible, environmentally benign behavior.

The second goal of this study was to test whether or not exposure to organizations that promote regulatory compliance influences users' attitudes toward regulation. The results show that neither past participation in a safety course nor ATV club membership affects attitudes. While these groups may exert a normative effect on users, it is be expected that users will be less likely to self-regulate their behavior when not in the presence of those groups. However, if social norms can be exerted that reinforce attitudinal dispositions instead of working against them, self-regulatory behavior would be more likely to occur. Therefore, if messages promoting self-regulation are to effectively influence attitudes, they must not only speak to those who are already disposed to support self-regulation, but must reach those who are less sympathetic. In other words, messages may be more effective if they incorporate predisposing factors rather than trying to change them. Further research may be quite helpful in identifying these.

This study revealed that a majority of Wisconsin ATV users have strong dispositions to regulate their own behavior, indicating that the majority of users will modify their behavior without much need for law enforcement or social pressure. However, it also reveals that those lacking this strong disposition will be difficult to reach through messages designed to encourage responsible riding. Consequently, the importance of strong social norms and effective deterrence is heightened. Yet the prospects are not promising that these factors will change behavior any time soon. First, users who are less supportive of regulation also identify strongly with their ATVs and express decreased concern for others. This suggests that these users with weaker social identities will be less influenced by social norms. (Wood, 2000) In addition, persuasive attempts and educational efforts may simply stiffen resistance to the message. (Meadow et al, 2005) Finally, OHV law enforcement is woefully lacking in many places. (Holsman, 2004; US GAO 1995) Without any perceived consequences of their actions from law enforcement and little influence from peer pressure, ATV users who are not predisposed to self-regulate simply have no reason to limit their behavior and comply with rules and regulations. Any change to this situation will require rethinking the message put forth and committing greater resources to law enforcement.

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Part 3 – Additional Major Findings

The third major goal of this study was to provide specific information usable to those concerned with ATV use on public land. To achieve this, a wide range of questions was asked on the user survey. Given their forthright nature, results to these questions will be described directly.

ATV Riding on WI Public Lands

Several recent reports have cited research showing that Wisconsin Off Highway Vehicle riders comprise upwards of 20% of the total state population above the age of 16. (Wisconsin Department of Tourism, 2004; WDNR 2006) While the accuracy of these studies is not in doubt, a closer investigation reveals that the numbers may not represent the number of people actually riding ATVs on public lands. Therefore, the economic impact and political representation of ATV riders may be overstated.

Wisconsin has four different ATV registrations: public land, municipal, agricultural and private land. Of these four, only public land registrants should be considered public land ATV stakeholders. These registrations comprise only 78.43% of the total ATVs registered in Wisconsin. (WDNR, 2007) Furthermore, this study revealed that only 70.70% of respondents ride public land at all. The actual number of registrations using public land can be estimated by multiplying the percentage riding public land (70.70%) by public land registrations (244,933). (Table 18) The result is 173,167, or only 55.45% of all Wisconsin ATV registrations.

Table 18 - Estimated WI ATV Registrations Using Public Land

Registration Type	# of WI Registrations as of 10/2/06	% of Total WI ATV Registrations	% of Public Registrations Riding Public Land	Est. # of Registrations Using Public Land	Est. % of Total Registrations Using Public Land
Public	244933	78.42%	70.70%	173167	55.45%
Municipal	412	0.13%			
Agricultural	54789	17.54%			
Private	12189	3.90%			
Total	312323				

Using the 173,167 ATVs estimated to be in use on public lands, it is then possible to estimate the number of public land ATV riders. Survey respondents indicated that they had 2.55 (n=502 sd=1.313, range=0-8) riders per household and 1.94 (n=517, sd=1.322, range=0-14) ATVs per household. This equals an estimated 1.31 riders per ATV. Multiplied by the 173,167 ATVs estimated to be in use on Wisconsin public lands, there are approximately 227,617 public land ATV riders in the state. (Table 19) Using the 2000 census number of 4,096,800 people in Wisconsin over the age of 16, public land ATV riders represent only about 5.56% of the total population over the age of 16. This is far less than the often-cited percentages exceeding 20%. It should be noted that this calculation excludes ATV users who neither own their own ATV nor live in a household that owns an ATV. However the number of people for whom this is the case is expected to be quite small as the Wisconsin Department of Tourism (2004) study indicates that over 97% of all riders questioned on public land own at least two ATVs.

Table 19 - Estimated WI Public Land Riders

Est. N Riding Pub Land	Riders/House	ATVs/House	Riders/ATV	Total WI Public Land ATV Riders
173167	2.55	1.94	1.31	227617

Finally, these estimates can be used to approximate the size of Wisconsin's various ATV stakeholder groups. This survey asked each respondent to indicate *all* the ways in which they used their ATVs. Of the recreational uses, 68.10% indicated they use their ATV to hunt or fish, 65.30% use their ATV to explore trails and public lands and 46.40% use their ATVs for thrills and excitement. (Table 20) From the 227,617 riders estimated on Wisconsin public land, these proportions yield stakeholder populations of 155,007 hunt/fish riders, 148,634 trail riders and 105,614 thrill riders.

Table 20 - Estimated WI Public Land Recreational Use

	Hunt	Trail	Thrill
% of Respondents Participating	68.10%	65.30%	46.40%
Est. # on Public Land	155007	148634	105614
Est. % of total WI Population over 16	3.78%	3.63%	2.58%

Riding Location

Overall, respondent residence location had little to do with motivations, values, attitudes toward regulations or riding behavior. However, there are several notable results pertaining to the spatial relationship between respondents and the places they ride. First, 89% of all respondents trailer their ATV less than 125 miles to ride it. In fact, 33.7% of all respondents do not trailer their ATV at all. This is likely due to the rural character of riders. First, 85.9% respondents live in areas with less than 20,000 people. Additionally, 44.64% of all respondents own land that is not their main residence. This likely means many have direct access to private land for riding. This is reflected in their responses stating that 75.8% ride at least some of the time on their own land and 53.1% ride on land

owned by friends and family. In fact, 29.3% of respondents indicated that they do not ride on public land at all with only 8.1% being completely reliant on public lands for ATV riding.

