FACILITATING MANAGEMENT AND DECISION-MAKING ON PRIVATE AND PUBLIC FORESTS IN INDIANA

by

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To my family.

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ABSTRACT

Active forest management is generally considered a desirable approach for both private and public tracts. While stakeholder collaboration and input are used on public lands, states have used several approaches to facilitate forest management on private forests including property tax-incentive programs, cost-share and technical assistant programs, and professional advice. Some researchers have studied how educational programs can facilitate woodland management on private lands. While some determined that the adoption of management practices can be influenced, in part, by attending educational programs, understanding of the factors that contribute to successful outcomes of educational programs for family forest owners is limited. Similarly, many federal and state agencies have used stakeholder input to inform natural resource management and policy in a variety of collaborative formats. In Indiana, the Indiana Forest Stewardship Coordinating Committee has provided input into private and public forest management in the state since 2010.

Using a case-study approach, this dissertation, through mail surveys and interviews, examined the role of the Forest Management for the Private Woodland Owner eight-week short course in woodland owner management decisions. Findings suggest that, across behaviors, woodland owner attitudes about and reasons for owning their woodlands were the most consistent predictors of the level of influence the course had on participants. Enrollment in the Indiana Classified Forest and Wildlands Program and likelihood of attending future educational programs were also positively associated with course influence for some behaviors while contact with the instructor after the course and owning woods for privacy had negative associations. The course played a role in different stages of the decision-making process of woodland owners to harvest timber, control invasive plants, create a written management plan, and use the services of a professional forester. Compatibility and relative advantage of a practice were important factors in adoption decisions. I also interviewed members of the Indiana Forest Stewardship Coordinating Committee to investigate its perceived value to members and how they view its contributions to forest management in the state. Overall, members generally held a positive perspective of its value and thought the committee benefited Indiana's forests although there was limited evidence to support this viewpoint. The committee followed some recommended collaborative approaches, but

fell short on others. Findings inform several recommendations that could benefit the committee and its role in the future.

CHAPTER 1. INTRODUCTION

Forests in the U.S. cover an estimated 741 million acres, of which approximately 60% are privately owned. An estimated 9.6 million family forest ownerships (FFOs) in the United States collectively control 272 million acres of forest land (Butler et al. 2020). In Indiana, slightly more than 84 percent of the 4.87 million acres of forestland is privately owned (Settle et al. 2016). Indiana has an estimated 187,000 family forest owners (FFOs) who control over 3.5 million acres of forests (Butler et al. 2016). While public forests in Indiana make up a relatively small percentage of total forest land cover, they include many large parcels. For example the Hoosier National Forest has a total area of over 202,000 ac. State forests in Indiana exceed over 150,000 ac in total, with four units (Clark, Harrison-Crawford, Morgan-Monroe, and Yellowwood) reaching near 25,000 ac each. Forest blocks of this size provide unique opportunities for combining different management regimes over time and space.

Regardless of their size, active forest management is generally considered a desirable approach for both public and private forests. For example, the National Report on Sustainable Forests states that,

> *"with the loss of an active management focus and the revenue streams that often accompany it, the survival of these forests and their associated ecosystem services is in question" (USDA 2011).*

While the report does not specifically define what they consider to be active management, timber harvesting, removal of hazardous fuels, and prescribed fire are mentioned within that context (USDA 2011). The Dictionary of Forestry defines forest management as

> *"the practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest."(Helms 1998)*

Conversely, a more passive approach to land management can negatively impact oak forests (Knoot et al. 2009) or result in an unnatural buildup of fuel accumulations that increases wildfire risk (O'Laughlin and Cook 2003). By emulating natural ecological processes, a disturbance-based management approach provides a broader array of ecosystem functions (North and Keeton 2008). Disturbance regimes have shaped the vegetative composition and structure of North American forests for thousands of years (Lorimer 2001). The combination of burning

practices by Native Americans and cutting, grazing and burning practices by European settlers shaped forest species composition and structure (Parker 1997, Jenkins 2013). In the absence of historical disturbance regimes, timber harvesting has been promoted as a tool to provide ecological benefits associated with early-successional habitat. Timber harvesting and other activities that emulate the historical disturbance regimes of midwestern oak-hickory forests may be more aligned with views of woodland owners who are more conservation- or nature-minded (Knoot et al. 2009).

While techniques and outcomes are similar on public and private lands, approaches to facilitate management on them differ. Presumably, increasing the number of forest landowners who actively manage how their forests "work" can maintain or increase the benefits forests provide society. Private woodland owners are not homogeneous, but rather have different values towards woodlands and motivations for owning woodlands. According to the National Woodland Owner Survey (NWOS) data, most FFOs have multiple reasons for owning woodlands (Butler et al. 2020). The most common reasons are "*to enjoy beauty or scenery*", "*for privacy*", and "*to protect or improve wildlife habitat*" (Butler et al. 2020). Less than 15 percent of woodland owners cite timber products as an important reason for owning forests, but removal of trees for sale is still a fairly common practice (Butler et al. 2020). Attitudes about woodlands are important because they can influence an individual's intention to perform a specific behavior (Rhodes and Ewoldsen 2013). Other factors can influence woodland owner management activities including tract size (Thompson 1997), whether or not they reside on their woodlands (Rickenbach and Kittredge 2009, Snyder et al. 2020), income level (Beach et al. 2005), education level (Floress et al. 2019), age (Beach et al. 2005, Floress et al. 2019), and land tenure (Côté et al. 2017). Strategies to facilitate management on private woodlands need to consider a combination of these factors in order to maximize success.

Common strategies to facilitate management on private woodlands include tax incentive programs, education, cost-share and technical assistance programs, and professional advice. A variety of tax policies can burden private woodland owners (Butler et al. 2012). Some states have initiated property tax relief programs to incentivize management and retain land in forested cover. For example, started in 1921, what is now named the Indiana Classified Forest and Wildlands Program, provides landowners a property tax reduction in return for following a management plan developed by professional forester. According to the last published report, a total of 746,357 ac were enrolled in 2014 (IDNR Undated). Cost-share and technical assistance programs are designed

to offset the costs of implementing conservation and management practices. Butler et al. (2014) published an analysis of the Forest Stewardship Program and found that while the program addressed local private forestland issues, only a fraction of eligible landowners participated. Nationally, an estimated 4 percent of woodland owners participate in cost-share programs (Butler et al. 2020).

Studies have shown that the adoption of management practices can be influenced, in part, by attending educational programs (Rasamoelina et al. 2010, Genskow 2012, Genskow and Blasczyk 2013, Rasamoelina et al. 2016). Participants in the Virginia Forest Landowner Education Program had higher rates of adoption for woodland management, having a management plan, and seeking technical or financial assistance compared to forest owners who did not attend (Rasamoelina et al. 2016). In their study, woodland management included silvicultural techniques, controlling invasive weeds, and tree planting among others. A Wisconsin program targeting unengaged woodland owners found that 35% of attendees contacted a forester after the class and 48% did some type of activity with trimming, planting, and thinning most frequently mentioned (Genskow and Blasczyk 2013). Educational programs have the potential to help FFOs make informed woodland management decisions. However, while increased knowledge can lead to better decisions by FFOs (Jones et al. 2001), behavioral theory clearly shows that deficiencies in knowledge do not alone predict adoption of behaviors (Weiss 2000).

Managing public lands takes a different approach compared to private lands due to the statutory guidelines imposed on them as well as the need to serve a wide variety of public stakeholders and interests. The mission of the Indiana Department of Natural Resources' Division of Forestry (‘the Division’, hereafter) is to promote and practice good stewardship of natural, recreational, and cultural resources on Indiana's public and private forest lands. However, the Division and other agencies face many complex resource management problems (Game et al. 2014). Beginning in the 1990s, Indiana state forests placed an increased emphasis on forest values (e.g., wildlife, recreation, historic preservation) other than timber (Carmen 2013). Because of this increasing emphasis, citizens have become more involved in formulating management policies (Carmen 2013). Improved decisions and outcomes can be achieved by including stakeholder groups with different perspectives in the decision-making process (Lynam et al. 2007), and public involvement is an important part of land use decisions (Kennedy and

Thomas 1995, Shindler et al. 2002). According to Carmen (2013:21), "*To better facilitate [the] process [of public input], the Indiana Forest Stewardship Coordinating Committee was established*."

Using a case-study approach, this dissertation, through mail surveys and interviews, examined the role of the Forest Management for the Private Woodland Owner eight-week short course in facilitating management for family forest owners. Specifically, I examined the relationship among landowner and land characteristics, attitudes about woodlands, and reasons for owning their woodlands and the level of course influence on certain management practices (Chapter 1). Secondly, I examined how the course influenced woodland owners during different stages of the decision-making process to harvest timber, control invasive plants, have a written management plan and use the services of a professional forester (Chapter 2). I also used a case-study approach to study the Indiana Forest Stewardship Coordinating Committee and its role in informing management of Indiana's forests. I interviewed members of the committee to examine its perceived value to members, the extent the committee follows accepted collaborative approaches, and how members view its contributions to forest management in the state (Chapter 3).

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CHAPTER 2. PREDICTORS OF IMPACT OF A LONG-RUNNING WOODLAND EDUCATION PROGRAM

2.1 Introduction

Most woodlands in Indiana and the Eastern U.S. are owned by family forest owners (FFOs) (Settle et al. 2016, Butler et al. 2020). These woodlands provide many goods and services to society (Manning et al. 1999, Witter et al. 2013). A generally accepted dogma of the forestry profession is that responsible, professionally-guided management will enhance societal benefits while meeting woodland owner objectives (Knoot et al. 2009). However, there is some question regarding the extent to which this occurs. Actively engaging private woodland owners is a key to conserving forests and the benefits they provide (Best 2002, Davis and Fly 2010). Despite significant investments in educational and assistance programs to facilitate management (Butler et al. 2014), relatively few FFOs have stewardship plans or participate in cost-share and technical assistance programs (Butler 2020). The 2010 National Report on Sustainable Forests (USDA 2011) reported the loss of working forests as one of three overarching issues of "*crucial importance*" to the benefits and services our forests supply all citizens. Moreover, the challenge of reaching FFOs has increased as woodlands have become more parcelized as ownership changes over time (Kittredge 2004). Educational programs targeting FFOs have the potential to facilitate better management decisions on private woodlands. The Cooperative Extension Service has played a prominent role in designing and delivering forestry Extension programs throughout the U.S. (Jones et al. 2001, Sagor et al. 2014).

2.2 Background

2.2.1 Woodland Owner Education

FFOs share a deeply rooted stewardship ethic and are open to receiving more information about managing their land (Sampson and DeCoster 1997). Knowledge of issues and action strategies are associated with responsible environmental behaviors (Hines et al. 1987). Extension educational programs and resources could serve as an important part of getting woodland owners to adopt desirable behaviors including timber harvesting, stewardship planning, seeking

professional advice, and controlling invasive plants among others. Some studies have shown that the adoption of management practices can be influenced, in part, by attending educational programs (Rasamoelina et al. 2010, Genskow 2012, Genskow and Blasczyk 2013, Rasamoelina et al. 2016). Educational programs can even shift inactive small scale woodland owners to active management (Krygier 1980). Despite these benefits, few Extension programs have documented behavioral changes (Workman and Scheer 2012). Keys for Extension program success, that is their impact, is also dependent on their design and delivery.

