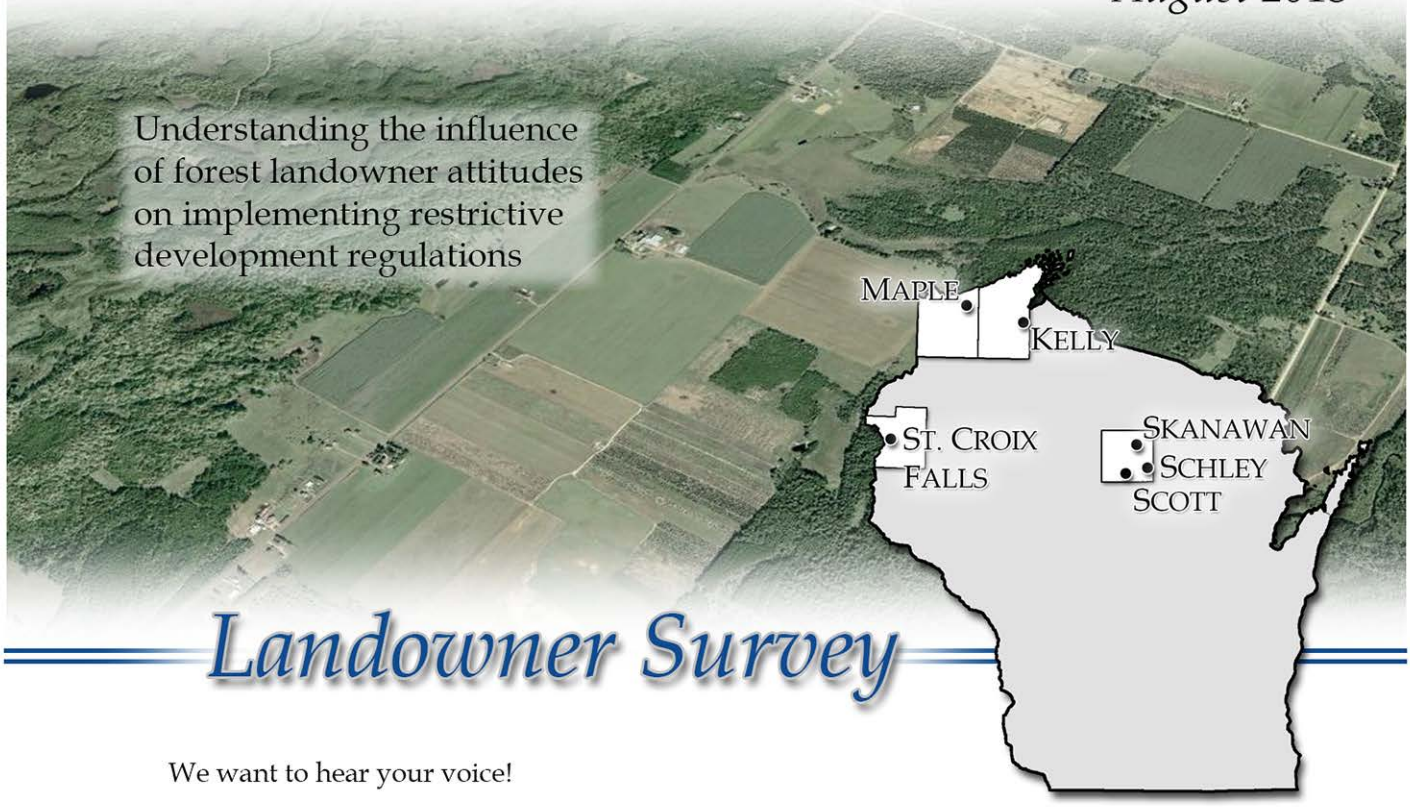
University of Wisconsin-Stevens Point
College of Natural Resources

Northern Wisconsin Landowner Survey

FINAL REPORT

August 2013

Understanding the influence of forest landowner attitudes on implementing restrictive development regulations



We want to hear your voice!

Communities in Northern Wisconsin are currently making decisions about future development that will affect the health of their forested land. Many communities in Northern Wisconsin are experiencing the challenges associated with balancing new development with the protection of the forested landscape. Whether it is the economic opportunities, rural development, or increased public attention to environmental management of this land, these factors are likely to impact how Wisconsin's forests are valued and managed in 'your community'.

As part of an on-going research project, we would appreciate your participation in this survey to help us understand the views and priorities of local landowners. Your participation is voluntary. We have selected you because of how much land you own. Your input is essential to finding responsible and practical ways to meet these challenges associated with planning for and managing the natural resources of the land. This survey will take approximately twenty minutes to complete. Please complete as much of the survey as possible; however, you are welcome to skip questions that make you feel uncomfortable. Your response is extremely valuable to us.

UW Extension
University of Wisconsin-Extension

Executive Summary

As a planner or local policy maker it may be difficult (especially early in one's career) to consider that it's not simply a lack of awareness or a misunderstanding of land use regulations that creates public challenges for implementing new policies, but rather that the attitudes and perspectives of those who will be governed by these regulations actually shape the tools we have available. Understanding this reality forces consideration of new questions that shape our actions, such as "what will the public support?" or "what causes stakeholders' responses to vary, often drastically, to different policy proposals?" The underlying reason for the research behind the Northern Wisconsin Landowner Survey presented here is to identify levels of support for different land use regulations and to determine what attitudinal factors influence individual landowners' views of efforts to deal with development pressure in forested landscapes.

The reasons why individuals in towns across northern Wisconsin value their forests vary widely and these values are often entangled with other attitudes such as views of new development, timber harvest, hunting, recreation, and a number of other critical issues facing forested townships. As a landowner there are also expenses stemming from management or taxes, potential profit associated with cutting or selling the forestland, and the need for future planning like determining how to handle ownership transitions. These issues are complex and show why working with stakeholders must be a process of building understanding about the attitudes that shape the debate over local land use regulations. There is a lot at stake in these decisions for landowners and for the community that is working to incorporate new development while preventing degradation of health of the resource and protecting the opportunities that have always been provided by the forest.

Background

The overall research effort led by Dr. Anna Haines with the UW-Extension Center for Land Use Education is focused on understanding how existing local land use policies will ultimately shape forested communities in the Northwoods region (encompassing parts of Michigan, Minnesota, and Wisconsin). The first phase of the study benefited from the selection of townships in Lincoln County, Wisconsin that have already adopted innovative density-based zoning regulations to address forest fragmentation. These policies are intended to reduce fragmentation by encouraging clustering of homes through higher density residential development requirements.

The first phase of the research led to the development of spatially explicit build-out models to allow for visualizing future scenarios reflecting complete build-out based on current land use regulations for towns in Lincoln County paired with forest dominated townships in other northern Wisconsin counties. Based on this work it was determined that an average of more than 1,000 new homes could be built in each of the Wisconsin Townships included in the study. Additionally, it was found that that the Lincoln County towns would see 12 percent fewer homes and a 10 percent decrease in forestland loss compared with towns without density-based

zoning. This work has demonstrated that current policies leave the door open for surprising amounts of residential development in these rural towns and that land use regulations can play a role in slowing or reducing forest fragmentation. While these future scenarios may never come to pass as land use regulations are often strengthened in response to new trends such as a large increases in development activity, it is also important that rural communities are aware of the futures their existing policies are currently designed to create.

Social Factors That Motivate Community Acceptance of Innovative Land Use Regulations

The study presented in this report represents a second phase of the overall research project and is led by Dr. Aaron Thompson with the UW-Extension Center for Land Use Education. This phase of the project serves as a follow up to the build out scenario modeling and focuses on understanding the attitudes held by landowners that shape the policy tools available to address forest fragmentation. This study uses survey data from six northern Wisconsin Townships all potentially facing residential development growth that could further fragment the forestland in their community. The townships were selected from those included in the original build-out scenario phase of the research project by including three pairs, representing one Lincoln County township and the non-Lincoln County pair. The sample was developed to focus on understanding the attitudes of the largest landowners in these townships by conducting a census of landowners who own a minimum of 60 acres based on local tax records. We seek to understand what is driving their decision making process and how their decisions (and those of others like them across Northern Wisconsin) may ultimately shape the forest landscape.

An eight page survey was sent to 402 large landowners in the selected townships in northern Wisconsin. The survey included question sets designed to measure respondents' attitudes and behavioral intentions that were hypothesized as relevant to support for stricter land use regulations. Respondents were contacted five times during the course of data collection and 51.4 percent of the surveys were returned. This strong response rate allowed for analyzing the research objectives that provided the following lessons about landowner attitudes toward stricter development regulations in northern Wisconsin.

Landowner Attitudes: Support for Forest Protection

- Using statistical models to identify attitudinal and demographic factors that influence support for more restrictive land use regulations we were able to identify that 'anticipated personal consequences of development' and 'support for government involvement' are key attitudinal factors. This suggests that individuals who perceive a greater threat to the activities they participate in or benefits that they receive from the forest are more likely to support stricter regulation. Additionally, individuals who are more supportive of government involvement are also more likely to support stricter regulations.

Landowner Attitudes: Hurdles for Forest Protection

- The survey results show that support for regulation is very low and while examination of individual policies does show some support for large minimum lot sizes attitudes toward these policies are largely negative. Analysis of the attitudinal data also revealed a dominant belief system held by respondents that showed a vast majority of landowners hold strong anti-government attitudes that could limit options for local land use regulation. In addition, no statistically significant mean differences were identified across the six townships for variables measured in this study.

The final report provides a detailed description of the process, analysis procedures, and results for the second phase of this research efforts stemming from the Northern Wisconsin Landowner Survey. For a more detailed summary of results and findings refer to the discussion and conclusion sections of the report.

Acknowledgements

This work was made possible by support from the USDA / CSREES McIntire-Stennis Cooperative Forestry Research Program. In addition, the UW-Extension Center for Land Use Education and Dr. Anna Haines were critical partners in the development of this project.

I would also like to thank several team members who were also involved in the development and analysis of the Northern Wisconsin Landowner Survey. Specifically, Anthony Sharp who managed the data collection process as part of his graduate studies at UW-Stevens Point and William Risse who developed the demographic analysis of respondents included in this report.

Suggested Citation

Thompson, Aaron W. (2013). Northern Wisconsin Landowner Survey: Understanding the influence of forest landowner attitudes on implementing restrictive development regulations. Retrieved from the University of Wisconsin-Stevens Point, UWEX Center for Land Use Education website: http:www.uwsp.edu/cnr/landcenter/

For additional information or if you have questions about the work contained in this report contact:

Aaron Thompson, Ph.D.
Assistant Professor of Natural Resource Planning,
Land Use Specialist -- Center for Land Use Education
College of Natural Resources
University of Wisconsin - Stevens Point
TNR Addition 207
Stevens Point, WI 54481
Phone: 715.346.2278
E-mail: aaron.thompson@uwsp.edu

Outputs

Activities

- Thompson, Aaron., Sharp, A. November 2011 – July 2013. Development, data collection, and analysis of the Northern Wisconsin Landowner Survey. Survey contacted 402 respondents from 6 northern Wisconsin communities with a 51.4 percent response rate.
- Thompson, Aaron., Floress, K. 2012. Using Social Data for Planning and Evaluating Collaborative Initiatives in the Agricultural Landscape. American Planning Association: Upper Midwest Annual Conference, Madison, WI.
- Thompson, Aaron. 2012. Lecture: Collaborative Planning: Barriers and Opportunities -- *Emphasis on understanding land use policy preferences of rural landowners from NWLS survey*. University of Wisconsin – Stevens Point, NRES 474: Integrated Resource Management.
- Sharp, Anthony. 2012. Promoting a collaborative approach between landowners and government agencies – the barriers and opportunities. *Thesis Proposal NRES 795.*

Publications

Products

- Sharp, Anthony., Thompson, Aaron. (In Preparation). Identifying attitudinal and demographic differences: Comparing characteristics of self-reported forest landowner typologies. *To be submitted to the Journal of Forestry.*
- Sharp, Anthony. 2013. Promoting a collaborative approach between landowners and government agencies –barriers and opportunities. *Major Advisor*: Dr. Aaron Thompson, University of Wisconsin – Stevens Point.

Contents

Research Proposal

Note: *This section includes a copy of the original proposal that was funded to complete the Northern Wisconsin Landowner Survey. Some of the details, such as variable names, were adjusted during the research process.*

Simulating Residential Development Policies to Measure Forest Fragmentation and Economic Impact

USDA/CSREES McIntire-Stennis Cooperative Forestry Research Program
2009-2010 Academic Year

Researcher:
Aaron Thompson, Ph.D.
Assistant Professor of Natural Resource Planning
(715) 346-2278; athompso@uwsp.edu

Supplemental Objective Proposal

The objectives described below are intended as a supplement the original case studies exploring the impact of alternative land development regulations on changes in forest fragmentation and potential net value of forest resources at the community level. These supplemental objectives contribute to the overall project by exploring the social factors that motivate community acceptance of innovative land use regulations. Specifically, this research is intended to identify factors that influence large forest landowners' attitudes toward more restrictive land development regulations. This information is critical as these landowners represent key stakeholders who control the remaining large tracts of land that are at risk of being subdivided.

Description of Activities

A survey will be used to collect data from large forest landowners in the six townships in Lincoln County, Wisconsin, as well as the six comparable Wisconsin townships previously identified by the research project. Study participants will be selected using county parcel records to identify individual landowners who control more than 80 acres in each of the townships. It is anticipated that this will result in a total of approximately 800 landowners being included in the study. The survey will be conducted as a five wave mailing and will measure the following variables:

- Attitudes:
  - Environmental stewardship
  - Property rights
  - Anticipated personal consequences of development
  - Willingness to accept more restrictive land use regulations
  - Future plans for the property

- Demographics:
    - Personal characteristics including: age, political orientation, residence status, etc.
    - Parcel characteristics

These variables will be measured using items developed after initial consultation with local planning staff and review of existing attitudinal scales from the literature. In addition, the items will be pre-tested with a small sample of key informants to evaluate the content and readability of the survey items. After data collection, the items associated with each variable will be evaluated using factor analysis and regression analysis will be conducted to evaluate hypothesis 1 and 2.

Objective 1*: Identify factors that influence landowner support for innovative planning approaches to address forest fragmentation:*

H1: Landowner willingness to accept more restrictive land use regulations is influenced by individual attitudes toward anticipated personal consequences of development, environmental stewardship, property rights, and the importance of marketed and non-marketed goods and public services.

H2: Landowners in municipalities with more innovative planning regulations will perceive the impacts of landscape fragmentation as a greater threat than landowners in municipalities using traditional planning approaches.

Objective 2*: Assess landowner response to the community build-out scenarios to identify opportunities and constraints to using these visualization tools to build support for community action to address forest fragmentation:*

Objective 2 will be accomplished using an exploratory research approach to determine landowner response to community build-out scenarios developed to assist communities in visualizing the impacts of forest fragmentation. The alternative development scenarios will be incorporated into the survey design and respondents will be asked to evaluate the likelihood and acceptability each scenario. This information will then be analyzed to identify if significant relationships exist with the attitudinal variables that can assist in developing strategies for engaging landowners in community efforts to respond to forest fragmentation.

Methodology

This first research objective is based on the Northern Wisconsin Landowner Survey (see Appendix 1) sent to landowners of Northern Wisconsin in order to gain understanding of their attitudes that influence preference for policies to address forest fragmentation within their community, assess the effectiveness of community build-out scenario visualizations, and to identify unique belief systems that assist in understanding the diversity of belief systems held by large landowners in these communities.

Participant Selection

A total of 402 Northern Wisconsin landowners who own more than 60 acres of land were selected to receive surveys. Parcel size and ownership were based on tax records accessed through GIS parcel data. These large landowners owned property in one of six towns in Northern Wisconsin. The address list was cleaned and all participants who were out of state residents, deceased, were not found when using an online white pages service, land trusts, LLC's without individual names, life estates, non-profit organizations, incorporated businesses, conservancies, partnerships and government agencies were removed from the list.

Addresses with full names and addresses, as well as LLC's with full names were kept in the potential respondents address list. The six towns that were selected based on three matching town pairs of three different towns in Lincoln County. Lincoln County was identified for comparison due to the comparatively progressive land use regulations of the county. Lincoln County towns for the study are Schley, Scott, and Skanawan.

Table 1. Paired Township Characteristics

		Town Pair 1		**Town Pair 2**		**Town Pair 3**	
	County	Lincoln	Bayfield	Lincoln	Polk	Lincoln	Douglas
Town Characteristics	Town	Schley	Kelly	Scott	St. Croix Falls	Skanawan	Maple
	% public and industrial	6	5	0	0	22	19
	Square Miles	48	37	31	32	36	32
	Housing Density	8.2	4.5	15.7	16.8	6	9.5
	% Forest	49	62	34	36	57	70
	Population	909	377	1287	1119	354	649
	Housing Units	395	168	488	538	216	303
Survey	Sample size	126	65	58	41	55	56
	Bad Addresses*	7	5	16	4	2	1
	Valid Responses	69	25	17	17	29	31
	Response Rate**	58.0%	41.7%	40.5%	45.9%	54.7%	56.4%

*Bad addresses were returned by the postal service or through direct contact from current resident indicating the respondent no longer lived at that address.