Trail Preferences

In 2005, the USDA Forest Service announced that OHV riding on National Forests would be limited to specifically designated trails and routes. (USDA, 2005) With the exception of a handful of small OHV parks in the state, this means that the majority of ATV riding opportunities in Wisconsin is now limited to designated county, state or federal trails. Limiting ATVs to trails has been done primarily to minimize interactivity conflicts and to avoid ecological damage associated with riding off maintained trails. While the need for this has been well documented (Holsman, 2004; Havlick, 2002), it remains to be seen how well ATV users will adhere to riding limitations. To establish a baseline of attitude toward this, survey respondents were asked to indicate where they prefer to ride their ATV.

Table 21 - User Trail Preferences

On Roads	Next to Roads	On Maintained Trails	On User Created Trails	Cross-country, off trails and roads
0.0%	6.2%	28.5%	33.3%	32.0%

Of the five possible choices, "On maintained trails" (28.5%) ranked third. (Table 21) The top choice was "On user created trails" (33.3%) followed closely by "Cross country, off trails and roads" (32.0%). In other words, 65.3% of all users prefer to ride off of

maintained trails. Additionally, none of the recreational sub-groups identified in Part 1 chose "On maintained trails" as their top preference. While this does not indicate that users will disobey trail rules, it does suggest that by staying on-trail, users will be suppressing a preference for riding off-trail. Trail designation and design should be undertaken in a manner that minimizes the attraction of riding off-trail.

Site Preferences

Within the questions measuring recreational motivations, respondents were asked to rank and state the importance of being in a natural setting as compared to being in a wild untouched setting. In the ranking question, being in a natural areas ranked first out the eight possibilities. Being in a wild untouched area ranked much lower at number five. This difference was also reflected in their respective importance with 46.0% of respondents stating that being in a natural area is very important as opposed to 35.6% rating being in a wild, untouched place as very important. Although ATV users highly value being in a natural environment, these results indicate that they do not require areas completely free of development.

In addition to the natural qualities, users were also asked a series of questions to determine the importance of various site amenities. Of these, maps at the trailhead, signs indicating permitted uses and connections to other trails were cited as the most important with mean responses falling between important and strongly important. Other amenities such as restrooms, drinking water and loading ramps scored much lower with mean

responses near slightly important. Technical challenges and mud experience also scored low yet were significantly more important to thrill users identified in Part 1.

Location Satisfaction

Other studies have shown OHV users to be concerned about the quality and availability of places to ride. (Schneider and Schoenecker, 2006; Fisher, Blahna and Bahr, 2001) While that was not directly questioned in this study, respondents were asked to indicate their perceptions of crowding at the places they ride. Only 20.5% agreed or strongly agreed with the statement that their riding location is too crowded with ATV users. Even fewer, 15.7% agreed that their riding location is too crowded with other users. This is further supported by responses indicating that 84.1% agree or strongly agree that the place they ride is in good condition. While it would be safe to assume that most users would prefer more riding options, overall, most appear satisfied with their current riding locations.

ATV Users and Other Forms of Motorized Recreation

ATV riding and other motorized activities share many similar attributes and would seem to fulfill many similar motivations. Therefore, significant overlap between the user groups could be expected. To measure this, respondents were questioned about their recreational participation and vehicle ownership. First, only 24.4% agreed they would rather ride a snowmobile if there is snow and 36.4% participate in off-road driving. Furthermore, only 33.7% stated that they own at least one snowmobile while only 11.1% own a dirt bike. Participation was even lower in motorized water sports with 14%

indicating they water-ski and 10.9% indicating they jet ski. This was further reflected in their water vehicle ownership with only 10.3% owning a speedboat and 5.8% owning a jet-ski. Participation and ownership was also tested between the sub-groups previously identified in Part 1. No statistically significant associations were found. Generally, there is little overlap between ATV users and other forms of motorized recreation.

Wisconsin DNR Safety Course

As indicated in Part 2, past participation in a Wisconsin DNR safety course has no influence on respondent support for regulation. However, responses indicate that the safety course is successfully encouraging ATV users to protect themselves. When asked if they agree that they always wear their safety gear, 77.6% of those who had taken a safety course agreed compared to 59.2% of those who had not taken a safety course. In total, 19.6% of all respondents indicated they had taken a Wisconsin DNR safety course.

Have you Taken a WDNR Safety Course?	I always wear my protective gear.		
	Disagree	Unsure	Agree
No	30.7%	10.1%	59.2%
Yes	18.4%	3.9%	77.6%

χ^2 (2)=8.892, p=.011

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Part 4 – Summary, Management Implications and Conclusion

Two principle obligations of public resources agencies are to provide goods and services for current populations and to ensure the long-term viability of their resources. To meet these goals, a sound understanding of both the population and the resource is required. This study was therefore undertaken with two major goals: 1) to expand the scientific understanding of public land ATV users and 2) to provide specific information usable to those concerned with ATV use on public lands.

The first challenge faced by public land managers observed in Part 1 was that ATV versatility leads to wide ranges of uses. This range of uses makes it difficult for managers to allocate recreational resources in a manner that addresses the unique needs of different types of users. Recreational Experience Preferences were used as a conceptual model to discriminate between different sub-groups of ATV users. This model reveal that there are three recreational groups: users who ride their ATV to hunt or fish, users who use their ATV to explore public land and trails and users who use their ATVs to experience thrills and excitement. Motivational profiles and differing attitudes of these user sub-groups were described to identify potential opportunities for management.

The second challenge observed in Part 2 was that the propagation of ATVs has forced agencies to rely on user self-regulation to prevent long-term resource damage and user conflict. The Theory of Planned Behavior was used as a conceptual model to determine what factors influence user support for regulation. Results of this section indicated that

intrinsic factors were the primary determinants of support for regulation while external factors such as safety course participation or ATV club membership had no influence. These results indicate that messages promoting responsible ATV riding or use will need to be reformulated and law enforcement will need to be increased in order to prevent resource damage and user conflict.

The third and final section of this study directly quantifies the traits, behaviors and demands of Wisconsin ATV users. Results indicated that the number of public land ATV users in Wisconsin might have been previously overestimated. In addition, results showed that the vast majority of respondents use their ATV on private land with only a small number relying exclusively on public land for their ATV recreation. Results also indicated that users are generally satisfied with their riding locations and do not perceive a great deal of crowding.