Bennett's Hierarchy and the Logic Model are two models that are commonly used for demonstrating impact by Extension (Workman and Scheer 2012). Bennett (1975) proposed a 7-level hierarchy based on Kirkpatrick's (1967) "*chain of events*" to guide Extension program evaluation (Figure 2.1). He called these levels "*stepping stones*" where lower levels were required to achieve adoption of recommended practices. Bennett's model served as a precursor for the Logic Model that is in common use today.

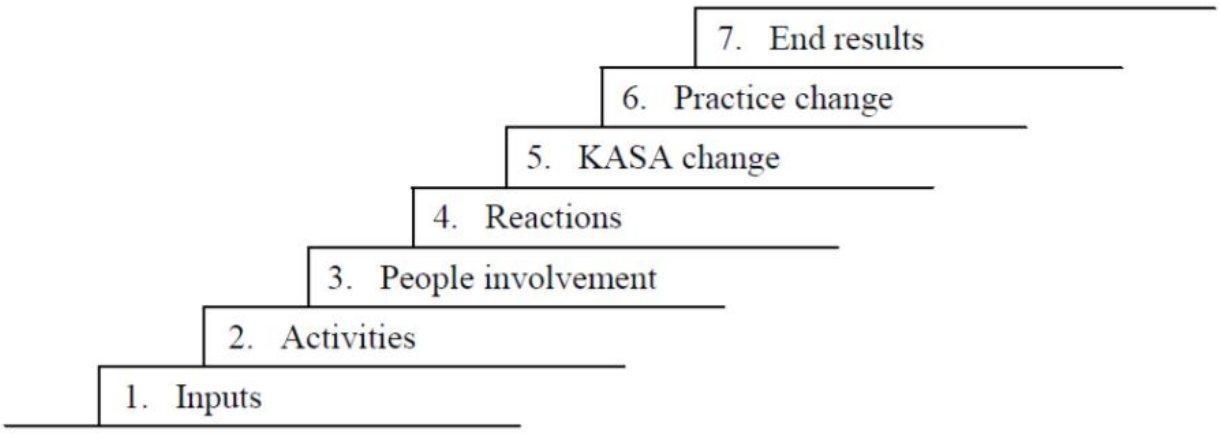

Figure 2.1 Benett's hierarchy of evidence for program evaluation. (Redrawn from Bennett 1975)

The Logic Model is a generalized model for developing, implementing and evaluating programs (W.K. Kellogg Foundation 2001). Logic Models are similar to Bennett's Hierarchy but also provide a visual representation of the situation and how a program will work including necessary inputs, outputs, activities, and outcomes (Renger and Titcomb 2002) (Figure 2.2). Many issues and the programs necessary to solve them are complex. The visually depicted relationships

among the issue, purpose of the program, planned activities, and anticipated outcomes facilitate program development (Helitzer et al. 2009). Logic Models bring to light details such as broad goals and identify gaps in logic and assumptions that, if left unsolved, lead to program failure.

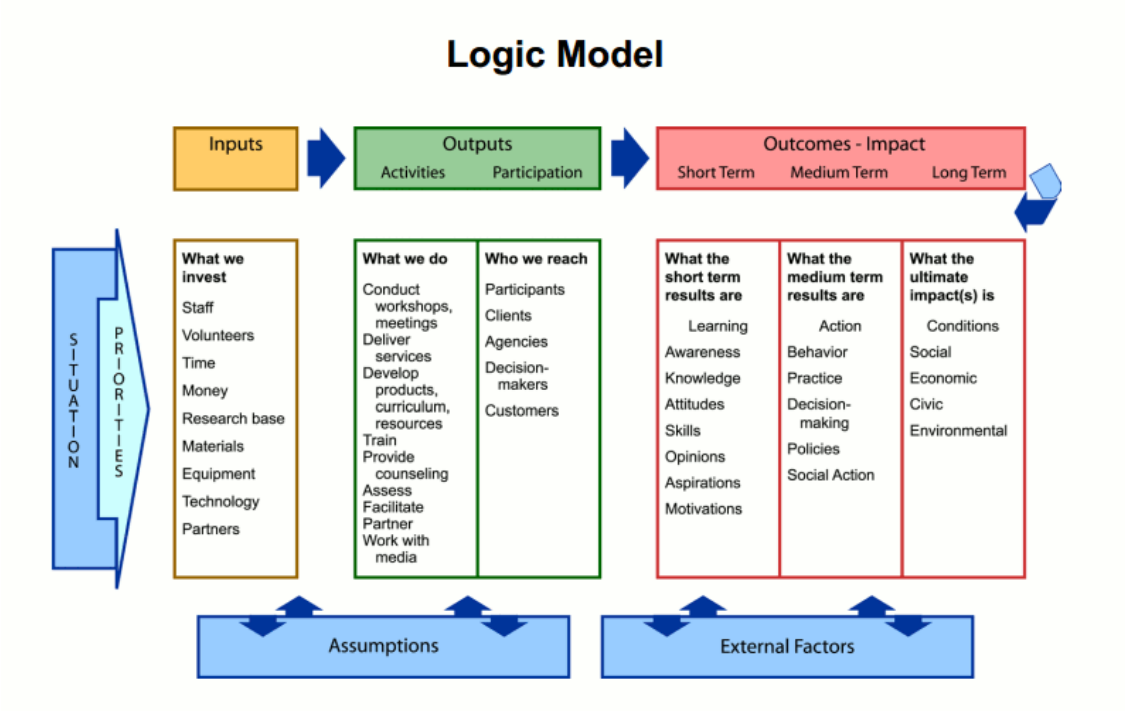

Figure 2.2 Example logic model. Adapted from Taylor-Powell et al. (2002).

Logic Models, however, have their limitations. They do not specify the causal mechanisms involved in the sequential steps from inputs to outputs to outcomes (Patton 2008:336). Regardless of format or delivery mechanism, Extension programs often aim to provide information to program participants that will lead to them doing something. For woodland owners, these actions typically take the form of seeking professional advice; developing a management or stewardship plan; adopting at least one management practice; or enrolling in a cost-share, technical assistance program, or tax incentive program. However, validity assumptions regarding the cause and effect relationships in respect to learning and subsequent behavioral change within educational programs are questionable (Weiss 2000:40-41). Patton (2008:348) suggested that this common theory where

"*information will produce knowledge change, knowledge change will produce behavior change*" doesn't work.

2.2.2 Factors that Influence Woodland Owner Behaviors

Landowner and Land Characteristics

To some extent, the characteristics of a woodland, and particularly the tract size, will influence management decisions. Larger tracts of woods can be managed more efficiently than smaller tracts. For example, more timber volume growth and removal was associated with tract size on South Carolina woodlands (Thompson 1997). The parcel size of wooded acres has been associated with some behaviors. In a meta-analysis review of published literature, Silver et al. (2015) examined the relationship between FFOs intent to harvest and actual harvesting. They found that parcel size as well as harvest price per acre had the most predictive support in the literature. In a meta-analysis of FFOs' activities, parcel size/forested acres was a consistent variable associated with a suite of woodland owner behaviors (Floress et al. 2019).

Absenteeism has also been studied in relation to FFOs' activities with somewhat mixed results (Floress et al. 2019). Logically, FFOs who live far away from their woodlands may be less active managers than those who live on or near their woodland tract. Rickenbach and Kittredge (2009) found absentee woodland owners in Massachusetts and Vermont were less motivated to do forest management than resident owners. In a survey of Indiana FFOs, Snyder et al. (2020) found differences in activities between absentee and resident owners. Absentee FFOs in their study were less likely to have inspected their woods for invasive plants, used herbicide to kill invasive plants, reduced fire hazard, or grazed livestock within the previous five years. However, absentee owners were more likely to be enrolled in the Indiana Classified Forest and Wildlands Program. Inconsistent definitions of what an absentee landowner is may confound its effects on woodland owner activities in the published literature.

Other owner characteristics could play a role in woodland activities and management. For example, retired owners or those with more disposable income may be able to invest more time and resources in certain woodland activities. In a synthesis study of the economic literature, Beach et al. (2005) found that income and age were generally found to have a negative association with timber harvesting. Alternatively, they found that education level and training increased timber

harvesting in the majority of models they reviewed. In a more recent meta-analysis of a suite of woodland activities, age and education level were usually not significant predictors of behavior (Floress et al. 2019). However, age more often had a negative relationship while education level was the opposite. New woodland owners (<10 years) in Quebec were more likely to carry out no timber harvesting on their woods then those who owned their woods for more than 20 years (Côté et al. 2017). The two groups in their study also differed in terms of education level, income, distance between their residence and woods, and ownership objectives.

Landowner Engagement

The degree to which FFOs are engaged within the forestry network could influence their woodland activities. This engagement process could take different forms including interaction with other woodland owners, participation in conservation assistance programs, or membership in conservation organizations. FFOs may consult family, peers, or professionals when making decisions about their woodlands (Kittredge et al. 2013). Synder and Killgore (2018) modeled aspects of decision-making networks on FFOs' management decisions across the country. In their study, consultations with family members had little effect on past and future decisions. However, consultation with professionals increased the likelihood of doing past and future activities including conducting a timber harvest. It could be that foresters and other land managers play key roles as influential people in a FFO's network (Kittredge et al. 2013).

Participation in programs can provide financial incentives to do management activities. For example, as part of the 2018 Farm Bill, the Environmental Quality Incentives Program cost shares control of invasive plants in woodlands and timber stand improvement (Kruse 2018, USDA 2021). In some cases, participation in programs may also increase access to professional advice. FFOs enrolled in the Indiana Classified Forest and Wildlands Program obtain direct access to advice and planning from professional foresters. In a study of FFOs in the northern U.S., owners enrolled in cost-share programs were more actively engaged in woodland management activities (Song et al. 2014). Despite these advantages, apparently most FFOs across the U.S. do not participate in them. In the most recent published summary of the National Woodland Owner Survey (NWOS) data, only 4% of FFOs participated in at least one cost-share program within the previous five years (Butler et al. 2020).

Attitudes and Beliefs

Woodland owners are not homogeneous but rather have different values towards woodlands and motivations for owning woodlands. According to the NWOS data, most FFOs have multiple reasons for owning woodlands (Butler et al. 2020). The most common reasons are "*to enjoy beauty or scenery*", "*for privacy*", and "*to protect or improve wildlife habitat*" (Butler et al. 2020). Less than 15 percent of woodland owners cite timber products as an important reason for owning forests, but removal of trees for sale is still a fairly common practice (Butler et al. 2020).