****Overall Response Rate of 51.4%**

Based on percentage of public and industrial land, square miles, housing densities, percentage of forests, populations, percentage of water (lakes and rivers) and housing units, towns were matched accordingly. The towns of Kelly in Bayfield County, St. Croix Falls in Polk County and Maple, in Douglas County were chosen to compare to the Lincoln County towns. A major attribute considered in the selection process was the amount of forested land matching the Lincoln County towns. For specifics on the relationship of town pairs refer to Table 1.

Procedure

The survey procedure used to conduct this study is adapted from Dillman's (2007) tailored survey design method using a five wave mailing with the following contacts:

- Contact#1: Introduction letter outlining the purpose of the survey
- Contact #2: Survey mailed
- Contact#3: A postcard reminder
- Contact #4: Survey mailed
- Contact #5: Postcard reminder

Variables

Data provided from respondents of the Northern Wisconsin Landowner Survey may open the possibilities of distinguishing a landowner into a group in order to determine if the landowner's belief systems impacts the likelihood to work with certain agencies or organizations.

- ***Demographics:***
  - Personal characteristics including: age, gender, education, political orientation, occupation, land ownership (acres), and income.
- ***Attitudes:***
  - Environmental Stewardship -- *defined here as positive "Environmental Attitudes"*
  - Property Rights -- *defined here as "Support for Government Involvement"*
  - Anticipated Personal Consequences of Development
  - Trust in Organizations
  - Views of Alternative Land Use Regulations
  - Future Plans for the Property
  - Self-reported Landowner Typology -- *adapted from Butler (2007)*

In the following sections you'll find a detailed description of the procedure used to develop aggregate measures of the attitudinal variables. This process uses exploratory factor analysis techniques to support the development of valid, reliable measures of these complex attitudinal constructs by analyzing patterns of responses to items from the survey data.

The steps involved in the attitudinal scale development process include:

- **Step 1:** Initial development of scale items
- **Step 2:** Data collection
- **Step 3:** Data cleaning (correcting errors in data entry)
- **Step 4:** Reverse coding negative items
    a. *Note:* Reverse coding is a planned, intentional procedure designed to allow presenting survey respondents with a range of both positive and negative evaluations of the target attitudinal object. The coding on the "negative" items are reversed to align with the positive items prior to factor analysis so that the directionality is the same. This means that disagreement with a "negative" item is treated in the analysis as being equivalent to agreement with a "positive" item.
- **Step 5:** Factor analysis
    a. Number of underlying latent attitudinal constructs identified (also referred to as factors)
    b. Determination of items loading on primary or secondary latent constructs
    c. Secondary factor analysis to establish percent variance explained by "selected" items representing attitudinal construct
- **Step 6**: Reliability analysis
    a. *Note:* A minimum number of 3 items is necessary for construction of an attitudinal scale, as well as a Cronbach's Alpha score of .600 that represents the key statistic from the reliability analysis (Devellis, 2003).
- **Step 7:** Summated rating scale construction
    a. *Note:* Establishes an aggregate score for the attitudinal scale based on simple formula: $SumIndex = item_a + item_b + item_c + etc.$

***Note:* If you are interested in using any of the attitudinal scales developed as part of this research please contact Dr. Aaron Thompson to request permission & receive updates prior to use.**

Aaron Thompson, Ph.D.
Assistant Professor of Natural Resource Planning,
Land Use Specialist -- Center for Land Use Education
College of Natural Resources
University of Wisconsin - Stevens Point
TNR Addition 207
Stevens Point, WI 54481
Phone: 715.346.2278
E-mail: aaron.thompson@uwsp.edu

Environmental Attitudes

In order to demonstrate the development process for attitudinal scales the following will present additional detail on the steps involved in the process for the Environmental Attitudes Scale.

Steps 1-4

The development of a forest landowner specific measure of environmental attitudes was based on adapting Thompson's (2010) attitudinal scale for measuring environmental stewardship attitudes among Midwestern agricultural landowners. Specifically, alterations to this existing measure focused on 4 sub-dimensions, including: environmental impact of activities on their land, required effort to manage for broader environmental quality objectives, social feedback or impact on neighbors and community, and change in income or leaving money on the ground to protect environmental quality.

The result of this scale development process is twelve items measuring different aspects associated with the sub-dimensions. The items are presented below in the order that they appeared in the survey, alternating positive and negative (N) items with regard to pro-environmental stewardship attitudes.

Environmental Attitudes: Survey Items

1. I believe the forest manages itself better if left alone from human impact.
2. (N) When managing my land it is important to maximize profits even if some damage is done to the health of natural areas (such as woodlands).
3. The natural areas on my land are part of the heritage of my land and should be maintained for the benefit of future generations.
4. It is my responsibility to leave my land in better condition than when I first began to manage it.
5. (N) How I manage my land has little impact on the quality of natural areas in the rural landscape.
6. As a landowner, I feel that I am responsible for protecting the environment by ensuring that extra effort is taken to prevent soil erosion and protect wildlife habitat.
7. (N) I believe it is too costly to take the extra effort necessary to safeguard streams and other wildlife habitat on my property.
8. Healthy woodlands are managed for more than just timber production.
9. I carefully consider how my management activities impact the health of my neighbors land before undertaking new projects.
10. Protecting the natural areas on my land improves the quality of life for other members of my community.
11. (N) The primary role of working lands (such as forests and farmland) is to provide resources that support jobs.
12. I am willing to sacrifice income in order to ensure that natural areas on my land are protected.

Steps 5-7

The result of the factor analysis process revealed multiple factors, demonstrating that the positive and negative items included in the survey were not measuring the same underlying attitudinal construct. While both the positive and negative items were both subsequently reviewed separately, the only reliable scale to emerge was from the positive items as shown in Table 2 below.

We can see from the key statistics that these item account for a large percentage of variance within a single factor, meaning that there is reason to believe that when combined that they are representative of a single attitude construct – positive environmental stewardship attitudes. Additionally the Chronbach's alpha score is well within an acceptable range for reliability, which suggests that should these items be tested again with a different set of respondents (with similar characteristics) that they would again hold together as a scale.

Table 2. Environmental Stewardship Scale

Items developed to identify pro-environmental stewardship attitudes.
Factor Analysis: Percent variance explained by Factor 1 = 50.4%; Chronbach's Alpha = .743

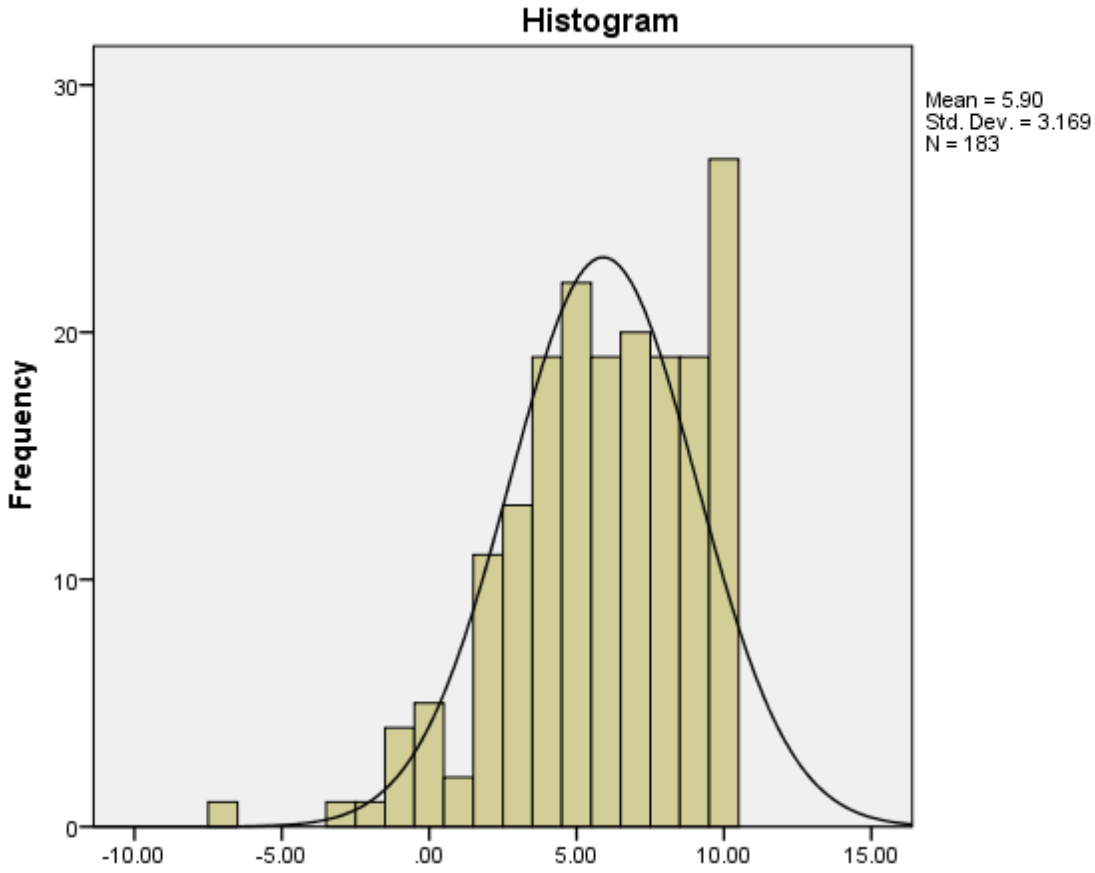
1) The natural areas on my land are part of the heritage of my land and should be maintained for the benefit of future generations. (.731)
2) It is my responsibility to leave my land in better condition than when I first began to manage it. (.770)
3) As a landowner, I feel that I am responsible for protecting the environment by ensuring that extra effort is taken to prevent soil erosion and protect wildlife habitat. (.679)
4) Protecting the natural areas on my land improves the quality of life for other members of my community. (.655)
5) I am willing to sacrifice income in order to ensure that natural areas on my land are protected. (.708)

Measured using a 5 point response scale from strongly disagree (-2) to strongly agree (+2). Item loading scores shown in parenthesis for un-rotated solution.

Once these items had been identified as composing a single scale a composite score was calculated for each survey respondent by using the formula: *Sum.EnvStewardship = Item01 + Item 02 + Item03 + Item04 + Item05* from Table 2. This means that an individual who marked strongly agree (+2) for each item would have a composite score of 10.

The last step in development involved running descriptive statistics for the summated attitudinal scale. Examining the mean and response distributions shown in Figure 1 we can observe that most respondents hold positive environmental attitudes, although the strength of these attitudes varies largely between neutral and strongly agree.

Figure 1. Descriptive Statistics for Environmental Attitudes Scale



Support for Government Involvement

The construction of this scale is similar to that of the Environmental Attitudes Scale in that it is also adapted from Thompson's (2010) work with agricultural landowners. However, in pre-testing and review phases this scale required significantly less modification. Items were generally left intact and wording substitutions were made to focus on forestland. Table 3 shows that all items included on the survey (once negative items were reverse coded) remained in the scale following factor analysis. This results is likely due to the consistency with a previously tested measure of government involvement. The recoding places directionality of this scale as being a measure of support for government involvement.

Table 3. Support for Government Involvement Scale

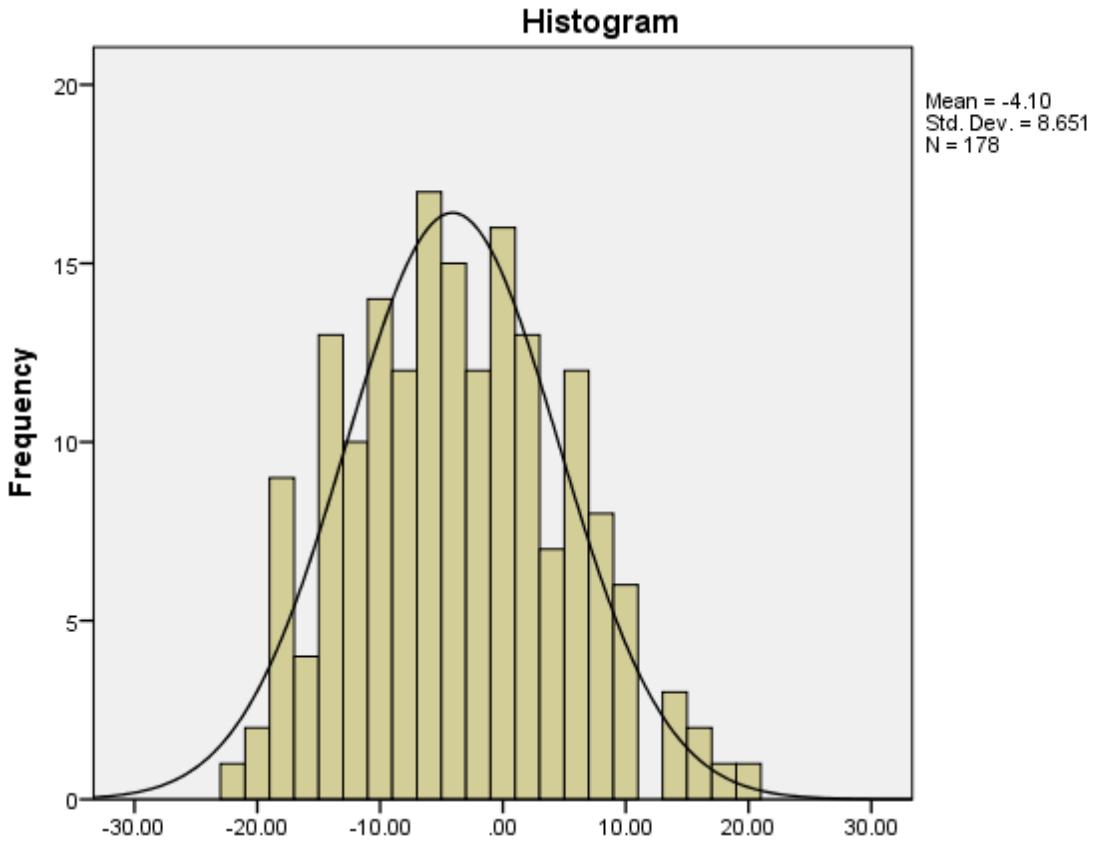
Items developed to identify positive views of government involvement – *NOTE: negative (N) items have been reverse coded for inclusion in this scale*
Factor Analysis: Percent variance explained by Factor 1 = 40.3%; Chronbach's Alpha = .846

1. Government expertise is essential to addressing problems facing woodlands in my community. (.824)
2. (N) Local residents are better at addressing issues concerning the future of woodlands in my community than the government. (.690)
3. Private property is a right created by government and can be changed over time as the needs of society change. (.488)
4. (N) Alternative approaches to forest management, such as Timber Stand Improvement, are often due to the innovation and ingenuity of landowners themselves, not government intervention. (.632)
5. Government intervention is the only way to ensure that the forested landscape is protected for the use of future generations. (.632)
6. (N) Government involvement negatively impacts my ability to manage my land by attempting to control what practices I use. (.627)
7. Government subsidies (such as tax credits) are necessary to ensure that woodlands are appropriately managed for the benefit of my community. (.547)
8. (N) The government should not be allowed to regulate land management practices on private property, even if current activities have the potential to negatively impact others. (.689)
9. Government agencies are an important partner that assists in the management of my land. (.678)
10. (N) Government programs do not provide me the flexibility that is needed to appropriately manage my land. (.673)
11. It is okay for government regulations to treat landowners differently due to a property's size or location which may result in some properties having a larger impact on environmental problems. (.411)

Measured using a 5 point response scale from strongly disagree (-2) to strongly agree (+2). Item loading scores shown in parenthesis for un-rotated solution.

Unlike the descriptive statistics for the Environmental Attitudes Scale we observe a more normal distribution of the data for the Support for Government Involvement Scale. It should be noted that the average respondent does hold a negative view of government involvement, but responses span nearly the entire possible range (-22 to +22) and follow a normal distribution.

Figure 2. Descriptive Statistics for Support for Government Involvement



Anticipated Personal Consequences of Development

Respondents were asked to describe their level of agreement with statements about the impacts of new housing construction and housing development in their communities. Responses were collected on a 5-point Likert-type scale ranging from (-2) Strongly Disagree to (+2) Strongly Agree.

Table 4. Anticipated Personal Consequences of Development Scale

Items developed to determine views of new development and the potential negative consequences perceived by the respondents.