Management Implications

Taken together, these three sections have several implications for the management of ATVs on Wisconsin public lands.

1. Previous studies may have overestimated the amount of ATV users on Wisconsin public lands. Any plan to create, expand or reduce ATV trails and opportunities should be done with these findings in mind. Agencies should consider conducting accurate, place specific and independent assessments of current demand for ATV recreation opportunities.

2. Wisconsin ATV users should not be treated as a single group. Findings reveal that there are distinct sub-groups of ATV users who are best approached separately. In doing so, managers will be able to provide better experiences for each group of users as well as better anticipate reactions to regulations.

3. The majority of Wisconsin ATV users support the principles on which regulation has been based. This support is largely dependent on underlying beliefs and values of users who place a high value on the environment and are concerned for the safety of others. Since the majority will likely cooperate and support the goals of management, care should be taken to avoid homogenizing all users in a manner that could alienate potential allies.

4. Users who do not strongly support regulation are unlikely to be influenced by messages promoting responsible use. Researchers and managers should continue to look for new ways to reach these users. Additionally, ATV manufacturers and clubs should be encouraged to promote an ATV riding identity that encourages a riding ethic based on minimizing conflict and preventing ecological damage. Nevertheless, a significant number of users will only be persuaded to obey regulations by a strong presence from law enforcement.

5. Wisconsin ATV users rely heavily on private land to ride their ATVs. ATV use is certainly enhanced by the availability of public land opportunities, but only a small amount of people rely on it exclusively for ATV recreation. Commercially developed,

private land riding opportunities should be encouraged to meet the needs of users who are looking for a thrill riding experience.

6. ATV clubs represent only about one tenth of all Wisconsin ATV users. These groups have been immensely helpful in promoting responsible riding and maintaining trails. However, this research has shown that clubs represent a minority of Wisconsin ATV users. Other ATV users should be considered both when providing opportunities and when crafting rules and regulations.

Conclusion

Public land managers have long struggled to utilize their land in ways that do not spoil it for future generations. As one of 'the oldest tasks in human history,' it will continue to be quite difficult. However, by contextualizing decisions both in terms of benefits for current populations as well as its sustainability over the long term, this task is made a bit easier. In the case of All Terrain Vehicles, managers must first develop accurate assessments for recreational demand. If trails are to be created or expanded, consideration must be given both to the impact it will have on other users and the resource as well as the impact it will have on recreational demand. ATV user satisfaction with current opportunities is currently quite high, as is private land usage. Managers must consider if expanding the supply of trails and opportunities will simply create demand that was previously non-existent or shift usage from existing sites to new ones. In addition, the social, ecological and economic costs of ATV recreation have been

shown to be quite high. These costs must be fully considered when discussing the social or economic benefits of ATV use.

Motorized use and technological invention have always been important components of public land recreation. Yet as technology and demographics change, managers must assess all costs and benefits associated with the incorporation of new activities into limited public land resources. Simply because an activity can be facilitated by public land does not mean that it should. Technology will continue to change and new activities will certainly emerge. Scarcely twenty-five years ago, few would have anticipated the growth in All Terrain Vehicles. We can only speculate as to what the next new activities will be. Therefore, decisions to accommodate new or expanded recreational uses and activities should be made on an activity and place specific basis with full understanding of all costs. Furthermore, these decisions should be based on two simple criteria: does an activity provide a net benefit to the current population and is it sustainable over the long-term. In doing so, we can help maintain our current enjoyment of the land while ensuring that future generations do not unnecessarily bear the costs of current decisions.

Appendices

Appendix 1: Survey Questions with Raw Responses

Section 1: ATV Riding Habits

1. How many years have you been riding an ATV? (Write in the amount)

n=515, mean=12.07, sd=8.505, range=0-42

2. Does your household own any All Terrain Vehicles?

n=517, mean=1.94, sd=1.322, range=0-14

3. How many days in the past twelve months did you ride an ATV?

n=514, mean=72.0229, sd=86.94479, range=0-365.25

4. During which months do you usually ride? (Check all that apply)

n=519, total months mean=7.98, sd=3.38

51.4% Jan

50.0% Feb

50.8% Mar

58.1% Apr

76.1% May

81.2% Jun

79.1% Jul

79.8% Aug

84.6% Sep

79.2% Oct

70.0% Nov

55.0% Dec

5. How far do you usually trailer your ATV to ride it? (Check One) n=502

33.7% I Don't

50.2% 1-125 Miles

12.4% 125-250 Miles

3.8% +250 Miles

6. On what types of land do you ride your ATV? (Check all that apply)

n=505, Total Land Types mean=2.16, sd=1.053

75.8% My own land

53.1% Owned by friends or family

8.3% Privately owned ATV park

13.7% Publicly owned ATV park

66.3% Publicly owned trails or land

7. How much of your riding is done on public land or trails? (Check One)

29.3 - 0% of the time

23.4% - 25% of the time

17.8% - 50% of the time

21.4% 75% - of the time

8.1% - 100% of the time

8. With how many other people do you usually ride your ATV? (Check One)

18.2% None

56.0% 1-3 other

24.2% 3-10 others

1.6% 10+ Others

9. Who do you ride your ATV with most often? (Check One)

24.6% Alone

51.3% Family

23.0% Friends

1.2% ATV Club

10. Please indicate your skill level at driving ATV's. (Check One)

2.8% Beginner

43.7% Intermediate

53.6% Advanced

11. Have you completed a Wisconsin DNR Safety Certification Course?

80.4% No

19.6% Yes

12. In the last twelve months, how many different places did you trailer your ATV to? (Write in the number) n=505, mean=2.99, sd=3.433, range=0-25

13. What are all the ways you use your ATV? (Check all that apply)

n=505, Total Uses mean=2.57, sd=1.03

79.8% A work vehicle to help with jobs and chores

68.1% A recreational vehicle to help with hunting or fishing

65.3% A recreational vehicle for exploring trails and public land

46.4% A recreational vehicle for excitement or thrills

4.4% Other: 11 Snowplow, 3 Racing, 2 Personal Transport, 4 other

14. What is the primary use of your ATV? (Check One) n=504

37.1% A work vehicle to help with jobs and chores

22.2% A recreational vehicle to help with hunting or fishing

27.2% A recreational vehicle for exploring trails and public land

13.5% A recreational vehicle for excitement or thrills

Section 2: ATV Location Preferences

1. When choosing a location to ride your ATV, how important are the following factors? (Write 1 in the space next to the most important, 8 in the least important. Fill in the rest from 2 through 7.)

n=447, mean=5.78, sd=2.472 To be near help if needed.

n=447, mean=3.31, sd=2.143 To be with friends.

n=458, mean=3.74, sd=3.624 To pursue another activity such as hunting, fishing, camping, etc.

n=450, mean=3.21, sd=1.936 To be in a natural setting.

n=446, mean=4.72, sd=2.160 To go to wild and unchanged places.

n=446, mean=4.13, sd=1.894 To discover something new.

n=447, mean=4.76, sd=2.205 To be free to make my own choices.

n=446, mean=5.05, sd=2.437 To experience excitement.