Since all FFOs do not share the same goals and objectives, several researchers have created different typologies or profiles of woodland owners based on a variety of factors that include in part woodland characteristics, owner demographics, ownership motivations and attitudes, and engagement in forestry activities. In a national study, Butler et al. (2007) divided FFOs into attitudinal groups using a multivariate, hierarchical cluster analysis of characteristics measured by the NWOS (2002-04). They divided forest owners into four groups – woodland retreat owners, working the land owners, supplemental income owners, and ready to sell owners. Ross-Davis and Broussard (2007) found that forestland owners in northern Indiana could be divided into three distinct groups – new forest owners, forest managers, and passive forest owners. These groups differed in whether they considered their land to be managed, harvested timber on their land, and used information from the Department of Natural Resources and foresters. Typologies increase our understanding of shared preferences among owners and may offer insights into how to approach educational and outreach efforts. Their value, however, in providing behavioral insights of FFOs is uncertain (Silver et al. 2015).

Attitudes about woodlands are important because they can influence an individual's intention to perform a specific behavior (Rhodes and Ewoldsen 2013). According to the Theory of Planned Behavior (TPB), performing a behavior is predicated by the intent to do so (Ajzen 1991). According to TPB, an individual's intent to perform a behavior is influenced by their attitude towards that behavior, subjective norms about the behavior, and perceived behavioral control to perform the behavior (Ajzen 1991). Using TPB, studies have shown that an individual's attitude towards the practice (i.e., behavior) is important. TPB has been used to describe behavioral intentions of woodland owners. For example, attitude towards natural reforestation was the strongest predictive component of the TPB model in explaining woodland owners' choice versus planting (Karppinen 2005). Very few published studies empirically measure actual behavior. In a

review of published studies on timber harvesting, only 5 of 87 articles directly linked attitudes to actual timber harvesting (Silver et al. 2015).

2.2.3 Research Questions

The factors that contribute to land management decisions of FFOs are complex. Owner and land characteristics, landowner engagement, and an individual's attitudes and beliefs about their woodland and its management all play a role in the decision to engage in or avoid a given behavior. Extension programming can help FFOs make informed woodland management decisions, and increased knowledge can lead to better decisions by FFOs (Jones et al. 2001). However, behavioral theory clearly shows that deficiencies in knowledge do not alone predict adoption of behaviors (Weiss 2000). Understanding the degree to which characteristics and attitudes of FFOs affect the influence educational programs have on planned outcomes will help shed light on these assumptions. These insights can be applied to many woodland educational program for FFOs. Using a long-running woodland owner course as a case-study, I will investigate the following research questions:

1) What extent did the course contributed to woodland management?
2) What level of influence did the course have in decisions to harvest timber, planning, control invasive species, develop/modify a management plan, and seek the services of a professional forester?
3) To what degree do landowner demographics, property characteristics, motivations for owning woodlands, and attitudes about woodlands and their management predict the level of course influence?

2.3 Methods

The Forest Management for the Private Woodland Owner eight-week short course is an Extension program with an over 25-yr history. The course is offered throughout Indiana at different locations each year. Extension foresters within the Department of Forestry and Natural Resources at Purdue University develop the course content in partnership with other groups including the Hardwood Tree Improvement and Regeneration Center (HTIRC), Purdue University Cooperative

Extension Service, the Indiana DNR Division of Forestry, and local Soil & Water Conservation District offices. Classroom sessions include tree identification, forest biology, planning, management practices, invasive species control, selling timber, financial management, wildlife, and informational resources and assistance. Two outdoor field tours are also included to reinforce concepts learned in class.

Survey Development

I developed a survey that included questions across five broad themes—the eight-week course (motivations for attending, views about the course, influence on woodland activities), information about their woodlands (size, residence, tenure, and reasons they own woodlands), woodland activities (program enrollment, recent and future activities, and views on woodland management activities), woodland information sources (use, preference, influence and trust), and participant characteristics (demographics, membership in organizations, education, income) (see Appendix A). Survey questions on reasons for owning woodlands, general questions about their woodland, past and future plans for their woodlands, and woodland activities were adapted from the National Woodland Owner Survey (2013 Version, Indiana 5.0, USDA Forest Service). Questions on information source preference, use, influence, and trust were adapted from a survey of farmers and crop advisors in the Saginaw Bay Watershed (Eanes et al. 2017, Genskow and Prokopy 2011). Lab members from the Natural Resources Social Science lab provided written and verbal input during the draft process. Two Purdue Extension Foresters (Lenny Farlee and Ron Rathon), who taught the course, provided input on the content of the survey. After the final draft was developed, I tested the survey with a retired forestry colleague and made minor modifications after his input.

In April through June of 2016, I surveyed 294 individuals who participated in a least one of 13 courses held between 2007 and 2015. I used a mixed-mode, 5-stage survey design (Dillman et al. 2014). I mailed an advance letter on 20 April announcing the arrival of the survey in the future. The first survey, reminder postcard, second survey, and final survey with postcard were mailed at approximately 2-wk intervals after the advance letter. I provided a $2 bill with the first survey in order to increase response rate (Millar and Dillman 2011, Glas et al. 2019). Respondents had a choice of completing the survey online with each mailing.

Statistical Analysis

Principal Component Analysis (PCA) is a statistical technique that reduces a large set of correlated variables into a smaller set of uncorrelated variables (i.e., principal components) (Laerd Statistics 2015). In SPSS (IBM, ver. 24), I used the principal components method in the factor procedure to reduce data for attitudes towards woodlands and their management (9 variables; scale 1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree or disagree, 4 = somewhat agree, 5 = strongly agree) and reasons for owning woodlands (14 variables; scale 1 = not important, 2 = slightly important, 3 = moderately important, 4 = extremely important). Responses of 'not sure' were excluded. While these variables are all ordinal, researchers often treat them as continuous in PCA (e.g., Ma and Kittredge 2011, Farmer et al. 2017). Statisticians disagree on the acceptability of treating ordinal variables as continuous in statistical analyses (Pasta 2009). However, doing so for variables that use a Likert scale is a "*reasonable practice*" (Pasta 2009). All PCA used the Varimax rotation method with the KaiseR Normalization. Only principal components with eigenvalues >1 were used in additional data analysis (Kaiser 1960). Variables with non-significant factor loadings ($P < 0.5$) remained as independent variables in the ordinal logistic regression models (Ma et al. 2012, Laerd Statistics 2015).

Participants responded to a series of questions about what extent did the information they learned in the course influence their decision to do specific activities. Respondents rated influence on a 4-point scale—'did not influence', 'slightly influenced', 'moderately influenced', and 'strongly influenced'. A subset of these activities (develop a new management plan, modify an existing management plan, harvest timber, control invasive species, and use the services of a professional forester) was used as dependent variables in my models. I selected these five activities because they are common goals of woodland education programs, including the eight-week course.

I used Ordinal Logistic Regression (OLR) to determine the relationship between the level the course influenced behaviors and the independent variables (Table 2.1). Selection of independent variables was based on factors that are associated with woodland management activities (see Section 2.2.2). In SPSS (IBM, ver. 24), I used the GENLIN procedure to run cumulative OLR with proportional odds. Odds ratios reflect the change in odds of being in a higher category. The OLR is a generalization of the binary logistic regression model with the dependent variable having more than two ordinal categories (Liu 2016:141). While the dependent variable in binary logistic regression models must be coded as either 1 or 0, the outcome variable is ordered

with multiple levels in proportional odds models (Liu 2016:143). The proportional odds assumption assumes that changes between all possible levels are identical. Separate OLRs were run for each of the five dependent variables. The dependent variables were coded as 1 = did not influence, 2 = slightly influenced, 3 = moderately influenced, and 4 = strongly influenced. Independent variables in OLR models must be either scale or ordinal variables (Laerd Statistics 2015). Since ordinal variables measured on a Likert scale are commonly treated as scale variables in some statistical analyses (e.g., Ma and Kittredge 2011, Farmer et al. 2017) and the other attitudinal scale variables loaded on the principal components were treated as scale variables, I classified independent ordinal variables as scale variables in OLRs. The assumption of proportional odds was assessed using a full likelihood ratio test comparing the fit of the proportional odds model to a multinomial model with varying location parameters. The proportional odds model has one slope coefficient and a unique intercept for n –1 levels of the dependent variable, whereas the multinomial model also has separate slope coefficients for n –1 levels of the dependent variable. Small, non-significant ($P > 0.05$) differences between these models indicates the assumption of proportional odds is met (Laerd Statistics 2015).

2.4 Results

The sampling frame included 287 participants after removing six bad addresses and one duplicate address. I received a combined total of 188 usable responses from both online and mail surveys for a 65.5% response rate. Course participants were mostly male with an average age of 62 years (Table 2.2). Most (87.2%) still owned woodlands. Only data from the FFOs who still owned woodlands (n=164) was used in subsequent analyses and summaries.

2.4.1 Participant Views

Course participants had generally favorable views about the benefits of the course. A majority (82.7%) of respondents either ‘somewhat agreed’ or ‘strongly agreed’ to the statement that participating in the course was important in helping me determine management objectives for my woodlands. Similarly, 77.4% of respondents either ‘somewhat agreed’ or ‘strongly agreed’ to the statement management of my woodlands improved because of what I learned in the course.

Table 2.1. Independent variables used in the Ordinal Logistic Regression models.

Variable Name	Mean (±SD)	Type	Description
MANAGE	0.121 (1.00)	Scale	Principal component (see Table 2.3 for factor loadings)
NORM	-0.022 (0.99)	Scale	Principal component (see Table 2.3 for factor loadings)
AMENITY[1]	0.009 (1.01)	Scale	Principal component (see Table 2.4 for factor loadings)
USE[1]	0.008 (1.00)	Scale	Principal component (see Table 2.4 for factor loadings)
QUALITY	3.44 (1.11)	Ordinal	Quality of life depends on my decisions
THREAT	1.73 (1.02)	Ordinal	Timber harvesting threatens woodland health
PRIVACY[1]	3.17 (0.97)	Ordinal	Importance for why own woodland – for privacy
NONTIMBER[1]	2.39 (0.91)	Ordinal	Importance for why own woodland – for cultivation/collection of non-timber resources
TIMBER[1]	2.86 (1.07)	Ordinal	Importance for why own woodland – for timber products such as logs or pulpwood
FARM[1]	2.89 (1.28)	Ordinal	Importance for why own woodland – part of my farm
INVEST[1]	3.04 (0.88)	Ordinal	Importance for why own woodland – for land investment
HOME[1]	2.61 (1.34)	Ordinal	Importance for why own woodland – part of my home site/primary residence
FIREWOOD[1]	2.34 (1.01)	Ordinal	Importance for why own woodland – for production of firewood
MEMBERSHIP	0.59 (0.83)	Scale	Number of forestry organization memberships
CLASSIFIED	0.61 (0.49)	Binomial	Yes/no -- current or past enrollment in Classified Forest and Wildlands
INSTRUCTOR	0.30 (0.46)	Binomial	Yes/no -- contact with instructor since taking the course
TENURE	25.5 (18.8)	Scale	Years owned woodlands
RETIRE	0.48 (0.50)	Binomial	Yes/no -- currently retired (proxy for age)
RESIDENT	0.42 (0.50)	Binomial	Yes/no -- do you live on your woodlands
ACRE	80.3 (119.4)	Scale	Acres of woodlands owned
COURSES	5.50 (1.51)	Scale	Likelihood of attending future educational programs about woodlands[2]

[1] Questions on reasons for owning woodland adapted from the National Woodland Owner Survey (2013 Version, Indiana 5.0, USDA Forest Service).