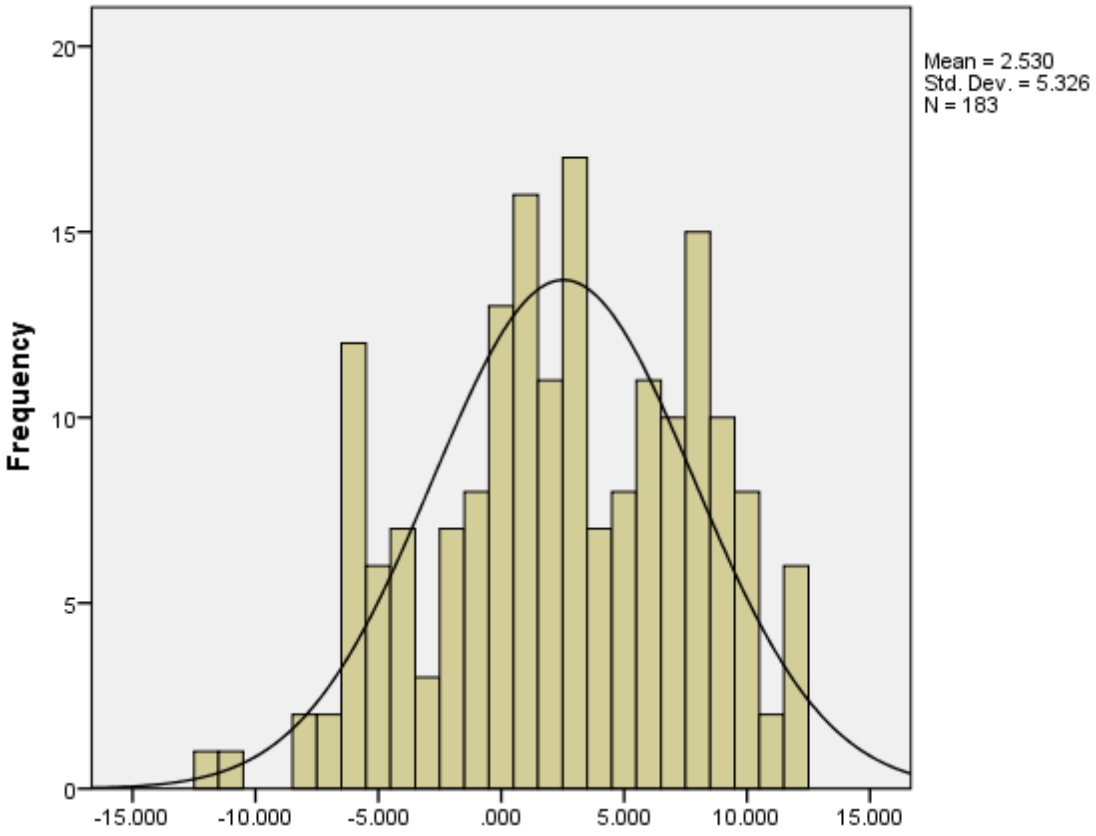
Factor Analysis: Percent variance explained by Factor 1 = 59.7%; Chronbach's Alpha = .865

1. New development in my community decreases my heirs desire to take ownership of my land. (.714)
2. New development in my community negatively impacts the beauty of my land. (.856)
3. New development increases the likelihood of negative interactions with members of my community. (.683)
4. New development decreases the quality of hunting in the area of my community. (.787)
5. New development in my community is disruptive to the timber production of the area. (.771)
6. New development in my community interferes with nature by decreasing the number and types of wildlife that are present now. (.815)

Measured using a 5 point response scale from strongly disagree (-2) to strongly agree (+2). Item loading scores shown in parenthesis for un-rotated solution. Items removed: (1) "New development in my community increases property value."

The purpose of this aggregate index is not to specifically identify the direct perceived impact, but rather to understand whether or not an individual sees new development as having negative impacts on their enjoyment or use of the forest in their community. As shown in Figure 3, the results indicate a broad range of views toward the consequences of new development.

Figure 3. Descriptive Statistics for Anticipated Personal Consequences of Development Scale



Trust in Organizations

Respondents were asked to rate their willingness to work with each of the following organizations based on past experience or opinions on a scale from (+2) Very Likely to (-2) Very Unlikely. The list was compiled from internet searches and discussions with family forest educators about different groups operating in northern Wisconsin that may be in a position to work with landowners and communities addressing forest fragmentation.

1. **U.S. Forest Service:** A federal agency that does not provide direct assistance or services to landowners.
2. **U.S. Fish and Wildlife Service:** A federal agency that provides landowners financial and technical assistance and services in the design and implementation of wildlife habitat practices.
3. **U.S. Natural Resources Conservation Service:** A federal agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.
4. **Wisconsin Department of Natural Resources:** A state agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.
5. **University of Wisconsin Extension:** Local university professionals that provide landowners educational programs and publications.
6. **County Land Conservation Department:** Local government agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.
7. **Forest Cooperatives:** Non-governmental organizations that provide landowners educational opportunities and technical assistance.
8. **Woodland Owner Organizations:** Organizations that provide educational opportunities to nonindustrial forest landowners.
9. **Land Trusts:** Non-profi t organizations (such as The Nature Conservancy) that provide educational opportunities and technical assistance to landowners.
10. **Private Enterprises:** Companies that provide landowners technical assistance.
11. **Knowledgeable Neighbors / Advocates:** Local citizens that provide landowners educational opportunities.

Analysis of responses to these items revealed two distinct factors that show a distinction between agencies and local partners. The Trust in Agency Scale included items 2 through 6 and the Trust in Local Partners Scale accounted for items 7 through 11 as shown in Table 5 below.

Table 5. Two Trust Scales

Trust in Agency Scale *VE: 65.1%; Chronbach's Alpha=.862*	**Trust in Local Partners Scale** *VE: 52.0%; Chronbach's Alpha=.756*
U.S. Fish and Wildlife Service	Forest Cooperatives
U.S. Natural Resources Conservation Service	Woodland Owner Organizations
Wisconsin Department of Natural Resources	Land Trusts
University of Wisconsin Extension	Private Enterprises
County Land Conservation Department	Knowledgeable Neighbors / Advocates

In Figures 4 and 5 we can also see that trust with these different types of partners does not uniformly lean in either direction. Rather we see mean scores (2.24 and 2.30) that are very similar and a normal distribution on both scales that indicates that respondents reported strong views toward both partner types.

Figure 4. Descriptive Statistics for Trust in Agencies Scale

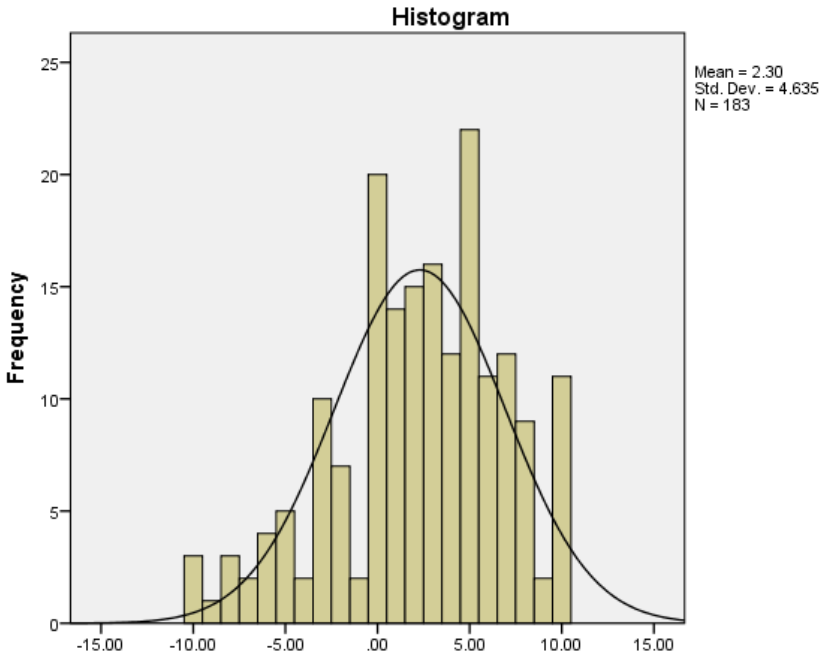
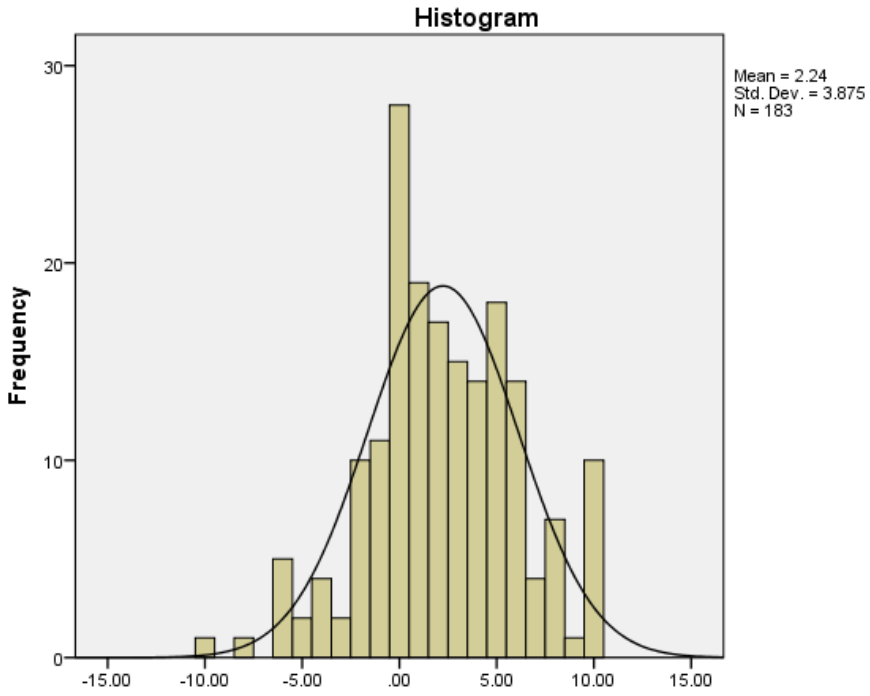


Figure 5. Descriptive Statistics for Trust in Local Partners Scale



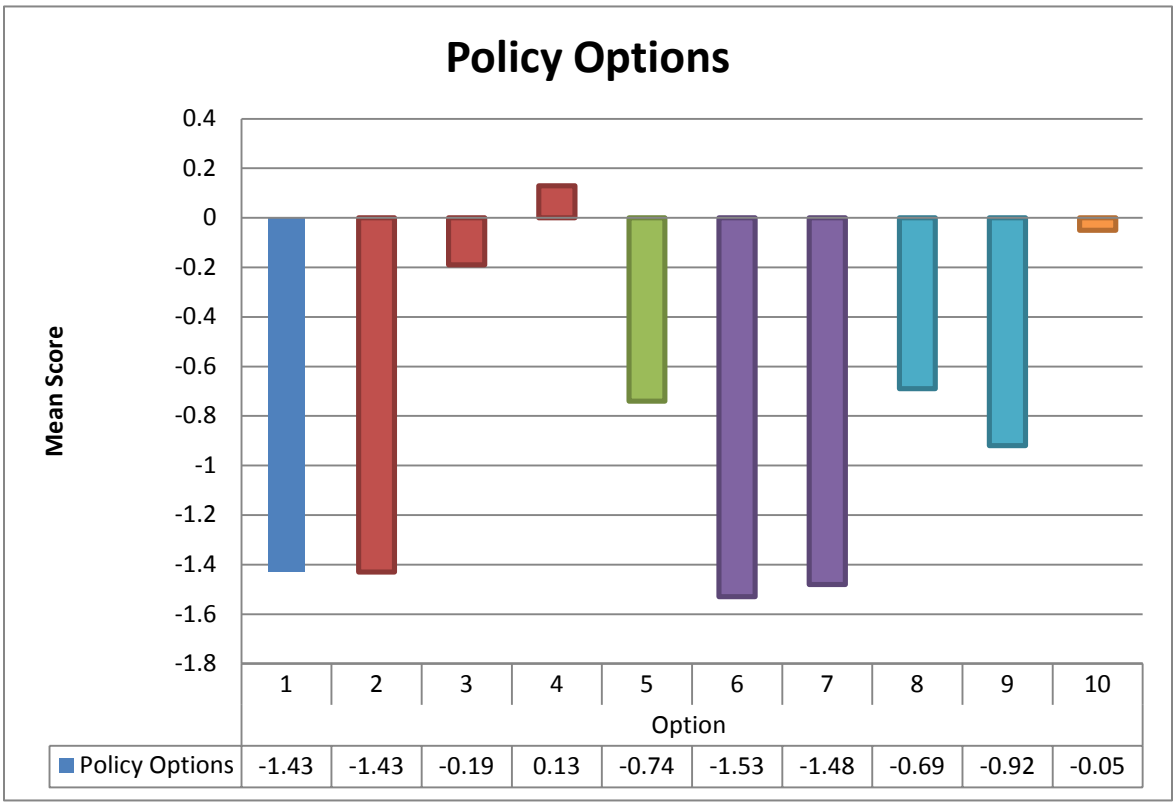
Views of Land Use Policy Alternatives

Survey respondents were asked to respond to each of the following land use policies when considering community regulations for the development of a 40 acre parcel in their community. The ten policies shown below reflect a range of approaches including no action, minimum lot sizes, maximum lot sizes, cluster development, and access strategies that a community could incorporate into subdivision or zoning ordinances to control the rate of forest conversion to new residential development.

1. Not restrict development, which would allow landowners to develop as many new homes as they would like.
2. Require a minimum lot size of 1 acre, which would allow up to 40 new homes to be built on this property.
3. Require a minimum lot size of 10 acres, which would allow up to 4 new homes to be built on this property.
4. Require a minimum lot size of 40 acres, which would allow only 1 new home to be built on this property.
5. Not allow development of any new homes on woodland in the community.
6. Allow up to 40 new homes to be built on this property, but require that the lots for each are no larger than 1 acre.
7. Allow up to 20 new homes to be built on this property, but require that the lots for each are no larger than 2 acres.
8. Require that any new homes be built clustered close together by restricting development to no more than 10 acres of the property, which would leave the remaining 30 acres as woodland.
9. Require that any new homes be built clustered close together by restricting development to no more than 20 acres of the property, which would leave the remaining 20 acres as woodland.
10. Only allow new homes to be built adjacent to existing roads, which would limit the overall number of homes that could be built in the community.

The descriptive statistics shown in Figure 6 indicate broad-based negative sentiment for many of the policies. Specifically, we see more innovative polices like maximum lot size approaches (items 6 & 7) and cluster development (items (8 & 9) having little support from landowners. However, there are also some positive indications within these results as well as “no regulation” (item 1) and weak minimum lot sizes (item 2) were also strongly opposed by survey respondents. While only receiving a neutral response to their likelihood of landowner support we also see that 40 acre minimum lot sizes (item 4) and restrictions based on access to existing roads (item 10) received the most positive support among the options presented.

Figure 6. Descriptive Statistics for Land Use Regulation Policy Alternatives



Based on these results a factor analysis was conducted to identify whether or not responses to these items grouped together in any meaningful pattern. One such pattern emerged from the exploratory analysis, revealing a common underlying construct best described as restrictive development policy that consisted of items 4, 5, and 10. Scale and descriptive statistics for the summated attitudinal scale constructed from these items are shown in Table 6.

The descriptive statistics, shown in Figure 7, provide some insight into the complexity of developing policy in response to forest fragmentation in these communities. These results indicate a diversity of opinions on appropriate development regulations with all possible scale values represented across a continuum from very likely to support (+6) to very unlikely to support (-6) the policy approaches. While the mean of -.67, shown in Figure 7, indicates that the average respondent is unlikely to support these restrictive development policies there is also strong support and opposition represented at either extreme.

Table 6. Willingness to Accept Restrictive Land Use Regulations Scale

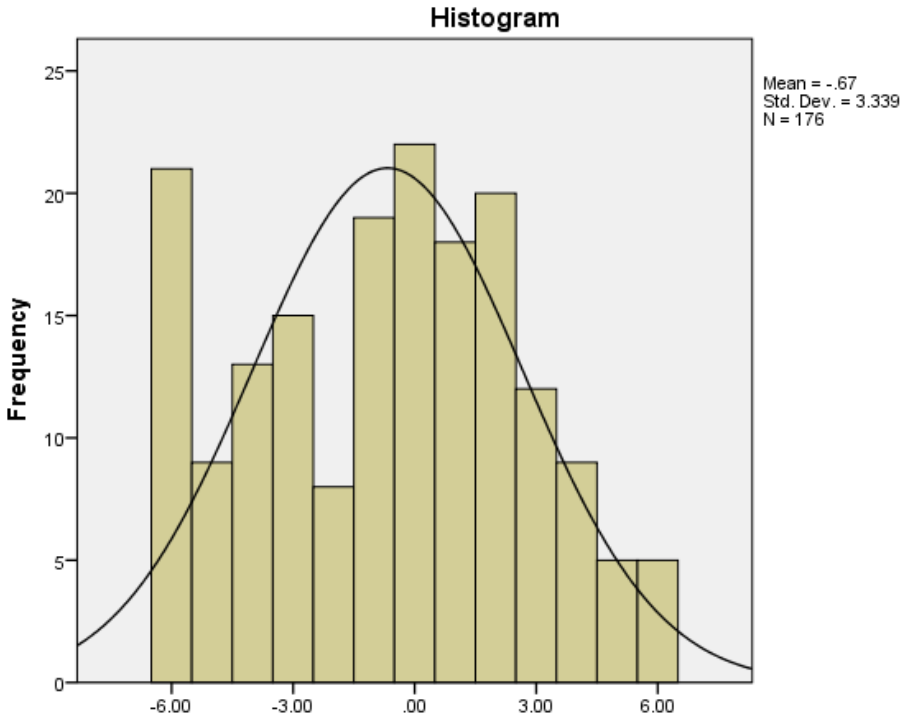
Items developed to determine willingness to accept more restrictive land use regulations in order to prevent forest fragmentation in their community.