2. Where do you prefer to ride? (Check One) n=484

0.0% On roads

6.2% Next to roads

28.5% On maintained trails

33.3% ATV created trails

32.0% Cross-county, off trails and roads

3. How important are the following features to your riding experience? (Check one for each)

Possible Factors	n	Mean	SD	% Very Important (4)	% Moderately Important (3)	%Slightly Important (2)	%Not at all Important (1)	% Not Sure (x)
Restrooms at the trailhead	466	2.1	1.036	13.1	16.8	31.8	33.8	4.5
Safe drinking water at the trailhead	465	2.07	1.048	12.1	19.5	26.7	37.2	4.5
Signs indicating length of trail	470	2.89	1.036	33.7	32.0	17.5	13.3	3.5
Technical challenges	456	2.3	1.014	13.6	25.5	30.0	24.6	6.4
Maps at trailhead	468	3.07	1.000	40.7	32.5	12.1	10.9	3.7
Well maintained areas	465	2.77	1.010	25.9	35.6	20.0	14.2	4.3
Variety of	466	3.04	.924	34.6	38.8	14.4	8.2	3.9

scenery								
Access to fuel stations	470	2.93	1.028	35.4	31.3	17.7	12.3	3.3
Available camping	458	1.98	1.005	8.8	20.2	25.7	39.5	5.8
Loading ramps at trailhead	451	1.74	.979	7.8	11.9	21.0	52.1	7.2
Routes connecting to other riding areas	467	3.02	.947	35.4	36.0	16.0	8.6	3.9
Signs showing all users allowed in area	466	2.97	.982	34.8	33.1	18.1	9.9	4.1
Mud experience	462	2.15	1.077	13.3	23.0	23.0	35.5	5.1

4. How well do the following statements describe the location where you most often ride your ATV? (Check one for each)

Statement	n	Mean	SD	%Strongly Agree (5)	%Agree (4)	%Unsure (3)	%Disagree (2)	%Strongly Disagree (1)
It is a place to escape civilization.	485	3.87	.965	23.5	51.5	10.9	13.0	1.0
It is a pristine wilderness.	484	3.81	.921	21.5	50.6	16.7	10.1	1.0
It is a place for recreation.	483	4.12	.765	30.4	56.5	8.3	4.3	.4
The land there is in good condition.	484	4.04	.748	24.2	59.9	12.0	3.1	.8
The land there is very impacted by use.	151	2.89	1.130	8.7	24.0	24.2	34.3	8.9
It has not changed much recently.	484	3.63	.891	11.6	54.1	21.3	11.4	1.7
There is too much development nearby.	484	2.74	1.068	7.4	17.4	24.6	43.0	7.6
It is too crowded with ATVs riders.	484	2.52	1.068	6.2	14.3	16.7	21.2	11.6
It is too crowded with other users.	484	2.44	1.021	5.8	9.9	19.0	52.9	12.4

I feel I can really be myself there.	483	3.81	.876	18.6	54.0	19.0	6.4	1.9
It is my favorite place to be.	485	3.72	.953	21.2	42.1	25.6	9.7	1.4
It reflects the type of person I am.	484	3.59	.945	14.5	45.9	26.2	11.2	2.3
I would rather go elsewhere.	484	2.40	.917	2.1	9.9	28.1	46.1	13.8
It is the most convenient place.	484	3.66	1.060	21.7	42.4	19.0	13.8	3.1
It is the nearby place I can legally ride	485	3.80	1.122	29.7	42.3	10.3	14.0	3.7

Section 3: ATV Riding Motivations and Opinions

1. Please rate the importance of each of the following factors that motivate you to ride your ATV. (Check one level of importance or each)

Possible Factors	n	Mean	SD	% Very Important (4)	% Moderately Important (3)	%Slightly Important (2)	%Not at all Important (1)	Not Sure (x)
To avoid the unexpected	452	2.41	1.112	19.7	24.1	22.1	25.8	8.3
To be with members of my group.	472	2.85	1.052	31.3	35.0	14.0	15.7	4.1
To get to places where I hunt, fish, camp, etc…	484	2.94	1.107	42.3	21.9	18.5	14.7	2.6
To be close to nature	484	3.27	.819	46.0	36.7	11.6	3.9	1.8
To see wild and untouched places	475	3.04	.926	35.6	36.4	17.1	7.5	3.5
To experience new and different things	478	3.05	.880	32.9	42.7	14.6	6.9	2.8
To be my own boss.	469	2.65	1.040	23.7	31.2	23.3	16.8	4.9