[2] Likert-type scale 1 = not at all likely, 2, 3,…, 7 = extremely likely

Table 2.2. Demographic, woodland and activity characteristics of respondents who still own woodlands (n=164).

Variable	Response level
Sex	92% male
Age	62 years old (±11.2)
Size of woodlands	80.3 acres (±119.4)
Length of woodland ownership	25.5 years (±18.8)
Retired	48%
Live on property where woodlands are located	57%
Have a management plan for woodlands	55%
Enrolled in Classified Forest and Wildlands Program	62%
Enrolled in other cost-share programs (Conservation Reserve Program, Environmental Quality Incentives Program)	51%

Participants responded to a series of reflective questions on their extent of knowledge, awareness and actions before and after the class regarding many topics related to woodland management. For all questions, self-reported ratings increased 35.2% to 79.7% (Figure 2.3). With the exception of the question, 'What extent did you have trust in Purdue Extension as a source of information on woodland management decisions?', raw scores for after the course were higher than any rating before the course.

The course had at least some influence on the decision to do various management activities for most respondents (Figure 2.4); however, the level of influence varied across activities. According to respondents, the course had the strongest level of influence to control invasive plants and use or recommend the services of a professional forester. Less than one-quarter of respondents indicated the course had a strong influence on their decision to do six different activities including developing a new management plan or modifying an existing management plan.

Figure 2.3. Self-reported ratings of knowledge and perceptions of different woodland management concepts before and after attending the course (n=157-161). Likert-type scale with 1 = not at all, to 5 = very much.

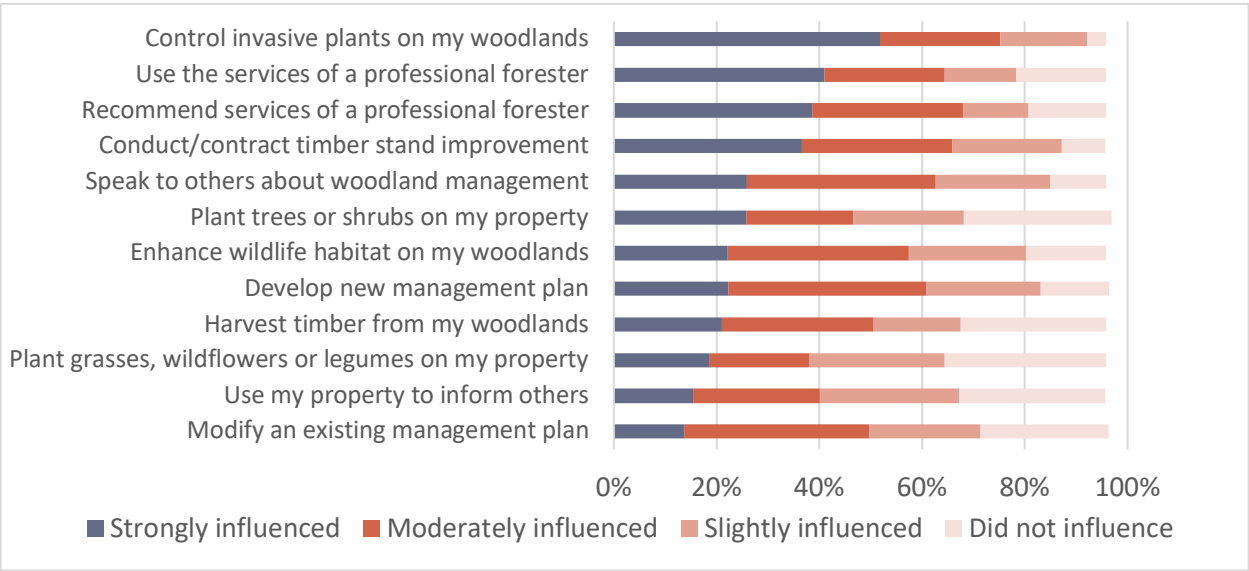

Figure 2.4. The degree that information learned in the course influenced decisions to do different management activities (n=155-160).

2.4.2 Principal Component Analysis

Factor loadings for the principal components for both variable sets are found in Tables 2.3 and 2.4. Cronbach's Alpha, a measure of scale reliability (Cronbach 1951), was calculated for each principal component. The value of Cronbach's alpha increases with the number of variables in the scale or as the average correlation between each possible pair increases (Denis 2018). Principal components with a Cronbach's alpha value of 0.70 or more have acceptable levels of internal consistency (Nunnally and Berstein 1994:264-265); those with less than 0.70 should be interpreted with caution (Ma et al. 2012). For the PCA that included nine variables for attitudes about woodlands and their management, the MANAGE and NORM components had eigenvalues greater than one and explained 37% and 16% of the variance, respectively (Table 2.3). The MANAGE component was loaded for ACTIVE, NECESSARY, RIGHT, RESPONSIBLIITY, and RESOURCES variables. The NEIGHBORS and OTHERS variables were loaded into the NORM component. THREAT and QUALITY were kept as separate variables in the OLR models.

Two principal components had eigenvalues greater than one for explaining reasons for owning woodlands (Table 2.4). The AMENITY and USE components explained 40% of the total variance. The AMENITY component was loaded for NATURE, WILDLIFE and ENJOY variables. The USE component was loaded for HUNT, CABIN, RECREATE and HEIRS variables. PRIVACY, NONTIMBER, TIMBER, FARM, INVEST, HOME, and FIREWOOD had low component loadings and were kept as separate variables in the OLR models. Cronbach's alpha for both NORM and USE components were below the 0.7 threshold.

2.4.3 Ordinal Logistic Regression Models

I used Ordinal Logistic Regression models to determine the relationship between a set of independent variables (Table 2.1) and dependent variables (develop a new management plan, modify an existing management plan, harvest timber, control invasive species, and use the services of a professional forester). These activities (i.e., dependent variables) also represented a spectrum of influence by the course across all activities (Figure 2.4). Both the deviance and Pearson goodness-of-fit tests indicated that all models were a good fit to the observed data (P = 0.27—1.00). However, these should be interpreted cautiously since most cells were sparse with zero frequencies in up to 75% of cells (Laerd Statistics 2015).

Six independent variables were significant predictors in the level of influence the course had on their decision to develop a new woodland management plan (Table 2.5). Utilitarian beliefs of their woodlands (USE) (Table 2.4) was positively associated with the course's influence on developing a new management plan ($P = 0.001$). The principal components related to positive attitudes towards management (MANAGE) and opinions or beliefs of others (NORM), as well as the importance of owning woodlands as part of their farm, also had a positive relationship with the course's influence on developing a new plan. Two variables, FIREWOOD and INSTRUCTOR, had odds ratios of less than one. Those who had contact with the instructor after the course and those who viewed production of firewood as an important reason for owing woodlands were less likely to indicate the course had some influence to develop a new management plan for their woodlands. USE, FARM and INSTRUCTOR had similar significant odds ratios for the course's influence on the decision to modify an existing management plan compared to developing a new plan. Owning woodlands for privacy was negatively associated with the course influence on modifying an existing management plan.

The OLR models for harvesting timber and using the services of a professional forester both had TIMBER as a significant predicting variable. Those who viewed harvesting timber products as an important reason for owning woodlands were about three times more likely to indicate the course had some level of influence on their decision to harvest timber and were more than twice as likely to indicate the course had some level of influence on their decision to use the services of a professional forester (Table 2.5). Enrollment in the Indiana Classified Forest and Wildlands Program was also positively associated with harvesting timber while membership in woodland organizations had a negative relationship (Table 2.5).

Three variables were significant predictors of the course influence on controlling invasive plants. Respondents who were more management oriented were more likely to indicate the course influenced their decision to control invasive plants on their woodlands. Those who viewed production of firewood at some level of importance for why they owned woodlands were about two times more likely to indicate the course had some level of influence on their decision to control invasive plants. The likelihood of attending future educational programs about woodlands (COURSES) was also positively related to the dependent variable.

Table 2.3. Variables and principal components of variables on attitudes about woodlands and their management. Variable scale was 1 = strongly disagree, 2 = disagree, 3 = neither agree or disagree, 4 = agree, 5 = strongly agree. Only principal components with eigenvalues >1 are shown. Factor loadings included in corresponding principal components are in boldface type.

	Mean (SD)	PC1 MANAGE	PC2 NORM	Cronbach's Alpha
I should actively manage my woodlands (ACTIVE)	4.45 (0.75)	**0.862**	-0.069	
Management is necessary to maintain healthy woodlands (NECESSARY)	4.46 (0.67)	**0.825**	0.012	
It is important to me that I do the right thing with my woodlands (RIGHT)	4.54 (0.70)	**0.742**	0.147	0.80
It is my responsibility as a woodland owner to maintain healthy woodlands (RESPONSIBILTY)	4.59 (0.64)	**0.739**	0.159	
I have the necessary resources to manage my woodlands (RESOURCES)	3.77 (1.03)	**0.600**	0.056	
Opinions of my neighbors influence my woodland management decisions (NEIGHBORS)	1.92 (1.08)	0.015	**0.763**	0.54
It is important to me that others believe I maintain healthy woodlands (OTHERS)	3.07 (1.25)	0.283	**0.702**	
Timber harvesting threatens the health of my woodlands (THREAT)	1.76 (1.05)	-0.314	0.459	
My quality of life depends on my woodland management decisions (QUALITY)	3.45 (1.10)	0.406	0.449	
Eigenvalue (initial total)		3.34	1.42	
Variance explained		0.37	0.16	

Table 2.4. Variables and principal components of variables on reasons for owning woodlands. Variable scale was 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = extremely important. Only principal components with eigenvalues >1 are shown. Factor loadings included in corresponding principal components are in boldface type.