Factor Analysis: Percent variance explained by Factor 1 = 62.2%; Chronbach's Alpha = .696

1. Require a minimum lot size of 40 acres, which would allow only 1 new home to be built on this property. (.842)
2. Not allow development of any new homes on woodland in the community. (.757)
3. Only allow new homes to be built adjacent to existing roads, which would limit the overall number of homes that could be built in the community. (.765)

Measured using a 5 point response scale from strongly disagree (-2) to strongly agree (+2). Item loading scores shown in parenthesis for un-rotated solution.

Figure 7. Descriptive Statistics for Willingness to Accept Restrictive Land Use Regulation Scale



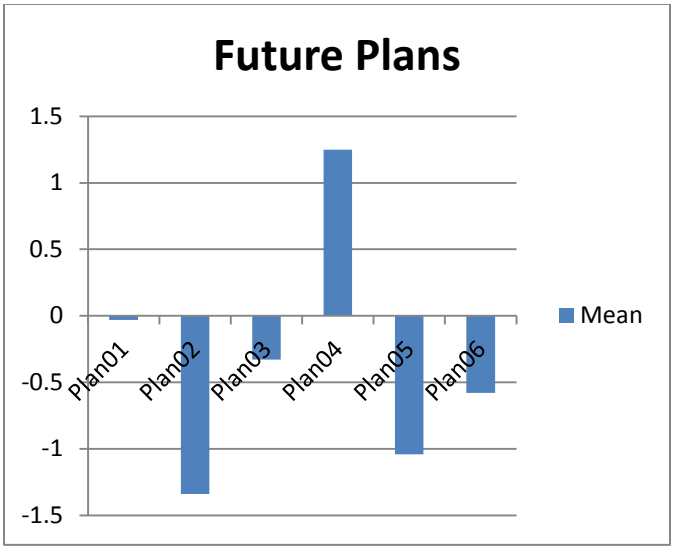
Future Plans

Respondents were also asked to indicate their future plans for the land by responding with how likely they are to undertake the actions listed below. Responses were coded from (+2) Very Likely to (-2) Very Unlikely.

1. Sell your property if you are offered a reasonable price.
2. Sell your land to someone who is interested in subdividing and developing the property.
3. Harvest the timber on your woodland to meet short term financial obligations but retain the property.
4. Pass your land on to your heirs.
5. Donate your land to a conservation organization.
6. Make an agreement with a conservation organization that will ensure the land stays wooded forever.

Figure 8 shows that most landowners are unlikely to sell their land for subdivision (item 2), but responses also indicate that the average respondent is unlikely to take steps to ensure the land remains forested (item 6). The strongest support and most likely future for the average respondent is that they will pass their land on to their heirs.

Figure 8. Descriptive Statistics for Future Plans for Land (not a scale)



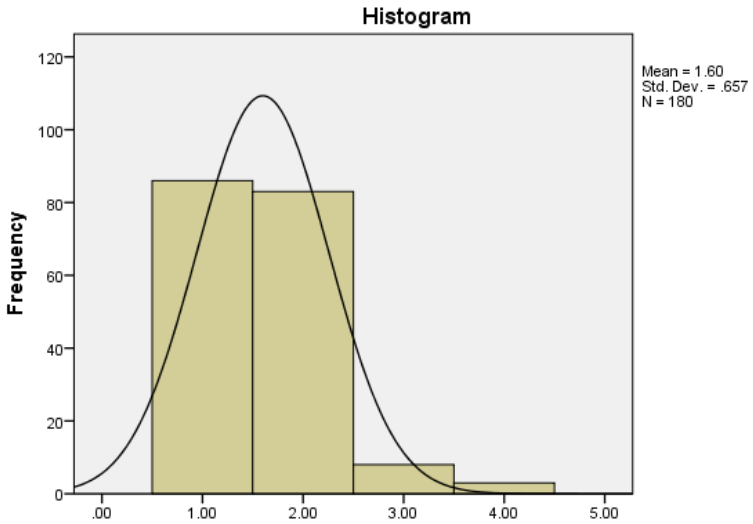
Reasons for Owning

The final variable was included to build on the work of Butler et al. (2007) who using results from the National Woodland Owner Survey identified 4 types of landowners based on their environmental attitudes and level of involvement in land management activities. For this study we adapted this into a self-reported measure by asking respondents to self-identify with one of the landowner types listed below. It should be noted that the descriptions shown here were included with the titles and the "less involved owner" title was adapted to make it easier for respondents to relate to what was being asked.

1. **Woodland Retreat Owner:** I have a strong appreciation for amenity values such as aesthetics and privacy. These are the most important reasons for owning my land and are more important than financial motivations.
2. **Working the Land Owner:** I see woodlands for beauty, recreation, but also a financial asset for ongoing monetary returns.
3. **Supplemental Income Owner:** I own timber for financial reasons. I am active in the management of land by participating in activities such as timber harvests, cost-share programs, having a conservation easement or green certification, or have worked with a forester.
4. **Less Involved Owner** - I rarely spend time at the property and may be looking to sell soon. I may also own land for tax credits.

Respondents overwhelmingly selected into either the "Woodland Retreat Owner" or "Working the Land Owner" categories, as shown in Figure 9.

Figure 9. Descriptive Statistics for Self-Reported Measure of Reasons for Owning Forestland



Results

The results are broken down into four sections focusing first on identifying the characteristics of those who responded to the Northern Wisconsin Landowner Survey before moving on to results for each of the research objectives.

Respondent characteristics

The following sections provide an overview of respondent characteristics based on results from demographic data provided by the survey.

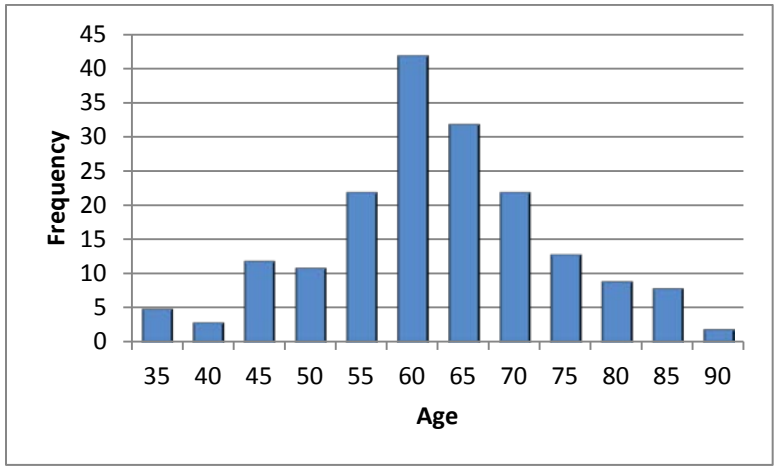
Age

The average age of respondents for this survey was 60.6 years with the a range from 89 to 31. Overall the distribution of ages was quite normally dispersed. Figure 10 highlights the general breakdown of age in histogram form. Almost half of all respondents, 44.4%, also indicated that they were retired.

Gender

Of the 179 respondents reporting, genders were overwhelmingly male. 88.3% of respondents indicated that they were males, with 11.7% of respondents indicating they were female.

Figure 10. Age by 5 year class intervals



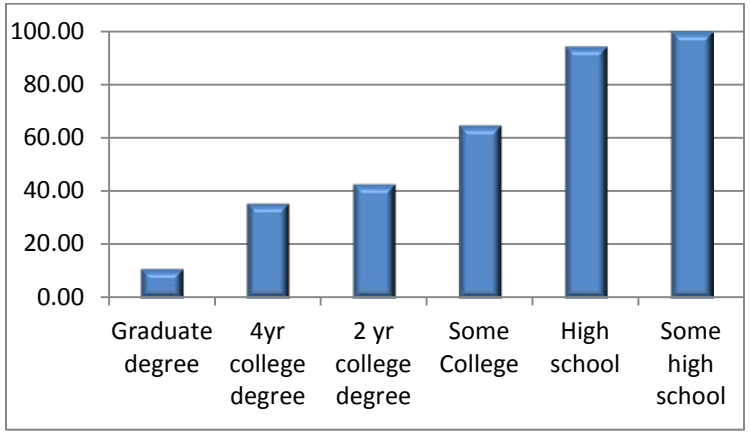
Education

The mode for this data indicates that a high school education was the most occurring level of education. While high school was the mode by itself, a large number of respondents (35.8%) indicated that they had either completed 4 years of college or a graduate degree. Well over 50% of respondents have completed at least "some college". Table 7 illustrates the full breakdown of education for the respondents.

Table 7: Education level

	Label	Frequency	Percent
Some high school	1	10	5.6
High school	2	53	29.6
Some College	3	39	21.8
2 yr college degree	4	13	7.3
4yr college degree	5	44	24.6
Graduate degree	6	20	11.2
Total	-	179	100.0

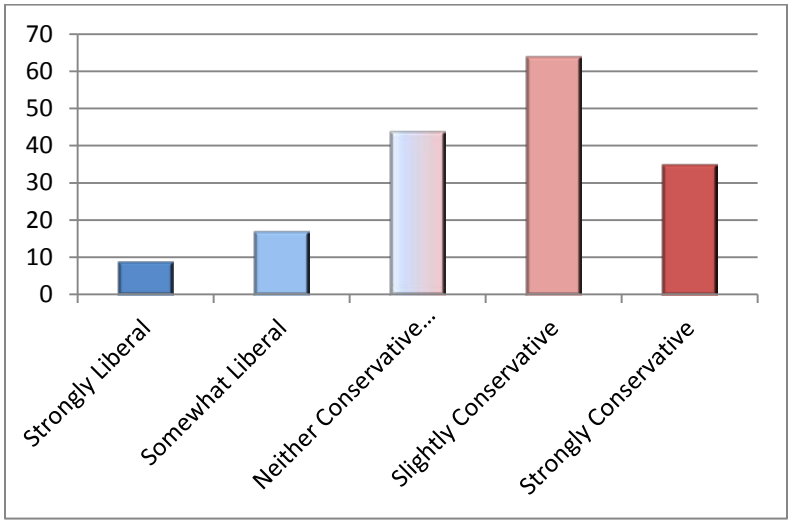
Figure 11. Cumulative education level by percent



Political Orientation

Overall 169 respondents indicated their political orientation. Of these respondents, 5.3% indicated they were "strongly liberal," 10.1% indicated they were "somewhat liberal," 26.0% indicated they were "neither conservative nor liberal," 37% indicated they were "slightly conservative," and 20.7% indicated that they were "strongly conservative." Investigation of figure 12 indicates that there is a slight negative skewness to the data, indicating that the sample is overall more conservative than liberal. The 57.7% of respondents that are either slightly or strongly conservative further emphasizes this non-normal distribution.

Figure 12. Political orientation



Occupational Information

Respondents were given the opportunity to write in their occupation. 167 respondents answered with an occupation, and these individuals were classified into general categories roughly based off of the NAICS classifications from the bureau of labor statistics. Table 8 highlights the occupation of the respondents in their respective category. Note that the largest sector of employment for respondents is agriculture, forestry, fishing, and hunting. This class is significantly larger, with 22.8% percent of respondents being employed in that sector with the next largest sector being construction at 10.8%.

Table 8: Occupations categorized by sector

Class Value		Frequency	Percent	Frequency Retired
1	Mining	2	1.2	1
2	Construction	18	10.8	8
3	Manufacturing	15	9.0	5
4	Utilities	2	1.2	1
6	Wholesale and Retail Trade	13	7.8	5
7	Transportation and Warehousing	8	4.8	3
8	Information	4	2.4	2
9	Financial Activities	6	3.6	1
10	Professional and Business Services	9	5.4	5
11	Educational Services	11	6.6	9
12	Health Care and Social Assistance	8	4.8	3
13	Other Services	13	7.8	0
14	Government	14	8.4	3
15	Agriculture, Forestry, Fishing, and Hunting	38	22.9	10
16	Military	2	1.2	14
17	Unemployed	3	1.8	2
	Total	166	100.0	72

"Frequency retired" indicates the number of respondents from that are now retired but previously worked in indicated sector.

Land Ownership

Survey respondents were asked to write in how much acreage they owned, farmed, managed for timber production, set aside for conservation, and finally whether they sold any land in 2011 within their town. This data was than classified into classes for easier interpretation. Results are listed below:

The average size of land ownership indicated by 177 individuals was 134.79 acres with a median of 110.0. The minimum was 0 acres, while the maximum was 900 acres. Table 9 shows land owned by the respondents.

Table 9: Acreage owned

Acres	Frequency	Percent
0-40	4	2.3
41-80	62	35.0
81-120	49	27.7
121-160	28	15.8
161-200	12	6.8
201-240	7	4.0
241-280	4	2.3
281-320	3	1.7
321-360	2	1.1
361-400	2	1.1
400+	4	2.3
Total	177	100.0

Table 10: Acres farmed (Row Crops or Pasture)

Acres	Frequency	Percent
0-40	85	60.7
41-80	33	23.6
81-120	8	5.7
121-160	4	2.9
161-200	4	2.9
200+	6	4.3
Total	140	100.0

A total of 140 individuals indicated a number of acres utilized for farming, with 47 people indicating that they did not use any acreage in their town for farming at all. The average number of acres farmed was 59.63 with a median of 28. The maximum number of acres farmed within the town was 1000. Note that the owners were not asked if the acres were owned by them or not, which explains the larger acreage being farmed as opposed to owned within the town. Table 4 shows the acreages indicated by respondents.

The same number of individuals (140) indicated how many acres they managed for timber production. The average number of acres was 54.34 with a median of 40.00. A total of 46 respondents specified that they had not set any of their land aside for timber production with the maximum acreage of 480. Table 11 shows the acreages in timber production listed by respondents.

Table 11: Acres in timber production

Acres	Frequency	Percent
0-40	81	57.9
41-80	33	23.6
81-120	14	10.0
121-160	4	2.9
161-200	2	1.4
200+	6	4.3
Total	140	100.0

Table 12: Acres set aside for conservation land

Acres	Frequency	Percent
0-40	101	82.1
41-80	15	12.2
81-120	5	4.1
121-160	0	0.0
161-200	2	1.6
Total	123	100.0

Only 120 individuals replied to the question asking if they had set aside any land for conservation. In this case, the mean was 18.67 with a median value of 0. A total of 86 respondents indicated that they had set aside no land for conservation purposes. The maximum specified by an individual was 200 acres. It is possible that more respondents have land set aside for conservation, but the way the question is worded, "During 2011, how many acres in the Town of ____ did you set aside for conservation," it could be interpreted as only asking them how many acres they set aside during that year, not how many acres total they have set aside as conservation land.

Unfortunately, no comments show if that is what respondents thought or not. Table 12 shows the acreages individuals designated for conservation.

Very few respondents said that they had sold land to others during 2011. 120 of the 126 respondents who replied to this question indicated none of their land had been sold. The maximum acreage sold was 80 acres by one respondent. The mean for this data was 1.26 acres and the median was again 0. Table 13 highlights acres sold by respondents.

Table 13: Acres sold in 2011

Acres	Frequency	Percent
0-20	123	97.6
21-40	2	1.6
41-60	0	0.0
61-80	1	0.8
Total	126	100.0

Income

When asked to indicate how much income comes from of their land, 139 of 159 respondents indicated that they made less than $10,000 yearly from the land they own. 20 respondents indicated that they made between $10,000 and $49,999. The other categories had far fewer individuals, with the maximum of $1,000,000 or more being indicated once. Table 14 indicates all results from the question.

Table 14: Income level

	Frequency	Percent
Under $10,000	129	81.1
$10,000 -- $49,999	20	12.6
$50,000 -- $99,999	2	1.3
$100,000 -- $174,999	1	.6
$175,000 -- $249,999	2	1.3
$250,000 -- $499,999	4	2.5
$1,000,000 or more	1	.6
Total	159	100.0

Objective 1: *Identify factors that influence landowner support for innovative planning approaches to address forest fragmentation*

Hypothesis 1: Landowner willingness to accept more restrictive land use regulations is influenced by individual attitudes toward anticipated personal consequences of development, environmental stewardship, property rights, trust in agencies, trust in local organizations, and demographic or parcel characteristics.

Analysis Process

The purpose of this analysis is to determine what attitudinal or demographic variables exert influence over an individual landowner's willingness to support restrictive development regulations. Two separate regression models were constructed to test the influence of independent variables identified in Hypothesis 1.

Model H1A: The first model uses a linear regression model to determine which of the independent variables (predictors) influence the respondent scores on the Restrictive Development Regulations Scale (dependent variable). The model focuses on evaluating the expected relationship between attitudes (Environmental Stewardship, Support for Government Involvement, Anticipated Consequences of Development, Trust in Local Organizations, Trust in Agencies) and behavioral intention identified by the Theory of Planned Behavior (Ajzen, 1991). In addition 3 control variables representing demographic (age and education) and parcel characteristics (acreage owned by individual) are also included.

- ***Model H1A: Ordinary Least Square Regression***
  - Dependent Variable: Restrictive Development Regulation Scale
  - Predictors: Environmental Stewardship, Support for Government Involvement, Anticipated Consequences of Development, Trust in Local Organizations, Trust in Agencies, Acreage, Age, Education

As described in the methods the Willingness to Accept Restrictive Land Use Regulations Scale is a summated score composed of positive or negative evaluations of 3 policies, including:

1. Require a minimum lot size of 40 acres, which would allow only 1 new home to be built on this property.
2. Not allow development of any new homes on woodland in the community.
3. Only allow new homes to be built adjacent to existing roads, which would limit the overall number of homes that could be built in the community.