To have thrills.	466	2.52	1.088	22.6	25.6	25.0	21.5	5.3

2. To what extent do you agree with the following statements? (Check one for each statement)

Statement	n	Mean	SD	%Strongly Agree (5)	%Agree (4)	%Unsure (3)	%Disagree (2)	%Strongly Disagree (1)
It is my right to ride how I want on public lands.	502	2.21	1.044	4.4	10.4	9.4	53.2	22.7
It is my right to ride where I want on public lands.	500	2.15	1.034	3.4	10.6	9.6	50.2	26.2
ATV riding on public lands is a privilege, not a right.	502	4.47	.870	62.9	28.7	3.2	3.0	2.2
If you keep my ATV out of an area, it's the same as keeping me out.	501	2.80	1.259	12.6	20.2	15.2	38.9	13.2
Some ATVs are too loud and fast.	499	3.80	1.145	31.3	38.9	12.6	12.8	4.4
There are a few bad riders that give all of us a bad reputation.	503	4.41	.775	53.3	38.4	6.0	.8	1.6
If there is snow, I would rather ride a snowmobile than an ATV.	502	2.57	1.333	13.1	13.3	14.9	34.9	23.7
I used to travel to the same places before I got an ATV.	497	2.74	1.140	5.8	26.0	15.9	40.6	11.7
When riding, I feel that my ATV is part of me.	500	3.70	.943	17.4	49.8	19.6	11.6	1.6
I ride my ATV because I am physically unable to walk or hike long distances.	501	2.03	1.155	5.8	9.8	4.0	42.5	37.9
I always wear my	499	3.35	1.255	21.8	32.1	10.4	30.9	4.8

protective gear.								
I am always careful around non-motorized users.	500	4.55	.642	60.2	37.2	1.0	.8	.8

Section 4: How you value nature and ATV riding

1. To what extent do you agree with the following statements? (Check one for each statement)

Statement	n	Mean	SD	%Strongly Agree (5)	%Agree (4)	%Unsure (3)	%Disagree (2)	%Strongly Disagree (1)
The primary value of forests is to generate money and economic self reliance for communities.	494	2.49	1.078	5.1	14.5	20.6	44.0	15.8
The primary value of forests is to provide timber, grazing land, and minerals for people who depend on them for their way of life.	494	2.94	1.131	7.5	29.8	20.1	34.1	8.5
Forests are valuable only if they produce jobs and income for people.	494	1.98	.0879	2.2	5.1	9.1	55.9	27.7
Nature's primary value is to provide products useful to people.	494	2.46	1.059	2.8	19.6	14	48.2	15.4
The value of forests exists only in the human mind. Without people forests have no value.	494	1.98	.928	2.0	6.1	11.7	48.4	31.8
Forests have as much right to exist	494	4.14	.905	39.3	43.7	9.9	5.9	1.2

as people.

Nature has as much right to exist as people.	494	4.20	.876	42.0	43.2	9.5	3.7	1.6
Wildlife, plants, and people have equal rights to live and develop.	494	4.00	.952	31.8	48.1	11.0	6.9	2.2
Forests have value, whether people are present or not.	494	4.43	.0632	49.7	45.1	4.0	1.2	0.0

2. Would you be willing to pay $x.xx per vehicle per year to ride your ATV on public lands if the funds were utilized for maintenance, management and improvements of the ATV trails and facilities at the site where they are collected? (Check One)

		Amount Queried				
Response		$25	$30	$40	$50	All
No	Count	27	27	27	55	136
	Percentage	22.0%	21.1%	23.5%	40.7%	27.1%
Yes	Count	63	67	50	45	225
	Percentage	51.2%	52.3%	43.5%	33.3%	44.9%
Unsure	Count	33	34	38	35	140
	Percentage	26.8%	26.6%	33.0%	25.9%	27.9%

3. Indicate your level of agreement with the following statements. (Check one for each)

A good way to fund ATV trail and facility maintenance and improvement is…

	n	Mean	SD	%Strongly Agree (5)	%Agree (4)	%Unsure (3)	%Disagree (2)	%Strongly Disagree (1)
… through daily use fees.	493	2.9	1.262	10.5	28	17.8	28.2	15.4
… though annual vehicle use fees.	491	3.29	1.191	14.1	38.1	19.3	19.6	9.0
… through ATV vehicle registration fees.	494	3.71	1.173	25.3	46.6	9.9	10.7	7.5
… entirely though volunteer efforts.	492	2.53	.96	3.7	12.8	26.4	47.4	9.8

… through a combination of user fees and volunteer efforts.	495	3.67	.977	15.8	52.5	18.2	9.9	3.6
… through taxes already collected.	496	3.45	1.191	20.8	34.5	20.0	18.3	6.5

Section 5: Demographics

1. What is your age? n=502, mean=46.49, sd=12.890, range=16-87

2. How many ATV riders are there in your household?

n=502, mean=2.55, sd=1.313, range=0-8

3. Where is your primary residence? n=504

1.0% On a farm.

12.5% A house in the country.

45.6% In a small town/area with less than 2500 people

13.3% In a medium town/area with between 2500 and 19,999 people

10.9% In a large town/area with between 20,000 and 250,000 people

3.2% In a metropolitan area with greater than 250,000 people

4. Do you own land that is not your primary residence?

55.35% No

44.64% Yes If yes, how many acres

n=504, mean=25.99, sd=58.353, range=0-500

5. Do you live near (within about 50 miles) any of the following? (check all that apply)

n=519, Total Live Near mean=2.09, sd=1.479

26% National Forest

52% State Forest

53.8% County Forest

60.2% ATV Trail

18.3% ATV Park

6. Do you belong to any ATV clubs or associations? n=519

8.7% Yes

91.3% No

7. Have you ever volunteered to do ATV maintenance or clean-up?

9.9% Yes If yes, how often during the last 12 months n=519, mean=.49, sd=2.799, range=0-45

90.1% No

8. Please check all of the following activities you participated in during the past 12 months. n=519 (number below represents percentage participating)

94.6% ATV Riding

36.4% Off-road driving

34.2% Hiking

44.6% Campground Camping

17.5% Primitive Camping

11.3% Mountain Biking

63.5% Big Game Hunting

55.2% Small Game Hunting

37.5% Bird Hunting

4.7% Backpacking

9.3% Horseback Riding

19.3% Nature Photography

72.8% Fishing

5.4% Rafting

21.6% Canoeing

57.8% Motor boating

14.4% Waterskiing

10.9% Jet skiing

9. Of the activities you checked in question 8 above, please circle your three favorites.

n=519 (number below represents percentage of respondents that selected activity as one of their three favorites