	Mean (SD)	PC1 AMENITY	PC2 USE	Cronbach's Alpha
Protect nature and biological diversity (NATURE)	3.49 (0.67)	**0.846**	-0.087	
Provide habitat for wildlife (WILDLIFE)	3.41 (0.80)	**0.692**	0.314	0.72
Enjoy beauty or scenery (ENJOY)	3.61 (0.68)	**0.685**	0.240	
Hunting or fishing (HUNT)	2.64 (1.12)	0.083	**0.756**	
Part of my vacation home or cabin (CABIN)	1.76 (1.11)	-0.025	**0.634**	
Recreation, other than hunting and fishing (RECREATE)	2.92 (1.03)	0.399	**0.597**	0.62
Pass land on to my children or heirs (HEIRS)	2.96 (1.11)	0.054	**0.508**	
Privacy (PRIVACY)	3.15 (0.98)	0.337	0.443	
Cultivation/collection of non-timber resources (such as berries, mushrooms, etc.) (NONTIMBER)	2.39 (0.91)	0.241	0.435	
Timber products such as logs or pulpwood (TIMBER)	2.86 (1.07)	-0.106	0.070	
Part of my farm (FARM)	2.91 (1.27)	-0.202	-0.063	
Land investment (INVEST)	3.05 (0.88)	0.474	-0.092	
Part of my home site/primary residence (HOME)	2.63 (1.33)	0.264	-0.171	
Production of firewood (FIREWOOD)	2.35 (1.02)	0.028	0.331	
Eigenvalue (initial total)		3.64	1.98	
Variance explained		0.26	0.14	

Table 2.5. Significant parameters in the Ordinal Logistic Regression models. The dependent variables were coded for level of course influence as 1 = did not influence, 2 = slightly influenced, 3 = moderately influenced, and 4 = strongly influenced. P-values in bold donote statitical significance ($P \leq 0.05$)

	New Plan (n =160)			Modify Existing Plan (n=155)		
Parameter	**Wald Chi-Sq**	**P-value**	**Odds ratio (95% C.I.)**	**Wald Chi-Sq**	**P-value**	**Odds ratio (95% C.I.)**
[CLASSIFIED=0]	2.43	0.119	2.156 (0.821, 5.662)	0.43	0.514	1.373 (0.530, 3.556)
[INSTRUCTOR=0]	4.14	**0.042**	0.363 (0.137, 0.963)	4.96	**0.026**	0.331 (0.125, 0.876)
[RETIRE=0]	1.61	0.205	0.559 (0.228, 1.373)	1.71	0.191	0.549 (0.224, 1.348)
[RESIDENT=0]	0.30	0.583	0.713 (0.213, 2.387)	0.09	0.763	0.835 (0.257, 2.705)
AMENITY PC[1]	2.04	0.153	1.521 (0.855, 2.704)	0.27	0.605	1.170 (0.646, 2.120)
USE PC[1]	10.50	**0.001**	2.956 (1.534, 5.695)	9.09	**0.003**	2.803 (1.434, 5.479)
MANAGE PC	4.20	**0.040**	1.650 (1.022, 2.663)	3.35	0.067	1.566 (0.969, 2.532)
NORM PC	3.94	**0.047**	1.766 (1.007, 3.096)	2.72	0.099	1.613 (0.914, 2.845)
QUALITY	0.77	0.379	1.239 (0.769, 1.996)	0.02	0.896	0.968 (0.593, 1.580)
THREAT	0.00	0.950	1.019 (0.563, 1.846)	0.42	0.518	1.216 (0.672, 2.199)
PRIVACY[1]	0.25	0.618	0.866 (0.491, 1.527)	0.48	**0.490**	0.819 (0.464, 1.445)
NONTIMBER[1]	0.94	0.331	0.710 (0.355, 1.417)	0.17	0.680	0.863 (0.429, 1.737)
FIREWOOD[1]	4.76	**0.029**	0.573 (0.347, 0.945)	3.59	0.058	0.617 (0.375, 1.017)
TIMBER[1]	0.16	0.692	0.909 (0.567, 1.457)	0.14	0.708	0.910 (0.555, 1.491)
HOME[1]	0.34	0.562	1.157 (0.707, 1.892)	0.11	0.742	0.921 (0.563, 1.505)
FARM[1]	5.80	**0.016**	1.561 (1.086, 2.242)	4.68	**0.030**	1.499 (1.039, 2.164)
MEMBERSHIP	3.39	0.065	0.610 (0.361, 1.032)	1.12	0.290	0.751 (0.441, 1.277)
TENURE	0.87	0.352	1.013 (0.986, 1.040)	0.25	0.614	1.007 (0.980, 1.035)
ACRE	0.39	0.531	0.999 (0.995, 1.003)	0.23	0.632	0.999 (0.995, 1.003)
COURSES	0.10	0.749	1.056 (0.757, 1.474)	2.90	0.089	1.356 (0.955, 1.927)

[1] Questions on reasons for owning woodland adapted from the National Woodland Owner Survey (2013 Version, Indiana 5.0, USDA Forest Service).

Table 2.5. Continued

Parameter	Harvest Timber (n = 159)			Control Invasives (n -= 159)		
	Wald Chi-Sq	**P-value**	**Odds ratio (95% C.I.)**	**Wald Chi-Sq**	**P-value**	**Odds ratio (95% C.I.)**
[CLASSIFIED=0]	4.04	**0.044**	2.688 (1.025, 7.046)	0.04	0.847	0.895 (0.292, 2.746)
[INSTRUCTOR=0]	0.01	0.920	0.953 (0.374, 2.429)	2.10	0.148	0.407 (0.120, 1.375)
[RETIRE=0]	0.22	0.640	0.812 (0.338, 1.948)	0.00	0.986	1.010 (0.346, 2.945)
[RESIDENT=0]	0.47	0.494	0.661 (0.201, 2.169)	0.02	0.877	0.891 (0.206, 3.850)
AMENITY PC[1]	0.08	0.774	1.092 (0.597, 1.998)	0.22	0.637	1.171 (0.608, 2.256)
USE PC[1]	2.30	0.129	1.664 (0.862, 3.213)	0.84	0.360	1.416 (0.673, 2.979)
MANAGE PC	0.21	0.644	1.118 (0.697, 1.793)	8.10	**0.004**	2.175 (1.274, 3.714)
NORM PC	2.90	0.089	1.632 (0.928, 2.870)	3.64	0.056	1.934 (0.982, 3.810)
QUALITY	0.15	0.698	1.103 (0.673, 1.808)	2.55	0.110	0.631 (0.358, 1.111)
THREAT	0.03	0.861	1.054 (0.584, 1.904)	0.89	0.345	0.699 (0.332, 1.470)
PRIVACY[1]	0.26	0.612	0.861 0.482, 1.538)	0.28	0.595	0.831 (0.420, 1.644)
NONTIMBER[1]	0.00	0.971	0.987 (0.495, 1.969)	0.75	0.387	0.697 (0.307, 1.580)
FIREWOOD[1]	1.20	0.273	0.757 (0.461, 1.245)	4.75	**0.029**	1.974 (1.071, 3.638)
TIMBER[1]	16.64	**<0.001**	3.025 (1.777, 5.148)	2.58	0.108	0.609 (0.332, 1.116)
HOME[1]	0.48	0.486	1.185 (0.734, 1.913)	0.23	0.632	1.151 (0.649, 2.041)
FARM[1]	0.72	0.398	1.164 (0.819, 1.656)	0.23	0.629	1.110 (0.727, 1.693)
MEMBERSHIP	4.60	**0.032**	0.556 (0.325, 0.959)	0.03	0.874	0.950 (0.507, 1.781)
TENURE	0.33	0.567	1.008 (0.981, 1.036)	0.00	0.987	1.000 (0.968, 1.033)
ACRE	0.20	0.652	0.999 (0.996, 1.003)	0.03	0.870	1.000 (0.997, 1.004)
COURSES	0.01	0.925	0.984 (0.707, 1.370)	9.417	**0.002**	1.855 (1.250, 2.754)

[1] Questions on reasons for owning woodland adapted from the National Woodland Owner Survey (2013 Version, Indiana 5.0, USDA Forest Service).

Table 2.5. Continued

	Professional Forester Services (n = 159)		
Parameter	**Wald Chi-Sq**	**P-value**	**Odds ratio (95% C.I.)**
[CLASSIFIED=0]	0.01	0.917	0.951 (0.370, 2.446)
[INSTRUCTOR=0]	0.01	0.940	0.963 (0.359, 2.581)
[RETIRE=0]	1.98	0.160	0.522 (0.211, 1.291)
[RESIDENT=0]	0.61	0.433	0.599 (0.166, 2.158)
AMENITY PC[1]	1.17	0.280	0.731 (0.415, 1.291)
USE PC[1]	3.14	0.076	1.772 (0.941, 3.337)
MANAGE PC	0.02	0.884	0.964 (0.586, 1.586)
NORM PC	0.15	0.699	0.892 (0.499, 1.593)
QUALITY	0.02	0.876	0.961 (0.587, 1.574)
THREAT	0.24	0.621	1.163 (0.639, 2.116)
PRIVACY[1]	0.38	0.536	1.198 (0.677, 2.120)
NONTIMBER[1]	0.39	0.532	1.254 (0.617, 2.550)
FIREWOOD[1]	1.55	0.213	0.719 (0.428, 1.208)
TIMBER[1]	12.52	**<0.001**	2.435 (1.487, 3.986)
HOME[1]	2.31	0.129	1.492 (0.891, 2.499)
FARM[1]	0.31	0.577	1.105 (0.778, 1.568)
MEMBERSHIP	2.93	0.087	1.639 (0.931, 2.885)
TENURE	0.11	0.741	0.995 (0.968, 1.023)
ACRE	2.04	0.153	0.997 (0.993, 1.001)
COURSES	1.21	0.272	1.221 (0.855, 1.742)

[1] Questions on reasons for owning woodland adapted from the National Woodland Owner Survey (2013 Version, Indiana 5.0, USDA Forest Service).

2.5 Discussion

The primary focus of this study was to determine how the course influenced traditionally viewed important aspects of woodland management and identify predictors of the level of influence the course played in several key outcomes. The Forest Management for the Private Woodland Owner eight-week short course had some level of impact on most participants. The course had a strong or moderate influence on a variety of activities for 41% to 78% of participants (Figure 2.4). Controlling invasive plants on their woodlands and using or recommending the services of a professional forester had the highest level of 'strong influence'. The course had less influence on developing a new management plan for their woodlands, harvesting timber, or modifying an existing management plan. However, just over half of the participants indicated the course had strong or moderate influence on these (Figure 2.4).

The Forest Management for the Private Woodland Owner eight-week course was viewed favorably by the majority of participants. The behaviors modeled in this study pertain to forest management and making informed decisions that align well with state and national goals (e.g., USDA 2018). Even though course participants on average owned large parcels and were management oriented (i.e., program enrollment, having management plans), the influence of the course on key woodland management behaviors was not uniform. Attitudes about woodlands and their management, reasons for owning woodlands, and level of engagement were significant factors in predicting the level of influence by the course. None of the variables pertaining to land and landowner characteristics were significant predictors of course influence in any of the models. This suggests that understanding FFOs' attitudes and motivations are not only important in determining behavioral outcomes of woodland owners, but also in how education is used to facilitate decisions about woodland activities. For example, FFOs who owned woodlands for timber production were three times more likely to indicate the course had some level of influence on their decision to harvest timber. Information they learned in the course perhaps facilitated action of a predisposed intention. Woodland owners who had no prior interest in harvesting timber were less likely to be influenced by the course to do so.