Model H1B: The second model replaces the summated attitude scale dependent variable with a single question drawn from responses to the build out scenario that we will focus on in Research Objective 2. After being presented with a map showing a future build-out scenario of their community based on current land use regulations (shown in Figure 17) respondents were asked to fill in the blank in the following statement with "absolutely necessary", "neutral", or "not necessary":

1. Regulations are _____ to prevent the future scenario shown in this map.

Following data entry these responses were recoded into a binary measure to compare respondents who felt that regulation was "absolutely necessary" (scored as a 1) to those that were either "neutral" or felt that regulations were "not necessary" (scored as a 0). This allowed for a secondary look at support for regulations by tying them to a specific future scenario allowed by current policies in their community. The binary dependent variable resulting from collapsing these variables required a change in statistical test as a binary logistic regression allows for conducting this analysis.

- ***Model H1B: Binary Logistic Regression***
  - Dependent Variable: Regulations are: absolutely necessary=1, all other =0
  - Predictors: Environmental Stewardship, Support for Government Involvement, Anticipated Consequences of Development, Trust in Local Organizations, Trust in Agencies, Acreage, Age, Education

Results

Model H1A: Ordinary Least Square Regression Results

The model performed well by explaining more than thirty percent of the variance in the dependent variable (as shown by the R^2 = .302 in Table 15). Additionally, attitudinal variables dominate the variability in support for more restrictive development. Based on the standardized beta coefficients we can identify that:

- Anticipated personal consequences of development exert the strongest influence on willingness to support restrictive land use regulations.
- Support for government involvement also plays a significant role in the decision making process, which supports the connection between government action and policy.
- Environmental stewardship attitudes, while constrained by limited variation in the scaled measure, do exert an influence on the decision making process as well. However, this influence is weaker than the other significant attitudinal factors.

Table 15. Predictive Models for Objective 1

Variable	Model H1a	Model H1b B (sig.)	Exp (B)
Constant	-2.481	-.611	.543
Environmental Stewardship	.160 (.144)*	.008	1.008
Support Gov't Involvement	.085 (.215)**	.056**	1.057
Consequences of Development	.260 (.424)**	.167***	1.182
Trust in Local Organizations	-.101 (-.115)	.043	1.044
Trust in Agencies	-.033 (-.045)	.116**	1.123
Acreage	.000 (.004)	-.003	.997
Age	.019 (.062)	.026	.1.026
Education	-.084 (-.038)	-.304**	.738
N	147	150	
R^2	.302	.341 (Nagelkerke R^2)	

Significance: *** p value ≤ .01, ** p value ≤ .05,* p value ≤ .10; Standardized Beta coefficients are provided in parentheses for Model H1a.

Draft results may change for external publication.

Model H1B: Binary Logistic Regression Results

The binary logistic regression model provided a different set of results that add to our understanding of factors influencing support for restrictive development regulations. This model also seems to have outperformed Model H1A, but the Nagelkerke R^2 isn't a perfect comparison with OLS R^2 performance, so it's more likely that we should assume this is an indication of comparable model performance. Similar to the OLS model the influence of attitudinal variables on this secondary dependent variable is apparent, including:

- Anticipated personal consequences of development is also the dominate attitudinal variable in this model with odds ratio, or Exp (B), results showing that an increase in score of 1 point on this scale results in an individual being 18.2 percent more likely to report that regulations are "absolutely necessary".
- Support for government involvement is also significant, but again we see a much smaller effect as a 1 point increase on this scale results in an individual being 5.7 percent more likely to support regulations.
- Environmental stewardship attitudes are not significant in this model.
- Trust in agencies shows a significant, positive effect as a 1 point increase on this scale results in an individual being 12.3 percent more likely to support regulations.
- Interesting, but more difficult to interpret within the control variable structure is the significant, negative relationship between education and support for regulations. In fact,

as this is a negative relationship the interpretation needs to be flipped to show the strength of this variable's influence. To achieve this result an inverse of the odds ratio is calculated using the formula (Inv.Edu = 1/.738) that shows an increase of 1 educational category results in an individual being 35.5 percent more likely to oppose regulation.

Hypothesis 2: Landowners in municipalities with more innovative planning regulations will perceive the impacts of landscape fragmentation as a greater threat than landowners in municipalities using traditional planning approaches.

The purpose of testing Hypotheses 2 is to examine whether or not attitude variations exist between the township pairs included in this study. Specifically, based on the work conducted in the build-out scenario phase of this research there is an underlying consideration that Townships in Lincoln County have adopted more innovative land use regulations to address forest fragmentation than their paired towns -- as discussed in the executive summary:

> *This study benefits from the selection of townships in Lincoln County, Wisconsin that have already adopted innovative density-based zoning regulations to address forest fragmentation. These policies are intended to reduce fragmentation by encouraging clustering of homes through higher density residential development requirement and they are unique among counties in northern Wisconsin. The first phase of the research led to the development of spatially explicit build-out models to allow for visualizing future scenarios reflecting complete build-out based on current land use regulations for towns in Lincoln County paired with forest dominated townships in other northern Wisconsin counties. Based on this work it was determined that an average of more than 1,000 new homes could be built in each of the Wisconsin Townships included in the study. Additionally, it was found that that the Lincoln County towns would see 12 percent fewer homes and a 10 percent decrease in forestland loss compared with towns without density-based zoning.*

Before proceeding it is important to note the total number of survey responses from each of the townships shown in Table 16. The small number of responses, specifically in Scott and Saint Croix, do place some limits on the ability to quantitatively analyze the results. However, the small number of responses is largely reflective of the small number of landowners in these townships that own 60 acres or more as the response rate is above 40 percent for all townships in the study.

Table 16. Response Rate by Township

		Town Pair 1		Town Pair 2		Town Pair 3	
	County	Lincoln	Bayfield	Lincoln	Polk	Lincoln	Douglas
	Town	Schley	Kelly	Scott	St. Croix Falls	Skanawan	Maple
Survey	Sample size	126	65	58	41	55	56
	Bad Addresses*	7	5	16	4	2	1
	Valid Responses	69	25	17	17	29	31
	Response Rate**	58.0%	41.7%	40.5%	45.9%	54.7%	56.4%

*Bad addresses were returned by the postal service or through direct contact from current resident indicating the respondent no longer lived at that address.

****Overall Response Rate of 51.4%**

Analysis Process

- ***Step 1: Compare Attitudinal Differences across Townships***
  - Run descriptive statistics to understand attitude scores for variables proposed as relevant to landscape fragmentation.
  - Conduct an ANOVA with multiple comparisons to compare the mean attitudinal scores for the following variables across the six townships.
    - Variables compared: Anticipated Personal Consequences of Development Scale, Support for Government Involvement Scale, Trust in Agency Scale, Trust in Local Partners Scale, Environmental Attitudes Scale, Willingness to Accept Restrictive Land Use Regulations Scale

- ***Step 2: Compare Aggregate Results for Lincoln County***
  - Restructure the analysis by conducting an ANOVA with multiple comparisons to compare the mean attitudinal scores aggregated to Lincoln County versus non-Lincoln County Townships.

- ***Step 3: Compare Support for Specific Policies & Future Plans***
  - The last step involves breaking down the analysis by returning to a comparison of individual scale items for "Land Use Regulation Policy Alternatives" and "Future Plans." This was performed using a similar procedure to Step 2, but substituting the individual scale items for the scale scores while using an ANOVA with multiple comparisons to compare the mean item scores aggregated to Lincoln County versus non-Lincoln County Townships.

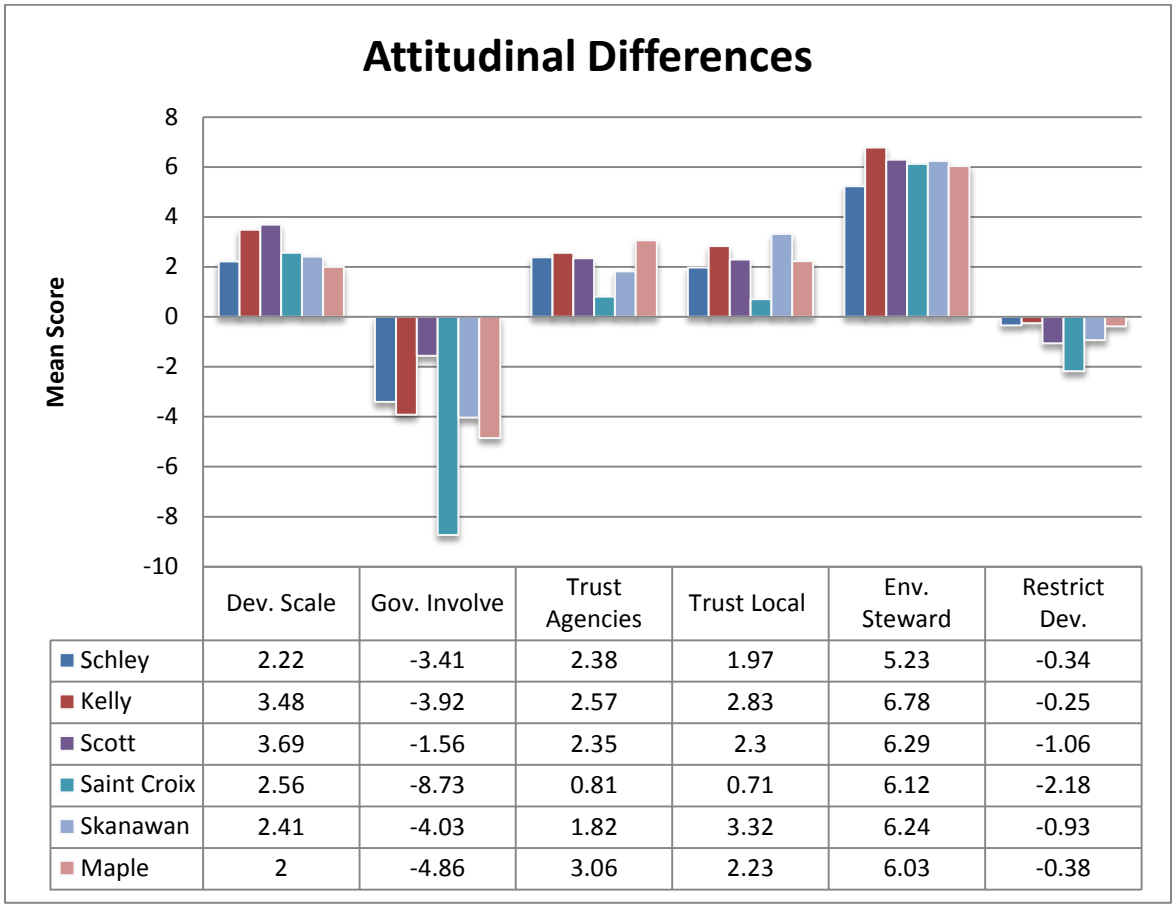
Results

The results of each step in the analysis provide evidence to reject the hypothesis as no significant attitudinal differences were identified in any of the three steps associated with this hypothesis. Despite this negative finding there are several interesting results that arose from these analysis steps.

Hypothesis 2 -- Step 1: Compare Attitudinal Differences across Townships

In Figure 13 a relatively constant mean response from each of the townships is shown. The average respondent generally agrees that new development is negatively affecting their community (Dev. Scale), generally disagrees that government agents and programs are beneficial for managing forests (Gov. Involve), shows some level of willingness to work with state and federal agencies (Trust Agencies) and local organizations (Trust Local), has a strong commitment to the environment and sees some responsibility for managing their land to preserve ecological health (Env. Steward), and is generally neutral to moderately against policies to severely restrict development in their community (Restrict Dev.). It should be noted that this consistency is confirmed by no significant differences in mean scores being identified by the ANOVA using multiple comparisons.

Figure 13. Attitudinal Differences between Landowners in 6 Townships



	Dev. Scale	Gov. Involve	Trust Agencies	Trust Local	Env. Steward	Restrict Dev.
Schley	2.22	-3.41	2.38	1.97	5.23	-0.34
Kelly	3.48	-3.92	2.57	2.83	6.78	-0.25
Scott	3.69	-1.56	2.35	2.3	6.29	-1.06
Saint Croix	2.56	-8.73	0.81	0.71	6.12	-2.18
Skanawan	2.41	-4.03	1.82	3.32	6.24	-0.93
Maple	2	-4.86	3.06	2.23	6.03	-0.38

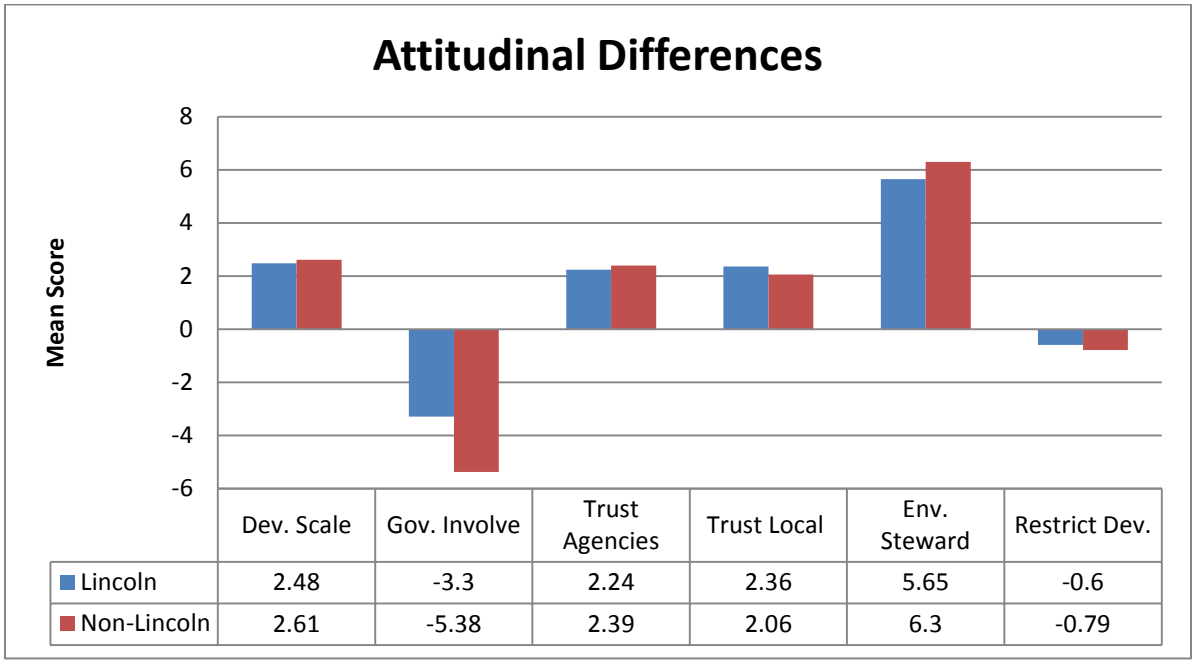
One possible exception to this overall pattern is that the results suggest that landowners in Saint Croix Township hold stronger anti-government attitudes, report lower levels of trust for both agency and local organizations, and are less favorable of restrictive development policies. However, these differences (while large in some instances) are not statistically significant in the ANOVA analysis comparing Saint Croix with the other 5 Townships. This result may suggest that something unique is occurring, but with the relatively small number of responses (n=17) received from Saint Croix the data is not available for more powerful statistical tests to examine these relationships.

Hypothesis 2 -- Step 2: Compare Aggregate Results for Lincoln County

The aggregate analysis of Lincoln versus non-Lincoln County Townships displayed many of the same properties of the results from Step 1. The survey results show little variation in mean scores between the two groups and no significant relationships were identified (see Table 14).

While not significant it is interesting to note that the scores for the Support Government Involvement Scale are more negative on average in non-Lincoln County Townships. This may give some indication that opposition to government involvement in managing the landscape may be slightly less in Lincoln County where stronger land use regulations have been successfully implemented.