63.2% ATV Riding

8.3% Off-road driving

5.2% Hiking

20.6% Campground camping

4.62% Primitive Camping

2.7% Mountain Biking

48.0% Big Game Hunting

20.0% Small Game Hunting

1.4% Bird Hunting

0.4% Backpacking

1.9% Horseback Riding

3.9% Nature Photography

41.6% Fishing

0.8% Rafting

2.5% Canoeing

16.2% Motor boating

1.7% Waterskiing

2.3% Jet skiing

10. How many other recreational vehicles do you own? (Fill in the Blank)

n=515, Total Rec Vehicle mean=1.55, sd=1.734, range=0-15,

28.9% own 0 vehicles

23.5% Motorcycle

48.7% Fishing Boat

10.3% Speed Boat

5.8% Jet Ski

33.7% Snowmobile

11.1% Dirt Bike

11. What is the highest level of education you have completed? (Check One)

n=505, mean=3.17(on a scale of 1-6), sd=1.303

2.4% 8th Grade

38.4% High School/GED

23.6% Tech School

15.6% Some College

14.5% College Degree

5.3% Advanced Degree

12. What is your annual household income level before taxes?

n=386, mean=79039.4, sd=73705.71, range=3,800-1,000,000

Appendix 2: Survey Cover Letter

College of Natural Resources

University of Wisconsin-Stevens Point Stevens Point, Wisconsin 54481-3897 (715) 346-2853 FAX (715) 346-3624

DATE

FIRSTNAME LASTNAME
ADDRESS
CITY, STATE ZIP

Dear FIRSTNAME LASTNAME,

From 1986 to 2006, All Terrain Vehicle (ATV) registrations in Wisconsin have grown from just over 25,000 to nearly 300,000. While many other outdoor recreational users have long been studied, there is very little information regarding the values, motivations and goals of this new group of users. For policy makers and land managers hoping to promote the benefits of outdoor recreation it is highly important that they understand the motivations and values of all groups, including ATV users. To address this lack of information, the enclosed survey has been developed that will measure how and where ATV users ride, how they feel about certain issues and how they value outdoor recreation. For this study, 1000 people, including you, were randomly selected from the 200,000 people who registered an ATV in the state of Wisconsin and agreed to allow the Wisconsin DNR to share their information.

I ask that you take 10 to 20 minutes to complete and return the enclosed survey. The information you provide will be used as the centerpiece of my Master's degree thesis and in articles submitted to scholarly publications. Be assured that the information you provide on the questionnaire is *entirely confidential* and will be recorded in anonymous form. The survey you received does have a unique identifier number that will only be used in the tracking of responses for follow up mailings in the next several weeks. Once the mailings are complete and survey responses have been entered into the database, *all surveys and identifier numbers will be destroyed* as required by university policy. I anticipate no risk to you as a result of your participation and if you want to withdraw from the study at any point, you may do so without penalty. The information on you up to that point would be destroyed.

As outdoor enthusiasts, we all place a high value on our chosen activities and on Wisconsin's tremendous natural resources. By completing and returning this survey in the pre-paid envelope, you will be adding to the scientific credibility of this project and advancing the understanding of outdoor recreation in Wisconsin. I hope you will take a few minutes of your valuable time to assist in the completion of this project. Thank you for your time and participation and I wish you continued safe and rewarding adventures in Wisconsin's outdoors.

Sincerely,

Robert A. Smail

If you have any questions regarding completion of the survey or for results, please call or write:
Robert Smail
Graduate Research Assistant
College of Natural Resources
University of Wisconsin - Stevens Point
Stevens Point, WI 54481-3897 715-252-3631

If you have any concerns about your treatment as a participant in this study, please call or write:
Dr. Sandra Holmes, Chair
Institutional Review Board for the Protection of Human Subjects
Department of Psychology
University of Wisconsin – Stevens Point
Stevens Point, WI 54481 715-346-3951

Your completion and submission of the survey to the researchers represents your consent to serve as a subject in this research.

Appendix 3: Survey Instrument

College of Natural Resources

Wisconsin ATV User Survey
Fall 2006

General Directions:

1. Assume all questions refer to All Terrain Vehicle riding unless otherwise directed. ATVs are generally defined by the Wisconsin Department of Natural Resources as engine driven, less than 900 pounds, 48 inches or less in width, straddled by the rider and having three or more low pressure tires.

2. If you, or anyone in your household do not own or ride and ATV please circle this statement and return this survey in the self addressed stamped envelope.

3. Please answer all questions as carefully and accurately as possible.

4. If you are uncomfortable or do not care to answer a certain question, please leave it blank and move on to the next question.

5. When you are finished, please place the survey in the addressed and stamped envelope and mail back to the College of Natural Resources at UW – Stevens Point.

Section 1: ATV Riding Habits

1. For how many years have you been riding an ATV? (Write in the amount)

_____ Years

If you do not ride ATVs, Please STOP here and return survey!

2. Do your household own any All Terrain Vehicles?

☐ Yes If Yes, write in how many you own? _____ATVs

☐ No

3. About how many days **in the past twelve months** did you ride an ATV?

_____Days (Write in the number)

4. During which months do you usually ride? (Check **all** that apply)

☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun
☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec

5. About how far do you usually trailer your ATV to ride it? (Check One)

☐ I Don't ☐ 1-125 Miles ☐ 125-250 Miles ☐ +250 Miles

6. On what type of land do you usually ride your ATV? (Check all that apply)

☐ My own land ☐ Publicly owned ATV park
☐ Owned by friends or family ☐ Publicly owned trails or land
☐ Privately owned ATV park

7. How much of your riding is done on public land or trails? (Check One)

☐ 0% ☐ 25% ☐ 50% ☐ 75% ☐ 100%

8. With how many other people do you usually ride your ATV? (Check One)

☐ Alone ☐ 1-3 other ☐ 3-10 others ☐ 10+ Others

9. Who do you ride your ATV with **most often**? (Check One)

☐ Alone ☐ Family ☐ Friends ☐ ATV Club

10. Please indicate your skill level at riding ATV's. (Check One)

☐ Beginner ☐ Intermediate ☐ Advanced

11. Have you completed a Wisconsin DNR Safety Certification Course?

☐ No ☐ Yes

12. In the last twelve months, to how many different places did you trailer your ATV? (Write in the number)

_____ Different Places

2

13. What are **all** the ways you use your ATV? (Check **all** that apply)

- ☐ A work vehicle to help with jobs and chores
- ☐ A recreational vehicle to help with hunting or fishing
- ☐ A recreational vehicle for exploring trails and public land
- ☐ A recreational vehicle for excitement or thrills
- ☐ Other_____

14. What is the **primary** use of your ATV? (Check One)

- ☐ A work vehicle to help with jobs and chores
- ☐ A recreational vehicle to help with hunting or fishing
- ☐ A recreational vehicle for exploring trails and public land
- ☐ A recreational vehicle for excitement or thrills
- ☐ Other_____

Section 2: ATV Location Preferences

1. When choosing a location to ride your ATV, how important are the following factors? (Write 1 in the space next to the most important, 8 in the least important. Fill in the rest from 2 through 7.)