Many researchers have identified different segments or typologies of woodland owners based on land and landowner characteristics as well as attitudes towards woodlands (Ross-Davis and Broussard 2007, Butler et al. 2007, Ficko and Boncina 2013). These approaches have provided clarity to approaches on how to target educational programming for segments with shared

management interests. Woodland owners who took the Forest Management for the Private Woodland Owner eight-week short course were not a representative sample of woodland owners in Indiana or the U.S. Most (60%) woodland owners in the U.S. own less than 10 ac and only 4% have management plans (Butler et al. 2016). While course participants were similar to the average woodland owner in terms of most demographics, they were more management oriented (i.e., having a management plan and enrollment in technical or cost-share assistance programs) and owned larger parcels of woodlands (Table 2.2). Additionally, 87.7% attended at least some amount of college with 53% obtaining a 4-yr or advanced degree. The content and structure of the eight-week course may be of much more interest to woodland owners who are more management oriented. Attending an eight-week course of this type is a significant investment in time. Those who are already doing management activities or engaged with forestry groups or professionals may be more suited for this type of course. Also, owning larger parcels of woodlands has been positively correlated with management intensity measured by increased volume of lumber in a stand and other forest behaviors (Hodge and Southard 1992, Thompson 1997, Floress et al. 2019). An additional explanation is that 62% of the course participants are enrolled in the Indiana Classified Forest and Wildlands Program. As a function of being enrolled in this program, landowners receive a property tax reduction in return for following a management plan developed by a professional forester. Enrollees must own a minimum of 10 acres of forest, wetland, shrubland, and/or grassland.

Social networks play a role in decisions woodland owners make about their land (Knoot and Rickenbach 2011, Kittridge et al. 2013). These networks contain both peer landowners and professionals (Kittridge et al. 2013). Contact with the instructor after the course was a significant predictor for developing a new management plan or modifying an existing plan in this study. Perhaps surprisingly, those who did have contact with the instructor after the course were about 3 times less likely to indicate the course had any level of influence on their planning. Participant's level of trust in Purdue Extension as a source of woodland information was high both before and after the course (Figure 2.3). During interviews with course participants, their views of the course instructors was very positive (B. MacGowan, unpublished data). Other factors may explain the relationship between contact with instructor and planning. Compared to other behaviors, the level of influence the course had on new and modified plans was relatively low (Figure 2.4). Over half of the respondents were enrolled in the Classified Forest and Wildlands Program. Those enrolled

prior to taking the course would have already had management plans. Additionally, the survey question was phrased if they have had "some form of contact with the instructor since you completed the Forest Management for the Private Woodland Owner course?" Their descriptions of their contact ranged from consulting with the instructor about management activities to chance encounters in activities unrelated to woodland management.

2.6 Conclusions

This study summarized the influence the eight-week course had on woodland management activities, but there were several limitations. The survey in this study was implemented after participants took the course. Their responses regarding attitudes about various management practices were formed from experiences before, during and after the course. Although the response rate of 65% was relatively high for mail surveys, I did not assess non-response bias. If there was bias, it could be possible that the course had less of an influence on non-respondents or they were less active FFOs compared to respondents. The survey respondents were also not a random sample of all Indiana FFOs. Having a high proportion of respondents enrolled in the Indiana Classified Forest and Wildlands Program is a possible confounding factor since it was unknown when they first enrolled (i.e., before or after the eight-week course). Professional foresters provide advice and write a woodland management plan as part of the program. FFOs who were enrolled prior to taking the eight-week course could not have been influenced to develop a new management plan or contact a professional forester. However, the eight-week course could have had an impact on previously implemented practices of FFOs by expanded the scale of adoption, improve the practice in some capacity, or simply confirm the continuance of the practice. Additional research that addresses how educational programs play a role in the decision-making process for key woodland management practices would help inform future approaches in education.

Improving Extension programming and its evaluation was an overarching goal of this study. Post-program surveys are used to gauge changes in knowledge, awareness, and skill in key areas as well as behavioral intent to perform key behaviors specific to the goals of the particular Extension program. Surveys are also used to assess behaviors 6 to 12 months after a program. I was able to assess the level of influence the course had on different behaviors, but could not determine the manner in which the course influenced the behavior. Future evaluations should consider asking specifically if the course directly led to implementing a practice, improving an

existing practice, or provided confirmation to continue a practice. However, not all practices occur on an annual basis. Evaluators need to account for intermittent behaviors such as timber harvesting, seeking professional advice, or planning. Finally, this study confirms that the attitudes of FFOs play a key role in woodland activities. Including questions about their attitudes towards particular practices and how the course contributed to those attitudes would provide insights into how the course played a role in future activities beyond the 12-month evaluation period.

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CHAPTER 3. EXTENSION EDUCATION'S ROLE IN WOODLAND OWNER DECISION-MAKING—A CASE STUDY OF AN INDIANA FOREST MANAGEMENT COURSE

3.1 Introduction

Forests provide a multitude of environmental (e.g., carbon sequestration, enhance water quality, wildlife habitat), economic (e.g., timber, wood products manufacturing, tourism), and social (e.g., recreation, aesthetics) benefits to society (Manning et al. 1999, Witter et al. 2013, USDA 2011). An estimated 9.6 million family forest ownerships (FFOs) in the United States collectively control 272 million acres of forest land (Butler et al. 2020). In Indiana, slightly more than 84 percent of the 4.87 million acres of forestland is privately owned (Settle et al. 2016).

Active forest management is generally considered a desirable outcome. For example, the National Report on Sustainable Forests states that,

> *"with the loss of an active management focus and the revenue streams that often accompany it, the survival of these forests and their associated ecosystem services is in question" (USDA 2011).*

Presumably, increasing the number of forest landowners who actively manage how their forests "work" can maintain or increase the benefits forest provide society, although landowners may view the concept of management differently than professionals or land management agencies (Feliciano et al. 2017).

3.2 Background

3.2.1 Woodland Management Practices

Woodlands must meet demand of world consumption of industrial roundwood and fuelwood which has almost doubled in volume since 1961 (FAO 2014). Timber is an important economic sector in Indiana with the total economic impact of forests and the hardwood industry totaling $17 billion (Settle et al. 2016). Increasing demand for timber products has the potential to impact woodlands in Indiana and the U.S. However, as long as volume growth meets or exceeds demand, then use is sustainable. The acres of forested areas in Indiana have increased in recent

years increasing with forest growth in volume exceeding volume harvested by 1.5 times (Settle et al. 2016).

Our forests perform several critical ecological roles, but also provide important social and economic values/uses to society. It is these three areas—environment, society, and economy—that underlie the concept of "sustainability" with the environmental realm forming the foundation (USDA 2011). The National Report on Sustainable Forests (USDA 2011) identified seven major driving forces affecting forest sustainability including loss of working forests (i.e., ecosystem services, lack of active management) and altered disturbance patterns (e.g., moving away from historical fire frequency and intensity). Disturbance regimes have shaped the vegetative composition and structure of North American forests for thousands of years (Lorimer 2001). The combination of burning practices by Native Americans and cutting, grazing and burning practices by European settlers shaped forest species composition and structure (Parker 1997, Jenkins 2013). While the harvesting of timber has economic benefits, it can emulate natural disturbance regimes, and particularly, those of larger scale and intensity. Using a disturbance-based management approach also provides a broader array of ecosystem functions by emulating natural ecological processes (North and Keeton 2008). In the absence of historical disturbance regimes, timber harvesting has been promoted as a tool to provide ecological benefits associated with early-successional habitat. For example, timber harvesting can enhance breeding bird diversity in oak-hickory forests by providing nesting habitat for songbirds associated with early-successional habitat and young forests (Kellner et al. 2016). Early successional habitat created by timber harvesting provides habitat for recently fledged birds that nest in the mature forest canopy (Ruhl et al. 2020). Habitats managed for early successional wildlife can also support diverse bee communities, an important pollinator group (Milam et al. 2018). Despite these benefits disturbance can result in the invasion of non-native plants (Kumschick et al. 2015). However, the timing of timber harvesting after invasion can have both positive and negative influences on invasion (Sokol et al. 2017)

Invasive plants are a significant threat to forest biota worldwide (Wardle and Peltzer 2017), including the eastern U.S. (Oswalt et al. 2015). According to the National Woodland Owners Association, invasive species and forest health are the second highest concern for family forestry in the U.S. (NWOA 2020). Because of this threat they are a management priority in public and private woodlands and often one focus of cost-share and technical assistance programs (e.g.,

USDA Environmental Quality Incentives Program). Given the scope of control that private woodland owners have on forest acreage in the eastern U.S., empowering FFOs to control invasive plants in their woods is essential. However, until recent years our understanding of how FFOs perceive the problem or activities they perform to control invasive plants was limited. Clarke et al. (2019) conducted a statewide survey of 2,424 FFOs in Indiana randomly selected from statewide forest parcel data for those who own at least one acre (0.4 ha). Their goals were to determine awareness and concerns of invasive plants, actions taken, and management challenges and opportunities. In their study only 40% of 1,422 respondents could identify some or all invasive plants in their woods. Sixty-two percent did some type of invasive species management within the previous five years; however, much of this was done without professional advice (Clarke et al. 2019). Thirty-five percent were enrolled in Classified Forest and only 12% contacted a university professional about invasive species (Clarke et al. 2019).

Both management plans and professional advice have the potential to facilitate desirable FFO behaviors. While the ecological benefits of having a woodland management plan are poorly understood, the concept of management planning is a common practice promoted by Extension (e.g., Grotta 2014, Tauber et al. 2021). Following a written management plan is often a required component of many cost-share, technical assistance, or tax incentive programs (e.g., IDNR Undated). For Indiana FFOs, the likelihood of managing invasive plants was associated with having a written management plan, larger parcels, or enrollment in the Indiana Classified Forest and Wildlands Program (Clarke et al. 2019). However, planning, professional advice, and program enrollment could be conflated in the literature because the first two activities are often a requirement or result of the latter activity. Because of this, enrollment in programs could serve as a proxy to assess the influence of either planning or professional advice on FFOs' behaviors. In an analysis of the National Woodland Owner Survey data set, Kilgore et al. (2015) found that FFOs who enrolled in cost-share and technical assistance programs were more likely to harvest timber or improve wildlife habitat.

Planning and professional advice are two of many factors that can influence FFO woodland activities. There have been two recent studies that analyzed the published literature on factors associated with FFO actions (Floress et al. 2019) and timber harvesting behavior (Silver et al. 2015). Floress et al. (2019) conducted a vote-count analyses of the published literature where all dependent and independent variables are coded with three possible outcomes— positive significant,

negative significant, or no statistical relationship. For timber harvesting, they found parcel size was always positive when included in models; however, ownership objective and policy tools were mixed. Policy tools were sometimes positive but mostly insignificant whereas ownership objective was mostly insignificant but positive or negative in two models each. Invasive species management was positively associated with environmental knowledge in three models and insignificant in three other models. Attitudes were commonly included in models for invasive species management; 6 models had a positive relationship while 11 models were not significant. Overall, they found that current/past landowner behavior, knowledge, and forest parcel size/area were significantly positive independent variables across behaviors (Floress et al. 2019). Their findings support prioritizing cost-share and technical assistance programs for FFOs who own larger parcels to maximize program impact across a suite of behaviors. However, many behaviors in their study also were positively associated with a variety of other factors including attitudes.