Figure 14. Attitudinal Differences between Lincoln County & Non-Lincoln County Landowners



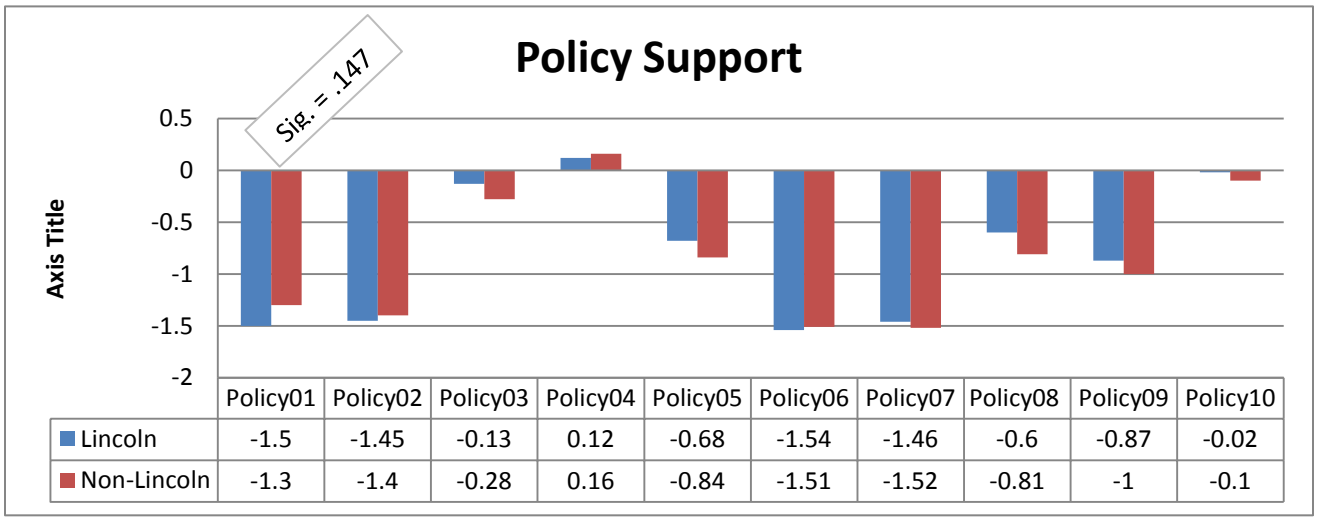
	Dev. Scale	Gov. Involve	Trust Agencies	Trust Local	Env. Steward	Restrict Dev.
Lincoln	2.48	-3.3	2.24	2.36	5.65	-0.6
Non-Lincoln	2.61	-5.38	2.39	2.06	6.3	-0.79

Hypothesis 2 -- Step 3: Compare Support for Specific Policies & Future Plans

In the final step in the analysis the results show again that no significant differences exist between townships in and outside of Lincoln County. There is some indication, though not significant, that residents of Lincoln County Townships are less supportive of inaction, or specifically lower agreement with the statement "Not restrict development, which would allow landowners to develop as many new homes as they would like." This strong opposition to no policy action to restrict development is an important indication that while landowners may not like many of the options available there remains incentive to act to address the problem.

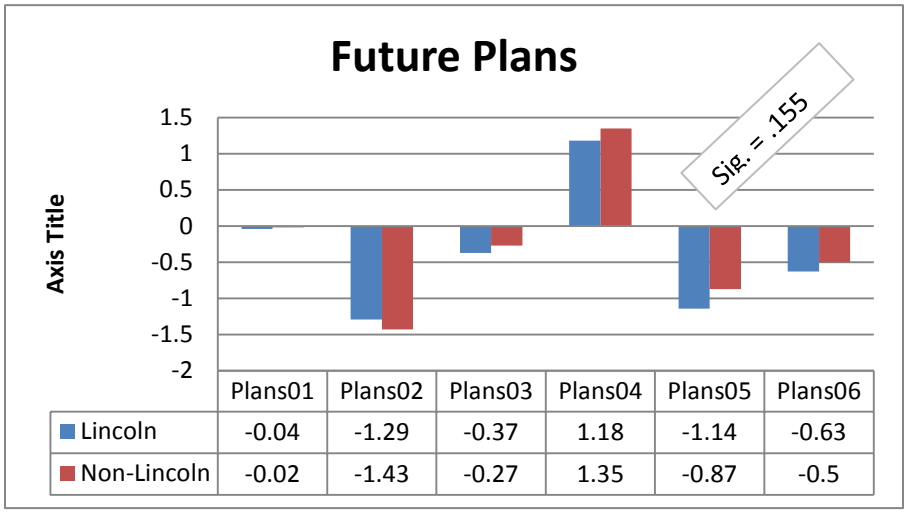
Also, landowners in Lincoln County indicated a slightly lower level of plans to "donate (their) land to a conservation organization" and the difference of means is approaching significance. However, the dominant future plan clearly remains to pass along the land to their heirs.

Figure 15. Policy Support ANOVA between Lincoln County & Non-Lincoln County Landowners



	Policy01	Policy02	Policy03	Policy04	Policy05	Policy06	Policy07	Policy08	Policy09	Policy10
Lincoln	-1.5	-1.45	-0.13	0.12	-0.68	-1.54	-1.46	-0.6	-0.87	-0.02
Non-Lincoln	-1.3	-1.4	-0.28	0.16	-0.84	-1.51	-1.52	-0.81	-1	-0.1

Figure 16. Future Plans ANOVA between Lincoln County & Non-Lincoln County Landowners



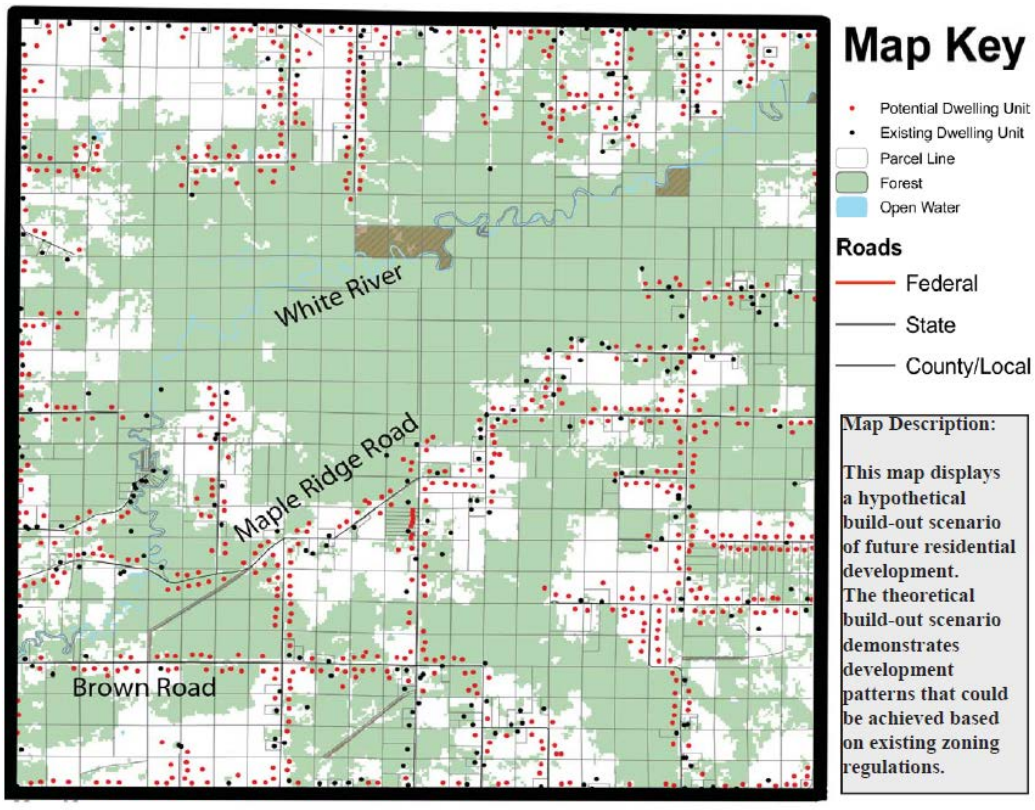
	Plans01	Plans02	Plans03	Plans04	Plans05	Plans06
Lincoln	-0.04	-1.29	-0.37	1.18	-1.14	-0.63
Non-Lincoln	-0.02	-1.43	-0.27	1.35	-0.87	-0.5

Objective 2: *Assess landowner response to the community build-out scenarios to identify opportunities and constraints to using these visualization tools to build support for community action to address forest fragmentation*

Build-out scenario maps, like the one pictured in Figure 17 for the Town of Kelly, were developed for each of the 6 townships. Residents in each of the communities received a copy of the survey with only their township build out scenario included. A set of map specific questions were asked to understand the effectiveness of the build-out scenarios as a communication tool for the public, including:

1. *(True or False)* The black dots represent the existing dwelling units.
2. *(True or False)* The red dots represent potential dwelling units.
3. Development is (a) _____ to the health of the woodlands in this community. *(Severe Threat, Neutral, Not a Threat)*
4. The situation shown on this map _____. *(Will Happen, Neutral, Will Not Happen)*
5. Regulations are _____ to prevent the future scenario shown on this map. *(Absolutely Necessary, Neutral, Not Necessary)*

Figure 17. Build-Out Analysis Map Example



Understanding: Map Information

Of those who responded to the question, "The black dots represent the existing dwelling units," 13 respondents of 173 (7.5%) answered incorrectly. Evidence in the comments though, may indicate that they understood what was being represented on the map, but disagreed with the data representation itself. A comment that may help to explain the respondents who inaccurately answered the question is, "the county map provided is inaccurate as to existing homes and this doesn't surprise me." While they seemed to comprehend what the data represented, it is likely that they chose to answer false because they disagreed with the accuracy of the data. These comments left referring specifically to map accuracy may help to explain why others answered incorrectly as well.

While only 7.5% of respondents answered the first map comprehensions questions incorrectly, 35 of 166 respondents (21.1%) answered the second questions referring to the "potential dwelling units" incorrectly. This begs the questions of why 22 more respondents selected the incorrect answer for the second questions regarding the build-out map. Some respondents left comments that provide insight into possible reasons for the increased frequency of incorrect answers. One respondent left a comment reading, "Potential dwelling units on this map is way too many. This is a(n) agriculture area." Another responded, "This increase in dwellings won't happen because of lack of employment opportunities." The first of these respondents answered the black dot question correctly, and the red incorrectly, indicating that they may have felt that the potential dwelling units simply weren't plausible, but comprehended what they represented. On the other hand, the second respondent whose example is shown above answered both questions correctly. It seems that both respondents understood the map according to their comments, but decided to answer the questions differently. It seems plausible that many of the respondents who answered "incorrectly" comprehended the data but disagreed with it and thus chose false.

Beliefs: Build Out Map

When asked whether development is or is not a threat to the health of woodland communities, 82 respondents of 179 (45.8%) stated that development is a severe threat to forest health. 33.0% were neutral on the matter, and 21.2% said that it was "not a threat."

A total of 55.1% of 178 respondents did not think that the build out situation portrayed on the map would happen. A much smaller percentage, 13.5%, thought that the situation portrayed on the map will happen in the future. The remainder of respondents was neutral on the matter. Some of the comments following this report indicate that people just don't see the development levels portrayed in the build out analysis as plausible.

A total of 52.0% of the 179 respondents indicated that they thought regulations were "absolutely necessary" to prevent the build-out scenario from occurring while 22.3 thought that regulations were not necessary. The remaining respondents were neutral on the matter. It is interesting that nearly 50% of respondents found regulations to be necessary, even though almost the same amount indicated that they did not think the scenario was likely to occur. This is likely

because they thought that some intermediate number of build out dwellings would occur and still thought regulations were needed to prevent it.

Responses to Build Out Map

Following is a list of feedback received on the mapping section of the survey from an open ended question at the end of the survey.

- "Potential dwelling units on this map is way too many. This is a(n) agriculture area."
- "I hope that in my lifetime I do not see all the future building sites on the map come true. That is a bad sign. If they want to build like that, go to the city and live there where they belong."
- "Timber production is necessary for both healthy forests and wildlife. The canopy needs to be opened up to allow new growth to occur, which is essential for wildlife. I would like to see clear-cuts a little small and broken up to create more edge habitat that is crucial for wildlife. I don't think that you will ever see the kind of the development that is on the map because there are not that many family sustaining jobs in the area."
- "Landowners right to manage without excessive government interference. The county map provide is inaccurate as to existing homes and this doesn't surprise me."
- "Your map is not accurate - Polk county has enacted drive-way access point you map assumes topography is 'flat' not the case."
- "I find this map confusing- it seems like the whole survey could be condensed and simpler. I bought the property to protect the land and forest as it is probably the only land with old growth oaks and would consider selling it to a conservation organization or even donate to protect the beautiful land and trees. I have been approached often by companies wanting to harvest the oak - I want to protect the trees and land."
- "At this point the economy has a number of effects. This increase in dwellings won't happen because of lack of employment opportunities. On the flipside, time is being harvested to help pay property taxes - which are quite high in Douglas County. Also there is a trailer court development next to my property which is really the ultimate in degradation of a natural area. This was established prior to the county invoking any sort of zoning rules. I have no answers on how to address... except owners should pay less tax in property tax. My taxes were actually bumped up a few years ago because I had forested land. Farmers pay less but not forested landowners. why?"

Supplemental Objective 1: *Conduct stakeholder analysis (using inverted-R) to develop typology of landowners' belief Systems*

Understanding the diversity of belief systems held by landowners that is composed of attitudes toward anticipated personal consequences of development, government involvement, and environmental stewardship.

Methods

An Inverted-R analysis using items found significant in the scale development (conventional-R analysis) for the anticipated personal consequences of development, government involvement, and environmental stewardship are inverted to develop a typology of stakeholders' belief systems. This method was developed for understanding the operant subjectivity of survey respondents toward community natural resources. This means that unlike normal factor analysis that groups together sets of items measuring a attitude construct, Inverted-R analysis produces clusters of individuals with similar belief systems based on their responses to survey items included in the analysis. The focus is on the person, or groups of respondents, and not the survey item in this analysis procedure.

The steps involved in the Inverted-R analysis are described below; however, for a more detailed description of this technique refer to Thompson et al. (2012).

- **Step 1:** Removal of incomplete responses
    a. *Note:* A total of 12 respondents were removed as part of this step.
    b. Additionally, having 100 percent of the responses for items included in the Inverted-R analysis is key as SPSS will not run this analysis with incomplete data.

- **Step 2:** Select included variables and transpose data
    a. *Note:* The option to transpose data is available in SPSS as a standard procedure.

- **Step 3:** Factor Analysis
    a. Note: This procedure is run in the same way as a traditional factor analysis with the exception that the unit of analysis is individuals and not scale items.

- **Step 4:** Selecting number of factors to retain
    a. *Note:* In this case the scree plot and subsequent review of the variance explained by each factor clearly showed 2 factors, but it was less obvious as to how many additional factors to review so scores for factors 1 through 5 were retained for the next step.

- **Step 5:** Individuals loading on factors
    a. *Note:* Scores from the Component Matrix are used to determine which belief system (or factor) each individual respondent most closely aligns with. In this analysis a factor loading score of .300 was established as a minimum threshold for inclusion. It should also be noted that many individuals loaded on more than 1 factor and in these cases belief system membership was established by the highest factor loading score.
    b. After an initial screening it was determined that 3 types of landowner belief systems best described the data. This was determined after loadings were examined across all factors and based on a determination that "Type I: Primary", "Type II: Secondary", and "Type III: Other" belief systems best described the data presented in the Component Matrix.

- **Step 6:** Descriptive statistics by factor (belief system)
    a. *Note:* This step requires returning to the non-transposed SPSS dataset and coding the belief system typology identified for each respondent. Descriptive statistics are then run as with any other nominal data classification scheme.

- **Step 7:** Graph Data (as shown in Figures 19-21)

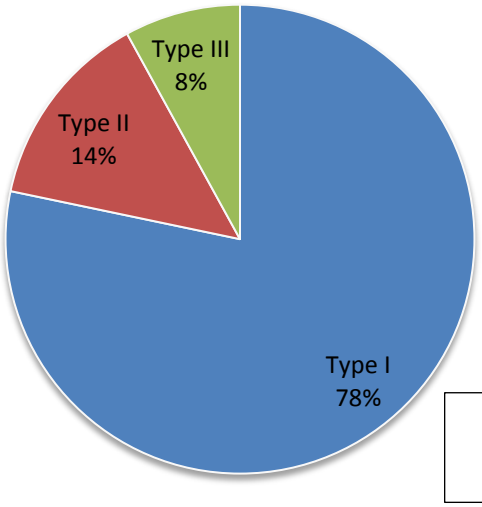
- **Step 8:** ANOVA with multiple comparisons to identify significant mean differences
    a. *Note:* The final step in the process is to determine if the differences observed in mean scores between the different belief systems are significant. To achieve this an ANOVA using multiple comparisons tests whether the difference in mean scores is statistically significant. A threshold of p (sig.) greater than or equal to .05 was used to establish statistical significance for this study.

Results

The results of the inverted R-Analysis revealed three forest landowner belief system types based on responses to attitudinal items designed to measure anticipated personal consequences of development, environmental attitudes, and support for government involvement. The inverted factor analysis process identified individuals within each of these categories that generally hold consistent views, while revealing patterns of differences with individuals in the other categories.

As shown in Figure 18 individuals affiliated with Type I represent a dominant belief system structure accounting for a similar set of attitudes held by 78 percent of respondents. Individuals in Type II represent a common belief structure unique from the dominant type and represent 14 percent of the population. The individuals who were classified into Type III actually represent an aggregate of those individuals who didn't fit into Type I or Type II. This was necessary to include the small number of individuals who were outside of the primary and secondary belief systems; however, these individuals collectively represent Factors 3, 4, and 5 from the factor analysis results. We have continued to include these responses as a comparison group while focusing on Types I and II so that their responses are not completely disregarded.

Figure 18. Belief System Typology by Percent of Total Respondents



Draft results may change for external publication.

Classifying Landowners' Belief Systems

- **Type I – Development Averse, Local Control Forest Stewards:** Their belief system (related to forest management) is dominated by a strong sense of environmental stewardship, while expressing a clear lack of support for government intervention and belief in the ability of local residents to resolve issues. Additionally, this group sees new development as holding a range of potential negative consequences that if left unchecked will decrease the quality of the forestland in their community.