_____ To be near help if needed.
_____ To be with friends.
_____ To pursue another activity such as hunting, fishing, camping, etc.
_____ To be in a natural setting.
_____ To go to wild and unchanged places.
_____ To discover something new.
_____ To be free to make my own choices.
_____ To experience excitement.

2. Where do you prefer to ride? (Check One)

☐ On roads
☐ Next to roads
☐ On maintained trails
☐ On ATV created trails
☐ Cross-county, off trails and roads

3

3. How important are the following features to your riding experience?

Possible Factors	Very Important	Moderately Important	Slightly Important	Not at all Important	Not Sure
Restrooms at the trailhead	☐	☐	☐	☐	☐
Safe drinking water at the trailhead	☐	☐	☐	☐	☐
Signs indicating length of trail	☐	☐	☐	☐	☐
Technical challenges	☐	☐	☐	☐	☐
Maps at trailhead	☐	☐	☐	☐	☐
Well maintained areas	☐	☐	☐	☐	☐
Variety of scenery	☐	☐	☐	☐	☐
Access to fuel stations	☐	☐	☐	☐	☐
Available camping	☐	☐	☐	☐	☐
Loading ramps at trailhead	☐	☐	☐	☐	☐
Routes connecting to other riding areas	☐	☐	☐	☐	☐
Signs showing all users allowed in area	☐	☐	☐	☐	☐
Mud experience	☐	☐	☐	☐	☐

4. How well do the following statements describe ***the location*** where you most often ride your ATV? (Check one for each)

Statement	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
It is a place to escape civilization.	☐	☐	☐	☐	☐
It is a pristine wilderness.	☐	☐	☐	☐	☐
It is a place for recreation.	☐	☐	☐	☐	☐
The land there is in good condition.	☐	☐	☐	☐	☐
The land there is very impacted by use.	☐	☐	☐	☐	☐
It has not changed much recently.	☐	☐	☐	☐	☐
There is too much development nearby.	☐	☐	☐	☐	☐
It is too crowded with ATVs riders.	☐	☐	☐	☐	☐
It is too crowded with other users.	☐	☐	☐	☐	☐
I feel I can really be myself there.	☐	☐	☐	☐	☐
It is my favorite place to be.	☐	☐	☐	☐	☐
It reflects the type of person I am.	☐	☐	☐	☐	☐
I would rather go elsewhere.	☐	☐	☐	☐	☐
It is the most convenient to get to.	☐	☐	☐	☐	☐
It is the only place around I can legally ride	☐	☐	☐	☐	☐

Section 3: ATV Riding Motivations and Opinions

1. Please rate the importance of each of the following factors that motivate you to ride your ATV. (Check one level of importance or each)

Possible Factors	Very Important	Moderately Important	Slightly Important	Not at all Important	Not Sure
To avoid the unexpected	☐	☐	☐	☐	☐
To be with members of your group.	☐	☐	☐	☐	☐
To get to places where I hunt, fish, camp, etc...	☐	☐	☐	☐	☐
To be close to nature	☐	☐	☐	☐	☐
To see wild and untouched places	☐	☐	☐	☐	☐
To experience new and different things	☐	☐	☐	☐	☐
To be my own boss.	☐	☐	☐	☐	☐
To have thrills.	☐	☐	☐	☐	☐

2. To what extent do you agree with the following statements? (Check one for each statement)

Statement	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
It is my right to ride **how** I want on public lands.	☐	☐	☐	☐	☐
It is my right to ride **where** I want on public lands.	☐	☐	☐	☐	☐
ATV riding on public lands is a privilege, not a right.	☐	☐	☐	☐	☐
If you keep my ATV out of an area, it's the same as keeping me out.	☐	☐	☐	☐	☐
Some ATVs are too loud and fast.	☐	☐	☐	☐	☐
There are a few bad riders that give all of us a bad reputation.	☐	☐	☐	☐	☐
If there is snow, I would rather ride a snowmobile than an ATV.	☐	☐	☐	☐	☐
I used to travel to the same places before I got an ATV.	☐	☐	☐	☐	☐
When riding, I feel that my ATV is part of me.	☐	☐	☐	☐	☐
I ride my ATV because I am physically unable to walk or hike long distances.	☐	☐	☐	☐	☐
I always wear my protective gear.	☐	☐	☐	☐	☐
I am always careful around non-motorized users.	☐	☐	☐	☐	☐

5

Section 4: How you value nature and ATV riding

1. To what extent do you agree with the following statements? (Check one for each statement)

Statement	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
The primary value of forests is to generate money and economic self reliance for communities.	☐	☐	☐	☐	☐
The primary value of forests is to provide timber, grazing land, and minerals for people who depend on them for their way of life.	☐	☐	☐	☐	☐
Forests are valuable only if they produce jobs and income for people.	☐	☐	☐	☐	☐
Nature's primary value is to provide products useful to people.	☐	☐	☐	☐	☐
The value of forests exists only in the human mind. Without people forests have no value.	☐	☐	☐	☐	☐
Forests have as much right to exist as people.	☐	☐	☐	☐	☐
Nature has as much right to exist as people.	☐	☐	☐	☐	☐
Wildlife, plants, and people have equal rights to live and develop.	☐	☐	☐	☐	☐
Forests have value, whether people are present or not.	☐	☐	☐	☐	☐

2. Would you be willing to pay $25.00 per vehicle per year to ride your ATV on public lands if the funds were utilized for maintenance, management and improvements of the ATV trails and facilities at the site where they are collected? (Check One)

☐ No

☐ Yes

☐ Unsure

3. Indicate your level of agreement with the following statements. (Check one for each) **A good way to fund ATV trail and facility maintenance and improvement is...**