In a meta-analysis review, Silver et al. (2015) examined factors that are associated with timber harvesting, but they also evaluated the quality of the methods and evidence used. They found 87 studies that addressed timber harvesting as a main focus. Very few of these (10%) measured actual timber harvesting or explicitly measured the relationship between attitudes, intention, and behavior. Of the 28 studies that used statistical methods to test correlations, they found that parcel size and harvest price per acre had the most predictive support in the literature. However, having a written management plan, contact with a professional forester/technical assistance, and Extension activity attendance/cooperation with Forest Service were found in 2 to 4 studies and were always positively associated with timber harvesting (Silver et al. 2015). Getting FFOs engaged with professional advisors and educational opportunities could be a key in ultimately obtaining ecological benefits (e.g., early-successional wildlife habitat, oak regeneration) that timber harvesting can provide.

3.2.2 Woodland Owner Attitudes

Beliefs and values generally shared by private forest landowners may also offer insights into how to approach educational and outreach efforts. Historically, many woodland owners believe timber is important, but protection of natural beauty and providing wildlife habitat rank higher for reasons of ownership (Sampson and DeCoster 1997; Butler et al. 2020). Information about forest management may be better received if consideration is given to the type of landowner,

since all forestland owners do not share the same goals and objectives for their property. Ross-Davis and Broussard (2007) found that forestland owners in northern Indiana could be divided into three distinct groups – new forest owners, forest managers, and passive forest owners. These groups differed in whether they considered their land to be managed, harvested timber on their land, and used information from the Department of Natural Resources and foresters (Ross-Davis and Broussard 2007). Many woodland owners in Indiana and across the country own forests for reasons other than producing timber (Kilgore 2004, Ross-Davis and Broussard 2007). While harvesting timber is not an important reason for owning woodlands for most landowners, cutting trees for personal use or sale is a common management activity (Butler et al. 2020). Segments of woodland owners in Indiana (Ross-Davis and Broussard 2007), the southeastern U.S. (Majumdar et al. 2008), across the United States (Butler et al. 2007), and Finland (Hujala et al. 2013) have different management objectives that for some include no harvest.

Ross-Davis and Broussard (2007) also examined land-use decisions (forest management, enrolling in assistance programs, and seeking information about forestry) by different typologies of FFOs in north central Indiana. Most landowners (64%) in their study considered their land to be managed. Even 41% of those in the 'passive forest owner' group considered their land to be managed. About three percent of FFOs had management plans (Ross-Davis and Broussard 2007). In a national survey of woodland owners, the majority (about 75%) did a least one management activity within the previous 5 years (Butler et al. 2020). However, compared to Ross-Davis and Broussard (2007) this study included a wider suite of practices and did not ask if doing one more resulted in land being managed. The national survey of FFOs had a higher incidence of written management plans (11%) but their published report excluded those who owned less than 10 acres of forest land (Butler et al. 2020); one acre was the minimum threshold in the Indiana study (Ross-Davis and Broussard 2007).

Reasons why FFOs own woodlands are diverse but also have changed over time. Starting in the last quarter century woodland owners cited timber harvesting with less frequency as an important reason for owning woodlands (Butler and Leatherberry 2004, Butler et al. 2020). In the most recent National Woodland Owner Survey, beauty and scenery, privacy, wildlife habitat, nature protection, and water protection were the most commonly cited reasons for owning woodlands (Butler et al. 2020). Major concerns of woodland owners in 2018 included high property taxes, keeping land intact for their heirs, trespassing or poaching, dumping and vandalism,

and government regulation (Butler et al. 2020). In a survey of Indiana adults, the majority believed that some type of management (or harvesting) was acceptable, although the motivation behind the harvest and professional supervision were important factors (Witter et al. 2012). These findings may be applicable to Indiana FFOs since the attitudes of the public are not different from those who own woodlands (Schaaf et al. 2006, Ross-Davis and Broussard 2007). Schaaf et al. (2006) attributed similar views between woodland owners and the general population to the increasing number of woodland owners and a growing number who were previously urban residents. They found that attitudes towards harvesting were largely related to motivations for the harvest (Schaaf et al. 2006).

3.2.3 Decision-making Process

The Diffusion of Innovations (DoI) Theory (Rogers 2003) has been used to explain farmer, and to some extent woodland owner, adoption of land management practices. DoI explains how innovations get adopted and how they spread (Figure 3.1). According to Rogers (2003), the four key elements of the diffusion process include the innovation, channels of communication, time, and the social system. The innovation can be a new idea, practice, or object. As early adopters use an innovation, others learn of the innovation through communication channels that may include the media or interpersonal interactions. This diffusion process requires time through the individual decision-making process of learning about the innovation to implementation, but also the rate of adoption in a system. The latter can be influenced in part by the structure of the social system, prevailing norms within the system, and views of important opinion leaders within the system.

According to DoI, an innovation's relative advantage, compatibility, complexity, trialability, and observability can influence its rate of adoption in a social system (Rogers 2003). Relative advantage could pertain to economic gains but also changes in status or other perceived benefits of adopting an innovation. Compatibility of an innovation relates to how it fits within an individual's values or beliefs, its perceived need, and how it fits within previously adopted behaviors. Complexity is associated with the level of difficulty in understanding or implementing an innovation. Trialability is the degree to which an innovation may be implemented on a small scale. Observability is the degree an innovation can be seen by or communicated to others in the social system. In general, an innovation's relative advantage, compatibility, trialability, and

observability are positively related to its rate of adoption. Innovations that are more complex will have a slower rate of adoption (Rogers 2003).

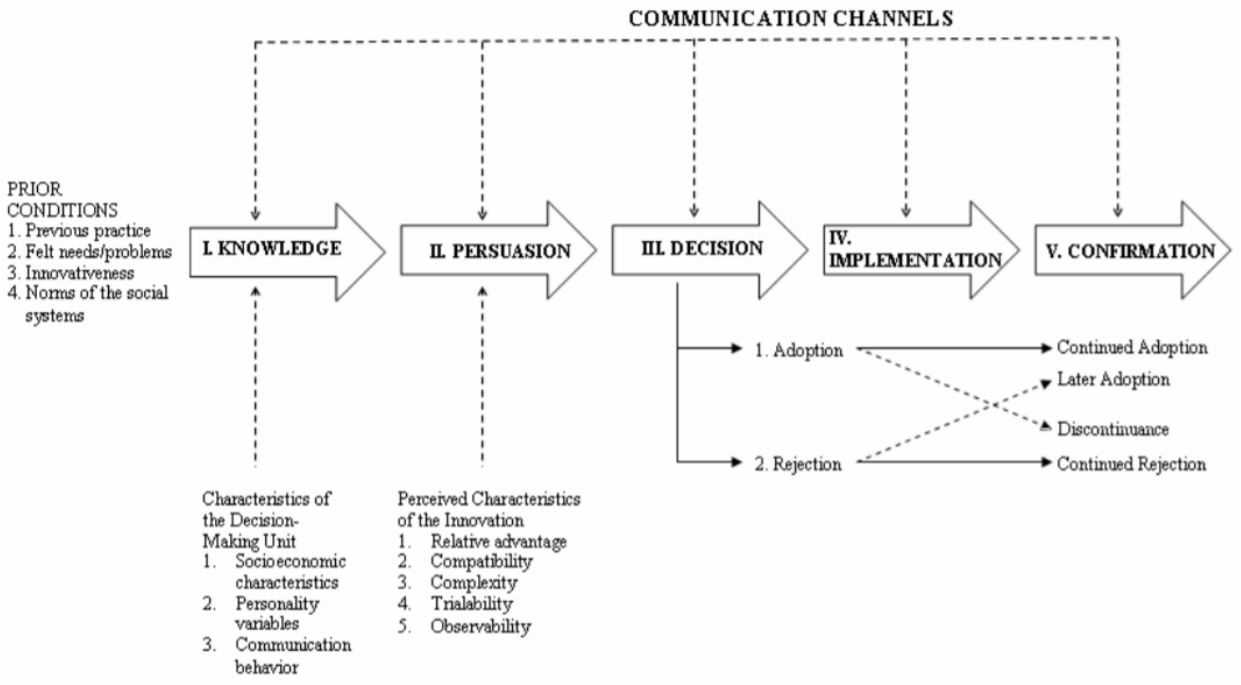

Figure 3.1. The five stages in the Innovation-Decision Process (Rogers 2003).

The five-stage decision process includes knowledge, persuasion, decision, implementation and confirmation (Rogers 2003). Before implementing any new practice or innovation, an individual must become aware of its existence and understand how it works. After doing so, the individual forms an attitude about the practice. The characteristics of an innovation plan an important role in attitude development and the decision to adopt or reject an innovation. In particular, innovations that are perceived as being incompatible with personal values and beliefs or with no relative advantage are not adopted (Rogers 2003). The trustworthiness of the messenger also plays a role in how a potential innovation is perceived. Once an individual decides to adopt an innovation, it is implemented and put into practice. Sometimes implementation can be delayed due to weather or seasonal constraints, permitting requirements, or a variety of other factors. During the implementation stage, adopters may tweak or "*re-invent*" the innovation to better fit

their situation. Finally, during the confirmation stage, adopters decide whether to continue implementing an innovation or abandon it (Rogers 2003).

DoI has been used to explain adoption, or intent of adoption, of conservation practices in a variety of situations. For example, Warner et al. (2020) used DoI characteristics to determine behavioral intentions for adopting yard fertilizer behaviors. They found compatibility of the practice was an important predictive indicator. Atwell et al. (2009) found that farmers were more likely to adopt perennial vegetative cover on their farms when the practice had immediate profitability (i.e., relative advantage), but was also compatible with other farm practices. However, an important part of DoI theory is the communication of innovations across social networks. Change agents as part of these networks have the ability to spread information about conservation practices (e.g., Lubell and Fulton 2007, Cerf et al. 2011).

Adoption of management practices that benefit the environment can be influenced, in part, by attendance of educational programs (e.g., Rasamoelina et al. 2010). However, programs that focus on changes in awareness and knowledge assume that deficiencies in either of these areas is a primary driver that limits specific behaviors. Assumptions that providing information increases awareness and knowledge that ultimately lead to the target audience changing behavior is an oversimplification of how people make decisions (Weiss 2000, Germain et al. 2014). DoI has been suggested as a framework for designing evaluations of Extension programs (Hubbard and Sandmann 2007). However, one must understand the entire context of when and how woodland owners make decisions about their woods to truly understand the process (Hujala et al. 2007). Thus, an in-depth case study approach has the potential to provide novel insights into FFOs' decision-making.

The Forest Management for the Private Woodland Owner eight-week short course provides a unique opportunity to examine FFOs decision-making and the role education plays in that process. The eight-week course is an Extension program with an over 25-yr history. The course is offered throughout Indiana at different locations each year. Classroom sessions include tree identification, forest biology, planning, management practices, invasive species control, selling timber, financial management, wildlife, and informational resources and assistance. Two outdoor field tours are also included to reinforce concepts learned in class. The course had some level of influence on a variety of woodland activities, with the strongest influence to control invasive plants and use or recommend the services of a professional forester (MacGowan Chapter 2). It is,

however, unclear how the course influenced participants. For example, did the course play a role in decisions on whether or not to engage in activities, the decision to continue an activity or maintain a practice, or the manner in which they do so?