- ***Anticipated Personal Consequences of Development***: This group of forest landowners on average holds strong, negative views of development. Their responses demonstrate that they believe development in their community will negatively impact them personally. In particular, individuals who hold this belief system most strongly agree with the statement, "New development decreases the quality of hunting in the area of community."

- ***Support for Government Involvement:*** Private property rights are frequently suggested as being a powerful force in land management. While the overall views of this group of individuals show that they do not support government involvement, one statement in particular stands out related to private property rights. The overwhelmingly negative response of this group to the statement, "private property is a right created by government and can be changed over time," shows a strong resistance to policies or approaches that may be viewed as changing an individual's property rights.

- ***Environmental Attitudes:*** This group of landowners holds strong positive environmental attitudes. One exception identified here was that this group was less likely to agree (mean score near neutral) to the statement, "Protecting the natural areas on my land improves the quality of life for other members of my community." This statement was designed to account for a sense of self-ascribed community responsibility that is encompassed by many definitions of environmental stewardship, so it is interesting to observe that agreement is not part of the dominant belief system in these northern Wisconsin towns.

- **Type II – Pro- Development and Government Involvement Forest Stewards:** The individuals who hold this belief system also have a strong sense of environmental stewardship for the forest while showing strong support for government involvement in managing the resource. Additionally, these individuals see little threat or negative consequences associated with future development in their community.

    - ***Anticipated Personal Consequences of Development***: Individuals who hold this belief generally disagree that development is a major threat to their community. In general this group disagrees with the statement, "New development in my community decreases my heirs desire to take ownership of my land." It can also be gathered from their responses to the other statements that there is little concern that development will negatively affect them in the future.

- ***Support for Government Involvement:*** The positive support for government involvement is apparent in this group's agreement with the statement, "Government expertise is essential for addressing problems facing woodland in my community." Additionally, their (reverse coded) support for government intervention is seen in response to item four that indicates their disagreement that innovation in forest management is the result of the ingenuity of landowners and not the government.

- ***Environmental Attitudes:*** This group of landowners, similar to those in Type I, generally hold strong positive environmental attitudes.

- **Type III – Other Views:** As an aggregate belief system category the respondents in this group represent "other" beliefs, or individuals that didn't fit within the larger Type I or Type II categories. This group is included in the analysis so that these respondents' belief systems are not lost or disregarded as a larger sample of forest landowners may reveal that these individuals are actually representative of a views that are more widely held and were simply minority views within the townships sampled for this study.

Figure 19. Results of ANOVA with Multiple Comparisons (Post Hoc Test: Games-Howell) for Type I and Type II Landowners

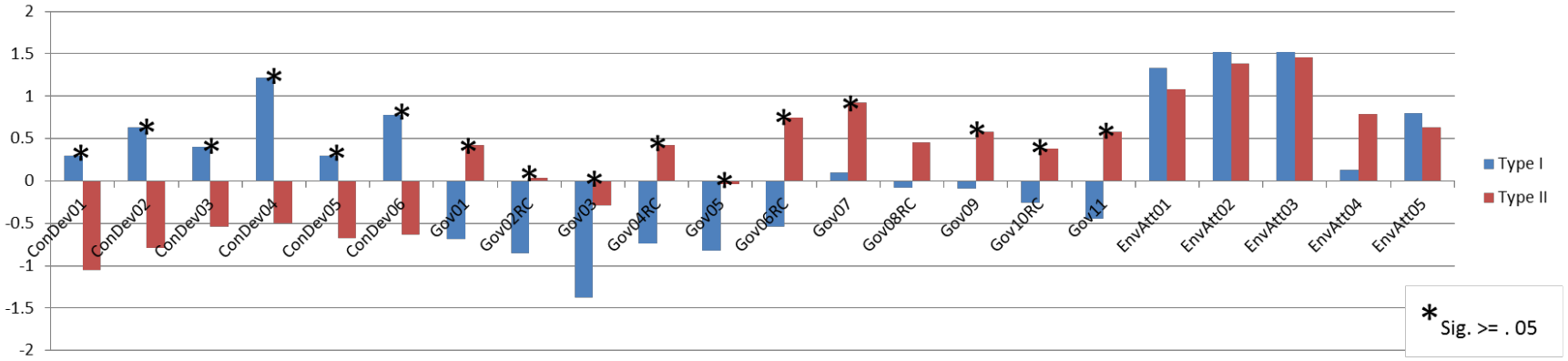
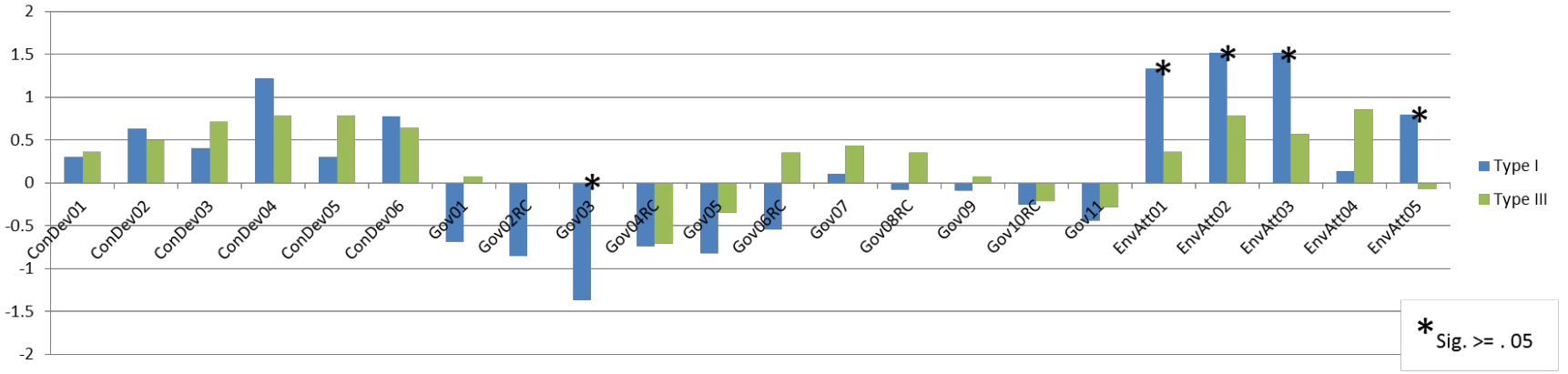
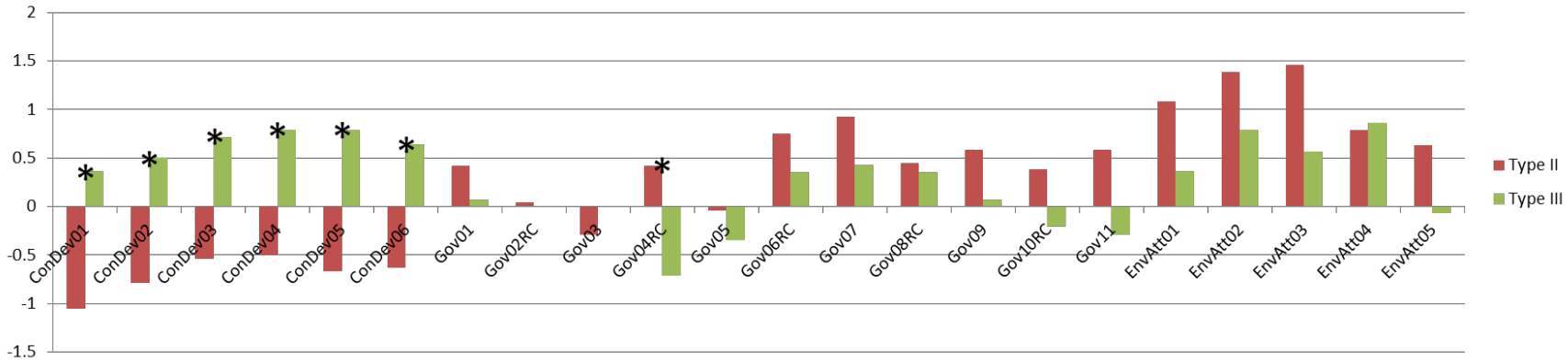


Figure 20. Results of ANOVA with Multiple Comparisons (Post Hoc Test: Games-Howell) for Type II and Type III Landowners



Draft results may change for external publication.

Figure 21. Results of ANOVA with Multiple Comparisons (Post Hoc Test: Games-Howell) for Type I and Type III Landowners



Distinguishing Belief System Characteristics

The ANOVA analysis associated with Step 8 in the Inverted-R Analysis process allowed for identifying significant differences in mean values across the 3 belief system types. These differences, highlighted when p is greater than or equal to .05, are shown in Figures 19 to 21. Based on these identified differences the following descriptions highlight trends that are unique to the attitudinal characteristics of the belief systems held by landowners who responded to the survey.

- **Type I:** This group sees greater negative consequences and focuses more on the power of local residents, rather than government involvement to address forest issues.

- **Type II:** This group doesn't see development as inherently negative for their community and generally they are much more accepting of government expertise, partnerships, programs, etc. than those in Type I or Type III.

- **Type III:** This group shares a lot in common with Type I; however, they differ from the other 2 groups because they responded more negatively to the environmental attitudes statements than either of the other groups.

Comparing Typologies

Finally, as the self-reported measure adapted from Butler et al.'s (2007) typology of landowners was included in the scale we were able to make a comparison to determine if the belief system typology identified as part of the supplemental objective shared commonalities with this earlier approach. Based on a simple Crosstab calculation, shown in Table 17, it is apparent that we are seeing differences across landowners that are not captured by the self-reported measure. The results show a relatively even split between the typologies, suggesting that further work should be done to explore whether ownership reasons or attitudinal characteristics of owners exert greater influence on land management decision making.

Table 17. Crosstabs showing Belief System * Reasons for Owning

		Reasons for Owning: *self-reported adaptation of Butler (2007)*				
		Woodland Retreat	**Working the Land**	**Supplemental Income**	**Less Involved**	*Total*
Inverted R-Category	**Dominant Belief System**	70	55	6	2	*133*
	Secondary Belief System	10	12	0	1	*23*
	Other Belief Systems	3	9	2	0	*14*
	Total	*83*	*76*	*8*	*3*	*170*

Draft results may change for external publication.

Discussion

It is anticipated that communities across the Northwoods will continue to face some level of residential development pressure due to continued demand for both primary and secondary home construction. These high amenity forested communities face significant change with anticipated negative impacts on forest health based on the analysis of current development regulations identified by the build-out scenarios from Phase I of this research.

The results of the Northern Wisconsin Landowner Survey show that in the six selected townships a majority of the largest landowners (those holding 60 or more acres) perceive new development as a real threat to their community. This may be particularly important to these landowners as the majority of respondents are older and indicated that they 'likely' to 'very likely' to pass their land along to their heirs. As a group they also responded most negatively to future plans that would involve selling their land to someone who intends to develop it with the average response being 'unlikely' to 'very unlikely'. These results suggest that large landowners are not only concerned about the potential impact of development in the short term, but also in the affect it may have on future generations of their family who own the land. However, the policy debate over how to regulate new development is more complex as the average respondent indicates that they are slightly negative to adopting the most restrictive development regulations. Furthermore, on average only one land use policy (adopting a minimum lot size of 40 acres for residential construction) saw a positive response; although this average was only slightly positive in terms of willingness to accept and could be classified as near neutral support. Among the policy options considered the 40 acre minimum lot size, the 10 acre minimum lot size, and restrictions tied to areas adjacent to existing roads were the only options that didn't receive strong disagreement on average.

Additionally, in examining the build out scenarios showing what their township's current regulations allow there was confusion, perhaps best expressed as disbelief, that the regulations would allow so many new homes. If we interpret the disbelief of the potential build-out scenarios (for example more than 55 percent indicated that they didn't believe this future would occur) as an indication of an unacceptable land use future then action has to be taken. In fact, a majority of respondents agreed that more restrictive regulation is needed to prevent to this development scenario from occurring.

Clearly there is a challenge for these communities to respond to landowner concerns over the potential negative consequences of new development and identifying policy options that are acceptable. The role that stakeholders' attitudes play in the planning process becomes clear in the inconsistencies within the responses – the observation that something has to be done about new development at odds with an overall negative response to all available local land use regulations. This study targeted this dilemma by exploring views of different attitude objects, such as views of the environment or the government involvement to understand what is influencing willingness to support more restrictive development regulations in forested townships. What the results of Research Objective 1 reveal is that the key attitudes driving willingness to accept more restrictive development regulations are "support for government

involvement" and "anticipated personal consequences of development". This suggests that those individuals who hold a more favorable view of government programs, agencies, and funding opportunities to assist in managing their forestland are also more supportive of local government regulating land use to protect the forest. Independently, the role of 'anticipated personal consequences of development' suggests that those who see development as doing more damage to the amenities the forest provides (such as hunting, wildlife, etc.) that they value are also more likely to support these stricter regulations.

Supplemental Research Objective 1 provides further clarity on the belief systems (or combinations of attitudes) related to action to regulate new development. The results revealed a dominant belief system across all six townships (consistent with the lack of differences identified across townships or counties tested in Research Objective 2). This dominant belief systems suggests that a majority (approximately 83 percent) of large landowners who responded to the survey believe that development has the potential to negatively affect their enjoyment of local forests, share a strong sense of responsibility for managing their land to protect the overall health of the forest, and have strong anti-government views while valuing private property rights.

The presence of strong anti-government attitudes in rural communities is far from a new phenomenon, but based on responses to this survey we see comparable levels of trust for agencies and local partners with the average response being near neutral for both groups when examined as an aggregate measure. In some ways it seems as though the attitudinal ingredients for stronger regulation of new development in forest dominated townships are there as we see strong environmental attitudes and landowners seeing a personal threat to allowing development to occur, but a major barrier remains. How do we overcome or work around a lack of support for government intervention in these landscapes?

Non-governmental organizations have been proposed as an intermediary in other settings; however, we don't see significant differences between these groups and government agencies in these Northern Wisconsin communities. It almost seems as though an impasse exists that will ultimately prevent communities from addressing the impacts of new development on their forestland. That is until we look at the attitudinal model and see that the relative influence of 'anticipated personal consequences of development' has nearly twice the impact of the government involvement variable. From this perspective we can see that in communities where the threat of development is more visible or real to the landowners the more likely it is that they will support action. This returns the discussion to a different place as forested townships are unlikely to experience an equal amount of development pressure at a given time, but rather one or more will experience faster growth than the others. The results of this study suggest that it is in those communities where landowners perceive the greatest threat that efforts to implement stricter regulations are more likely to succeed. Perhaps this is actually the case for Lincoln County as it is conceivable that when the stricter regulations were passed the threat of development was perceived as stronger by residents. While the unique attitudes hypothesis tested in Research Objective 2 was rejected as the results show little difference in attitudes across

the six townships, it does raise questions about how a community takes the next steps or possibly about when they should try to proceed with these efforts.

Conclusions

Ultimately, communities looking for answers about how to proceed with efforts to protect the health of the forested landscape can draw key lessons from this study. First, developing an understanding of local landowner attitudes can assist communities by focusing the scope of planning activities. In this study it was shown that while overall none of the land use regulations were strongly supported by landowners, there were several that were less disliked by landowners. This provides a starting point for a community dialogue about which policies to begin discussing without the possibility of alienating landowners or stakeholders who might see more progressive policies presented in an early meeting and then walk away from the process.

Second, there is a need to identify other leaders from within the community outside of local government or agencies who can help structure the discussion. Rather than be sidetracked by efforts to change attitudes toward local government it may be possible to find those landowners who already perceive the benefits of government involvement and work with them to reach out to their neighbors. This indirect partnering approach may assist in overcoming the large hurdle presented by anti-government attitudes, but it requires being flexible and working to develop local leadership on issues affecting the health of the forest.

Finally, the build out scenarios developed as part of Phase I of this research may provide an interesting avenue for communities to encourage landowners to think about the potential negative impacts of development. These scenarios do reflect what is allowed under existing rules and they generated a strong reaction from survey respondents. Often land use regulations are too complex to generate a strong dialogue on the future that residents want for their community, but through creative visualization tools it may be possible to move forward by raising awareness of what could happen based on the current rules in order to generate discussion about protecting the forest from new development.

References

Azjen, I. (1991). The Theory of Planned Behavior. Organization behavior and human decision processes 50(2): pp. 179-211.

Butler, B. J., Tyrrell, M., Feinberg, G., VanManen, S., Wiseman, L., & Wallinger, S. (2007). Understanding and reaching family forest owners: lessons from social marketing research. Journal of Forestry, 105(7), 348-357.

DeVellis, Robert F. (2003). Scale development: Theory and applications. Thousand Oaks, CA: Sage Publications Inc.

Dillman, D. A. (2007). Mail and Internet Surveys: The Tailored Design Method–2007 Update with New Internet, Visual, and Mixed-Mode Guide. Hoboken.

Thompson, Aaron, Dumyahn, S., Prokopy, S., Amberg, S., Baumgart-Getz, A., Jackson-Tyree, J., Perry-Hill, R., Reimer, A., Robinson, K., Saylor, A. (2012). Comparing Random Sample Q and R Methods for Understanding Natural Resource Attitudes. Field Methods, online – awaiting publication.