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
... through daily use fees.	☐	☐	☐	☐	☐
... though annual vehicle use fees.	☐	☐	☐	☐	☐
... through ATV vehicle registration fees.	☐	☐	☐	☐	☐
... entirely though volunteer efforts.	☐	☐	☐	☐	☐
... through a combination of user fees and volunteer efforts.	☐	☐	☐	☐	☐
... through taxes already collected.	☐	☐	☐	☐	☐

Section 5: Demographics

1. What is your age? _____

2. How many ATV riders are there in your household? _____

3. Where do you live?

- ☐ On a farm.
- ☐ A house in the country.
- ☐ In a small town/area with less than 2500 people
- ☐ In a medium town/area with between 2500 and 19,999 people
- ☐ In a large town/area with between 20,000 and 250,000 people
- ☐ In a metropolitan area with greater than 250,000 people

4. Do you own land that is not your primary residence?

☐ No ☐ Yes If yes, how many acres _____

5. Do you live near (within about 50 miles) any of the following? (check all that apply)

☐ National Forest ☐ State Forest ☐ County Forest ☒ ATV trail ☐ ATV Park

6. Do you belong to any ATV clubs or associations?

☐ Yes If so, which one(s):_____

☐ No

7. Have you ever volunteered to do ATV maintenance or clean-up?

☐ Yes If yes, how often:_____ days

☐ No

8. Please check all of the following activities you participated in during the past 12 months.

___ ATV Riding	___ Mountain Biking	___ Bird Hunting	___ Fishing
___ Off-road driving	___ Big Game Hunting	___ Backpacking	___ Rafting
___ Hiking	___ Small Game Hunting	___ Horseback Riding	___ Canoeing
___ Campground Camping		___ Nature Photography	___ Motor boating
___ Primitive Camping			___ Waterskiing
			___ Jet skiing

9. Of the activities you checked in question 8 above, please circle your three favorites.

10. How many other recreational vehicles do you own? (Fill in the Blanks)

____ Motorcycle	____ Speed Boat	____ Snowmobile
____ Fishing Boat	____ Jet Ski	____ Dirt Bike

11. What is the highest level of education you have completed? (Check One)

8th Grade	High School/GED	Tech School	Some College	College Degree	Advanced Degree
☐	☐	☐	☐	☐	☐

12. What is your annual household income level? $ _____

Appendix 4: WI ATV Trail Buffers and Geo-Coded Addresses

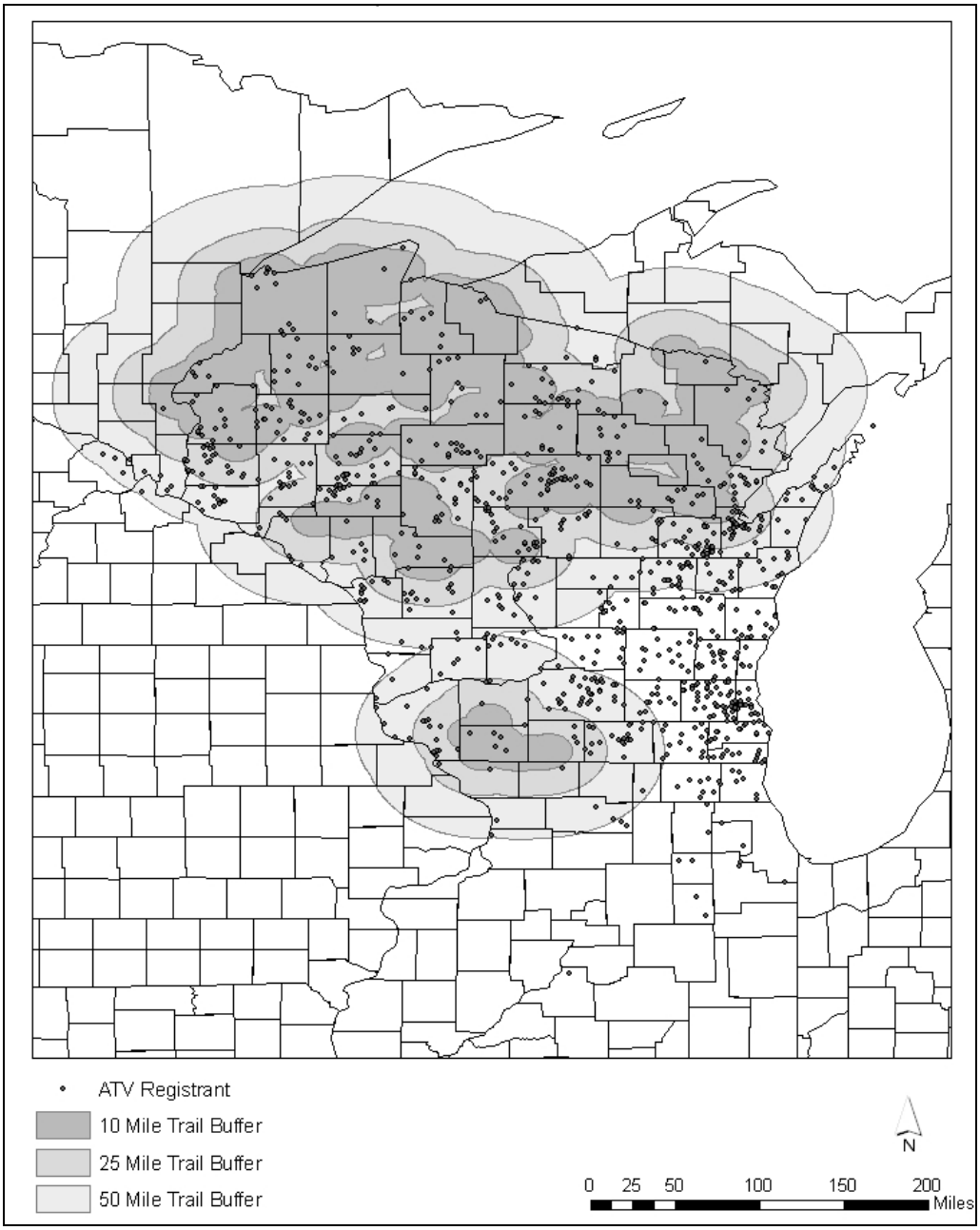

Figure 3 - ATV Trail Buffers and Geo-Coded Addresses