Thompson, Aaron William. (2010). Views of Agriculture: Understanding Farmers' Attitudes to Identify Strategies for Improving Rural Landscape Planning (Doctoral dissertation). Available from Purdue University e-Pubs. (Reference No. AAI3444870)

Appendices

Appendix 1: Northern Wisconsin Landowner Survey

Dear Landowner of Kelly,

We want to hear your voice!

Communities in Northern Wisconsin are currently making decisions about future development that will affect the health of their forested land. Many communities in Northern Wisconsin are experiencing the challenges associated with balancing new development with the protection of the forested landscape. Whether it is the economic opportunities, rural development, or increased public attention to environmental management of this land, these factors are likely to impact how Wisconsin's forests are valued and managed in Kelly.

As part of an on-going research project, we would appreciate your participation in this survey to help us understand the views and priorities of local landowners. Your participation is voluntary. We have selected you because of how much land you own. Your input is essential to finding responsible and practical ways to meet these challenges associated with planning for and managing the natural resources of the land.

This survey will take approximately twenty minutes to complete. Please complete as much of the survey as possible; however, you are welcome to skip questions that make you feel uncomfortable. Your response is extremely valuable to us.

If you have any questions about the survey or this research, please feel free to contact us using the information provided below. Thank you for your help.

Sincerely,

Aaron W. Thompson
Assistant Professor
College of Natural Resources
University of Wisconsin - Stevens Point
Office: 715-346-2278
E-mail: aaron.thompson@uwsp.edu

Anthony K. Sharp
Graduate Student
College of Natural Resources
University of Wisconsin - Stevens Point
Office: 715-346-4853
E-mail: anthony.k.sharp@uwsp.edu

Ownership

The survey must be completed by an adult member of your household 18 years of age or older. Due to the nature of our research, the person responsible for making decisions about your land should be the one who completes this survey.

Please mark all answers clearly, in pen or pencil, as indicated below.
Example "A" ☐ ☐ ☒ Example "B" ☐ ☐ ☑

Which category best describes the ownership of your property?

- ☐ Individual
- ☐ Joint (such as husband and wife)
- ☐ Family partnership
- ☐ Trust or estate
- ☐ Corporation or business partnership
- ☐ Other (please specify)

Development in Your Community

Please mark one of the trends that you have noticed in your community's development (new housing construction) over the past 10 years:

- ☐ I have noticed an increase in the amount of development in my community.
- ☐ I have noticed minimal development in my community.
- ☐ I have noticed a variable amount of development in my community (some years there is a lot and it is very slow in others).
- ☐ I don't know.

How strongly do you agree or disagree with each of the following statements about the impacts of new housing construction and housing developments in your community?

	Strongly disagree SD	Disagree D	Neutral N	Agree A	Strongly agree SA	Don't know DK
New development in my community increases property value.	-2	-1	0	1	2	☐
New development in my community decreases my heirs desire to take ownership of my land.	-2	-1	0	1	2	☐
New development in my community negatively impacts the beauty of my land.	-2	-1	0	1	2	☐
New development increases the likelihood of negative interactions with members of my community.	-2	-1	0	1	2	☐
New development decreases the quality of hunting in the area of my community.	-2	-1	0	1	2	☐
New development in my community is disruptive to the timber production of the area.	-2	-1	0	1	2	☐
New development in my community interferes with nature by decreasing the number and types of wildlife that are present now.	-2	-1	0	1	2	☐

Property Rights

Please describe your level of agreement on the following scale for each of the statements that relate to your general views of property rights associated with your land.

	Strongly Disagree		Neutral		Strongly Agree	Don't Know
Government expertise is essential to addressing problems facing woodlands in my community.	-2	-1	0	1	2	☐
Local residents are better at addressing issues concerning the future of woodlands in my community than the government.	-2	-1	0	1	2	☐
Private property is a right created by government and can be changed over time as the needs of society change.	-2	-1	0	1	2	☐
Alternative approaches to forest management, such as Timber Stand Improvement, are often due to the innovation and ingenuity of landowners themselves, not government intervention.	-2	-1	0	1	2	☐
Government intervention is the only way to ensure that the forested landscape is protected for the use of future generations.	-2	-1	0	1	2	☐
Government involvement negatively impacts my ability to manage my land by attempting to control what practices I use.	-2	-1	0	1	2	☐
Government subsidies (such as tax credits) are necessary to ensure that woodlands are appropriately managed for the benefit of my community.	-2	-1	0	1	2	☐
The government should not be allowed to regulate land management practices on private property, even if current activities have the potential to negatively impact others.	-2	-1	0	1	2	☐
Government agencies are an important partner that assists in the management of my land.	-2	-1	0	1	2	☐
Government programs do not provide me the flexibility that is needed to appropriately manage my land.	-2	-1	0	1	2	☐
It is okay for government regulations to treat landowners differently due to a property's size or location which may result in some properties having a larger impact on environmental problems.	-2	-1	0	1	2	☐

We would like to understand your level of trust in different organizations working to address issues in the forested landscape. **Based on your past experience or opinions, how likely are you to work with each of the following organizations?**

	Very Unlikely		Neutral		Very Likely	Don't Know
U.S. Forest Service -**Description of organization**: A federal agency that does not provide direct assistance or services to landowners.	-2	-1	0	1	2	☐
U.S. Fish and Wildlife Service -A federal agency that provides landowners financial and technical assistance and services in the design and implementation of wildlife habitat practices.	-2	-1	0	1	2	☐
U.S. Natural Resources Conservation Service -A federal agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.	-2	-1	0	1	2	☐
Wisconsin Department of Natural Resources -A state agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.	-2	-1	0	1	2	☐
University of Wisconsin Extension -Local university professionals that provide landowners educational programs and publications.	-2	-1	0	1	2	☐
County Land Conservation Department -Local government agency that provides landowners financial and technical assistance and services in the design and implementation of stewardship practices.	-2	-1	0	1	2	☐
Forest Cooperatives -Non-governmental organizations that provide landowners educational opportunities and technical assistance.	-2	-1	0	1	2	☐
Woodland Owner Organizations -Organizations that provide educational opportunities to non-industrial forest landowners.	-2	-1	0	1	2	☐
Land Trusts -Non-profit organizations (such as The Nature Conservancy) that provide educational opportunities and technical assistance to landowners.	-2	-1	0	1	2	☐
Private Enterprises -Companies that provide landowners technical assistance.	-2	-1	0	1	2	☐
Knowledgeable Neighbors / Advocates -Local citizens that provide landowners educational opportunities.	-2	-1	0	1	2	☐

In order to gain a better understanding of woodland landowner environmental stewardship, We would like to know how much you agree or disagree with the following statements?

	Strongly Disagree		Neutral		Strongly Agree	Don't Know
I believe the forest is better off if left alone from human impact.	-2	-1	0	1	2	☐
When managing my land it is important to maximize profits even if some damage is done to the health of natural areas (such as woodlands).	-2	-1	0	1	2	☐
The natural areas on my land are part of the heritage of my land and should be maintained for the benefit of future generations.	-2	-1	0	1	2	☐
It is my responsibility to leave my land in better condition than when I first began to manage it.	-2	-1	0	1	2	☐
How I manage my land has little impact on the quality of natural areas in the rural landscape.	-2	-1	0	1	2	☐
As a landowner, I feel that I am responsible for protecting the environment by ensuring that extra effort is taken to prevent soil erosion and protect wildlife habitat.	-2	-1	0	1	2	☐
I believe it is too costly to take the extra effort necessary to safeguard streams and other wildlife habitat on my property.	-2	-1	0	1	2	☐
Healthy woodlands are managed for more than just timber production.	-2	-1	0	1	2	☐
I carefully consider how my management activities impact the health of my neighbors land before undertaking new projects.	-2	-1	0	1	2	☐
Protecting the natural areas on my land improves the quality of life for other members of my community.	-2	-1	0	1	2	☐
The primary role of a forest is to provide resources that support jobs.	-2	-1	0	1	2	☐
I am willing to sacrifice income in order to ensure that natural areas on my land are protected.	-2	-1	0	1	2	☐

Reasons for Owning

We would like to understand the reasons that individuals have for owning woodlands.
If you have wooded property, please select one of the four following reasons for owning that best describes you.

- ☐ **Woodland Retreat Owner** - I have a strong appreciation for amenity values such as aesthetics and privacy. These are the most important reasons for owning my land and are more important than financial motivations.
- ☐ **Working the Land Owner** - I see woodlands for beauty, recreation, but also a financial asset for ongoing monetary returns.
- ☐ **Supplemental Income Owner** - I own timber for financial reasons. I am active in the management of land by participating in activities such as timber harvests, cost-share programs, having a conservation easement or green certification, or have worked with a forester.
- ☐ **Less Involved Owner** - I rarely spend time at the property and may be looking to sell soon. I may also own land for tax credits.

With the potential for new development to alter the character of the forested land there are many different types of land use regulations that can be implemented to reduce these impacts. Using the following example of a 40 acre wooded property, how likely are you to support each of the listed regulation alternatives?

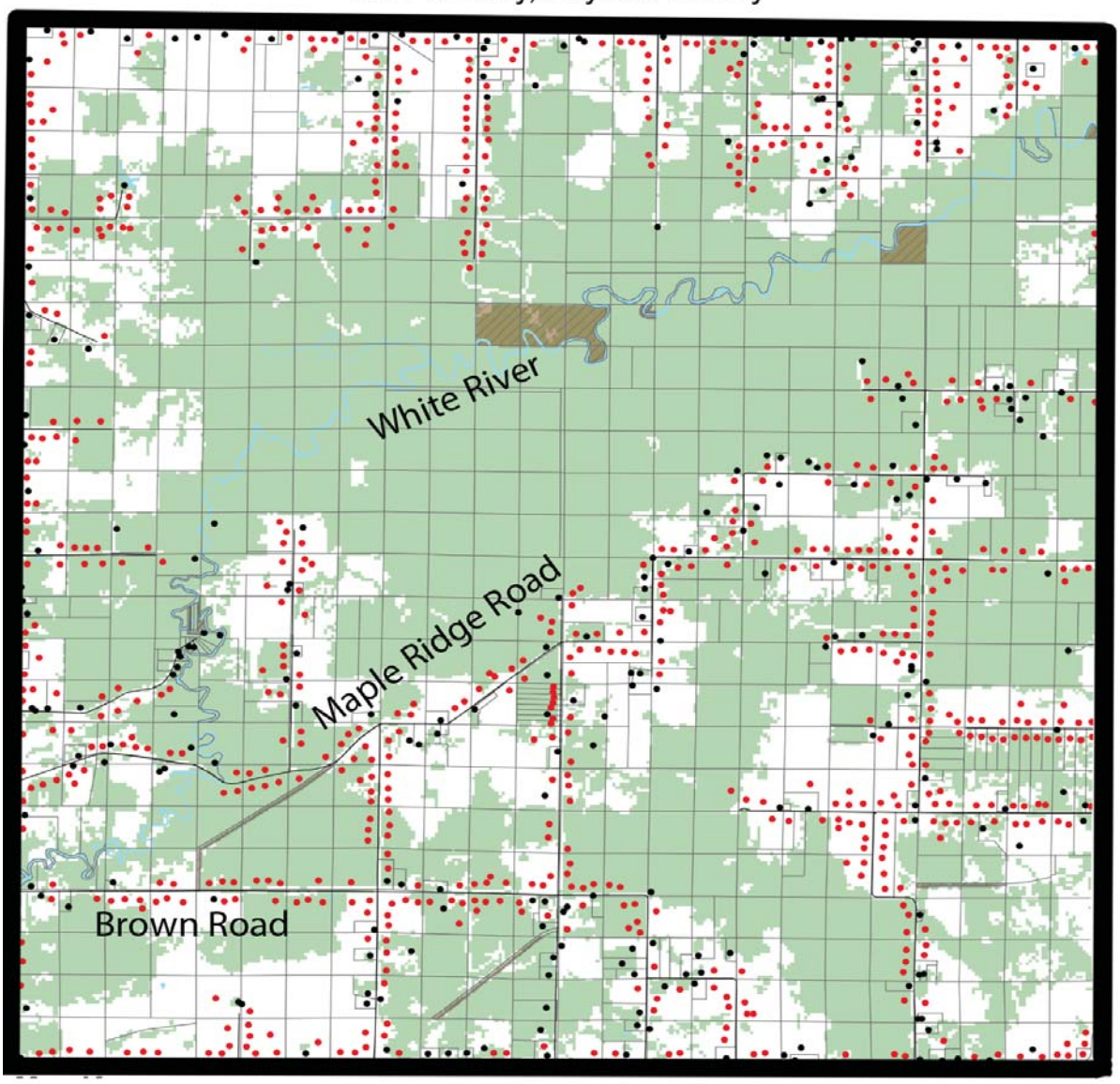
On a 40 acre wooded property in your community regulations should:	Very Unlikely		Neutral		Very Likely	Don't Know
Not restrict development, which would allow landowners to develop as many new homes as they would like.	-2	-1	0	1	2	☐
Require a minimum lot size of 1 acre, which would allow up to 40 new homes to be built on this property.	-2	-1	0	1	2	☐
Require a minimum lot size of 10 acres, which would allow up to 4 new homes to be built on this property.	-2	-1	0	1	2	☐
Require a minimum lot size of 40 acres, which would allow only 1 new home to be built on this property.	-2	-1	0	1	2	☐
Not allow development of any new homes on woodland in the community.	-2	-1	0	1	2	☐
Allow up to 40 new homes to be built on this property, but require that the lots for each are no larger than 1 acre.	-2	-1	0	1	2	☐
Allow up to 20 new homes to be built on this property, but require that the lots for each are no larger than 2 acres.	-2	-1	0	1	2	☐
Require that any new homes be built clustered close together by restricting development to no more than 10 acres of the property, which would leave the remaining 30 acres as woodland.	-2	-1	0	1	2	☐
Require that any new homes be built clustered close together by restricting development to no more than 20 acres of the property, which would leave the remaining 20 acres as woodland.	-2	-1	0	1	2	☐
Only allow new homes to be built adjacent to existing roads, which would limit the overall number of homes that could be built in the community.	-2	-1	0	1	2	☐

Future Plans

The following statements are about different decisions that a landowner can make for the future of their property. When you are ready to change ownership of your property how likely are you to:

	Very Unlikely		Neutral		Very Likely	Don't Know	N/A
Sell your property if you are offered a reasonable price.	-2	-1	0	1	2	☐	☐
Sell your land to someone who is interested in subdividing and developing the property.	-2	-1	0	1	2	☐	☐
Harvest the timber on your woodland to meet short term financial obligations but retain the property.	-2	-1	0	1	2	☐	☐
Pass your land on to your heirs.	-2	-1	0	1	2	☐	☐
Donate your land to a conservation organization.	-2	-1	0	1	2	☐	☐
Make an agreement with a conservation organization that will ensure the land stays wooded forever.	-2	-1	0	1	2	☐	☐

Town of Kelly, Bayfield County



Map Key

- Potential Dwelling Unit
- Existing Dwelling Unit
- Parcel Line
- Forest
- Open Water

Roads

- Federal
- State
- County/Local

Map Description:

This map displays a hypothetical build-out scenario of future residential development. The theoretical build-out scenario demonstrates development patterns that could be achieved based on existing zoning regulations.

Please indicate your understanding of the map above.

The black dots represent the existing dwelling unit.	True	☐	False	☐
The red dots represent potential dwelling units.	True	☐	False	☐

Please mark the boxes below which identify your beliefs about the future of the build-out analysis map above.

Development is (a) _____ to the health of the woodlands in this community.	☐ Severe Threat	☐ Neutral	☐ Not a Threat
The situation shown in this map _____ .	☐ Will Happen	☐ Neutral	☐ Will Not Happen
Regulations are _____ to prevent the future scenario shown in this map.	☐ Absolutely Necessary	☐ Neutral	☐ Not Necessary

Demographic Information

Please answer the following questions about yourself, The information will be used for classification purposes only.

In what year were you born? ____

What is your gender?
- ☐ Male
- ☐ Female

What is your highest level of formal education?
- ☐ Some high school
- ☐ High school or GED
- ☐ Some college
- ☐ 2 year degree
- ☐ 4 year degree
- ☐ Graduate degree
- ☐ Other (specify) ____

Are you retired? Yes ☐ No ☐

What is or was your main occupation? ____

How would you describe your political orientation?
- ☐ Strongly conservative
- ☐ Somewhat conservative
- ☐ Neither conservative nor liberal
- ☐ Somewhat liberal
- ☐ Strongly liberal

During 2011, how many acres in the Town of Kelly did you:

a. Own..... ____

b. Farm (row crops or pasture)..... ____

c. Manage for timber production.... ____

d. Set aside for conservation..... ____

e. Sell to Others..... ____

Please indicate how much income your land provides from farming or timber production in a typical year.
- ☐ Under $10,000
- ☐ $10,000 -- $49,999
- ☐ $50,000 -- $99,999
- ☐ $100,000 -- $174,999
- ☐ $175,000 -- $249,999
- ☐ $250,000 -- $499,999
- ☐ $500,000 -- $999,999
- ☐ $1,000,000 or more

Your Views

Please take a moment to reflect on what you believe are the most important issues facing the forested landscape in your community, and how do you think it ought to be addressed? (Please record your response or any additional comments you have about the survey here.)