3.2.4 Research Questions

Decisions that woodland owners make about their property are often situational and depend on the contextual factors at the moment in time (Hujala et al. 2007). While some published studies have associated attendance at educational events with certain behaviors (Genskow 2012, Silver et al. 2015, Rasamoelina et al. 2016), the manner in which they do so is poorly understood. Knowledge of how courses play a role in woodland owner decision-making will provide a clearer understanding of how to approach FFO education in the future. A case study of management activities of participants in the eight-week course will provide an in-depth analysis into why landowners choose to (or not to) perform key management behaviors and the factors, including the course, which play key roles in the decision-making process (Ary et al. 2010). Within the DoI framework, the course could influence participants within in each of the five steps of the decision-making process as well as facilitating communication of ideas either within the course or among participants outside of the course. Within this context, my research questions are:

1. What are the attitudes, motivations and barriers for adoption of timber harvesting, invasive plant control, woodland management planning, and obtaining advice from a professional forester?
2. Why/how do FFOs first get involved in education?
3. What role did the eight-week course play in the decision-making process?

3.3 Methods

3.3.1 Interviews

Between December 2016 and April 2017 I conducted 22 semi-structured interviews of 24 woodland owners. Twenty-one interviews were conducted in person. One interview was conducted by phone because of scheduling conflicts. Interview participants were recruited by phone from a list of 294 individuals who participated in a least one of 13 Forest Management for the Private

Woodland Owner eight-week short courses held between 2007 and 2015. Participants during 2007-15 were mostly male (92%), averaged 62 years old, and owned an average of 80.3 ac of woods for 25.5 years. About half were retired, and over half lived on the property where their woodlands were located. I removed 17 participants who reported that they didn't own woodlands. Since the courses spanned a period of 9 years, I grouped contacts into two groups---those who attended the course during 2007-11 and those who attended during 2012-15. I assigned a random number to each respondent then contacted them by phone to schedule interviews in order, beginning with the lowest random number. I interviewed 10 woodland owners from the earlier courses and 14 woodland owners from the later courses. The ages of participants ranged from between 36 years old and 78 years old; twenty-one were male. The length of interviews ranged from 30 minutes to an hour.

Interviews were semi-structured where I asked a set of standard questions from an interview guide in a systematic order. I digressed from this order to probe beyond their answers or if content was addressed in a previous question (Berg and Lune 2012). The interview guide centered around three areas—attitudes and thoughts about woodlands and their management, attitudes about the eight-week course, and attitudes and motivations regarding woodland management plans, professional foresters, timber harvesting, and controlling invasive plants (see Appendix B).

3.3.2 Coding

Transcribed interviews were coded in NVivo 12, QSR International. I developed a final codebook (Appendix C) through the following process. I drafted the initial codebook using the interview guide as an outline. I reviewed the draft codebook with a second researcher (Linda Prokopy) where we discussed the overall coding structure. After I updated the codebook draft, we coded one transcript, reconciled differences, and updated the codebook. Over online meetings coders reconciled differences using low kappa scores (generated by the coding comparison query in NVivo) to identify problem codes (i.e., those with kappa scores <0.7), visual inspection of coding stripes within NVivo, and negotiated consensus of code meanings. The codebook was revised after each reconciliation. We repeated this process three additional times using one or two new transcripts. I empirically tested the coding framework on the last three subsets of two interviews using Cohen's kappa statistic as a measure of intercoder reliability (Cohen 1960). This

statistic considers the level of agreement between coders as well as the element of chance. The last two sets of intercoder reliability tests had acceptable levels of agreement with a final Cohen's kappa of 0.73 indicating acceptable consistency between coders.

During the codebook development, codes were organized into a hierarchy of parent nodes, child nodes, etc. Within the codes, I identified common shared themes of interviewees. As a standard practice with qualitative inquiry, themes were described in the results rather than summarized as the number of interviewees who shared a particular viewpoint since views expressed less frequently are important as well (Berg and Lune 2012, Knoot et al. 2009). Quotations are presented in the results to highlight key findings.

3.4 Results

3.4.1 Woodland Attitudes and Values

Woodland owners have multiple reasons for owning woods and the eight-week course participants were no different. Family was a prominent theme among this group of woodland owners. For some, owning woodlands was connected to memories of family experiences about woodlands whether it was woods they currently own or parcels owned by other family members. These experiences were related to exploring the woods as a child and other social interactions; these were unrelated to exposure to woodland management. For many woodland owners, current experiences with family were highlighted. Sometimes these were related to hunting, mushroom gathering and other recreation. However, the most prominent theme was that their woodlands provided an opportunity to spend quality time with family. Their enjoyment was a combination of seeing family members they otherwise may not see often, but also almost a pride or satisfaction in exposing family members to woodlands and the outdoors. One owner expressed this in the statement,

> *"It's given great enjoyment to so many people. ...And my children and their friends coming down here, there's a lot of kids that come down here that have never been in an area like this. And they get here and they're like, 'Oh my gosh!' And they all seem to love it."*

Other family connections were related to intergenerational transfer. Some course participants owned woodlands that have been a part of the family. It was important for them to

keep that tradition and they hoped to pass it down to the children or grandchildren. One co-owner said,

> *"What it means to me. This particular piece of property that we own is very special to me because it's been in my husband's families since the early '70s."*

Another prominent theme course participants valued about their woodlands was the aspect of nature preservation and diversity. They mentioned how woodlands contribute to wildlife habitat, clean air, and soil health. Seeing animals such as different songbirds, bobcat or owls confirmed that owning woods was helping to preserve nature. But for many, having woodlands was also an opportunity to keep land in a natural state. For example, one owner said

> *"I appreciate the opportunity to be the steward of a natural space. Providing habitat for wildlife is really important to me. And I wanted some space that's left alone. I don't think there's quite enough of that."*

Some owners also recognized that other lands were under development pressure or mismanaged, so keeping an area where plants and animals were "*left alone*" was meaningful.

There were some other reasons important to woodland owners, including having their woodland as a retreat or place unplug, or as part of their home. However, several noted the value of consumptive use and doing so responsibly. Utilizing the resource was a way of life and a source of pride for some. A few owners expressed satisfaction being able to consume wild meat from deer and other game animals they hunt. A couple owners relied on firewood gathered from their woodlands for heat. Several woodland owners discussed timber as reason they owned woodlands, but also cutting trees for their own use to build furniture or structural building materials.

3.4.2 Motivations and Attitudes about Woodland Education

For some woodland owners, the eight-week course was their very first experience with woodland education. For others, it was one a long series of different experiences. In response to the question, 'Do you recall what first got you interested in educational programs about woodlands?', several themes emerged that contributed to their motivation to start.

In many cases, an individual who was either a personal connection (i.e., neighbor, friend, family, spouse) or a professional connection (e.g., forester, district conservationist, Purdue Extension) played a role in facilitating their participation in the course. The participants were not

necessarily actively seeking out knowledge or looking for educational opportunities, but rather an individual extended a direct invitation. For example,

> *"I attended DeKalb Soil and Water, and I can't think of the gentleman's name, but we got invited to [it]."*

Knowledge of the eight-week course and other opportunities was not always enough to get woodland owners involved.

> *"Just busy in life. And I finally had a friend, a friend of mine who is a woodland owner, he'd been eight, ten years prior and wanted to go through again to see what had changed."*

With some participants, attending the course was a way to get other family members involved in the woods or at least increase their understanding of the activities they did in their woods. One participant mentioned,

> *"...I wanted to do it for myself so I would have a little bit better understanding, but my wife, she's, of course, part owner of the woods. She never really understood where I was kind of headed with this."*

Another owner took the course with his son so that he

> *"...might be able to carry on with the ownership in some capacity."*

The seeking of knowledge about their woods was expressed as a theme that facilitated getting involved in woodland education opportunities. For some, being able to understand more about their woodlands was a daunting task that was a challenge. As they learned more about their woods through different means, it instilled a need for more information.

> *"And of course, it was a world-- when you're introduced to a new world like that, you have no knowledge. So the deficit of knowledge, I guess, led me to want to become more educated about it."*

Negative past experiences with woodland management decisions contributed to seeking out more information for some woodland owners. For example,

> *"We cut trees. We had the place timbered and the guy pretty much raped the place. We didn't know what we were doing. We didn't know anything about how to go about it."*

A desire to do more or be a better steward of the woods was another theme. As a woodland owner, some felt they should do the 'right' thing and seeking out knowledge about how to achieve that was one avenue. One owner said,

"I mean, I almost live in the woods and I should know more about it. …there was just so much information that I had no idea about, so just to educate myself and maybe understand …"

Another mentioned,

"Well, the main drive for having the interest is just the fact that I owned quite a bit of it and so I wanted to take better care of it. That's really all it comes down to."

For these owners, learning more about woodlands was instrumental towards improved stewardship.

These themes were not necessarily mutually exclusive for a given woodland owner. For example, desires to learn more about their woodlands or be better stewards of their woodlands may have been long-held beliefs. The catalyst to get involved was speaking to a professional advisor or how other woodland owners manage their woods.

"I had a few people that were managing their woods talking to me and I got a chance to take a class."

For some, experiences they had during their youth played a role in their attitudes about woodlands and wanted to learn more. For example,

"I've worked for a Christmas tree farmer in seventh, eighth grade, and through high school and I trimmed Christmas trees. And he got me thinking about forest management and he was actually wanting me to take his job."

3.4.3 Attitudes about the Eight-week Course

Perhaps the most expressed theme by participants was their universal satisfaction with the eight-week course. Many simply stated, "*I really enjoyed it.*" The information they learned, the structure of the course, the knowledge and dedication of the instructors, and hearing perspectives from other woodland owners were noted by my many participants. For some the information was confirming to them, but for most participants the information presented in the course was new, with one owner describing it as, "*eye opening*." Negative aspects expressed about the course included the amount of information was overwhelming, or they had to travel a long way to attend.

Several attendees commented on the Extension foresters who taught and organized the courses. The instructors were viewed as knowledgeable and easy to talk to, but it was perhaps their dedication to helping attendees that was most appreciated. One participant described an experience he witnessed after class.

"[The instructor] was really good. He made sure he left time for questions. He had breakout sessions. He stayed after just of course asked that all questions, just write them down so we can keep it rolling. But then he stayed, I don't know how long he stayed. But after about 45 minutes I left and he was still there."

The way instructors approached the course and interacted with participants built a level of trust. However, a large part of that trust was also connected to Purdue Extension. Many participants had past experiences with Purdue Extension including 4-H, pesticide applicator training, interactions through past farming operations, and other forest/wildlife workshops; one owner was a member of his county Extension board. Trust in Purdue Extension was mentioned by several participants as a reason they go to them for forestry and other information. In reference to why he uses Purdue Extension as a source of information, one owner said,

"And I don't think the universities are apt to be selling me stuff…I feel that universities and Ag extensions are basically trustworthy and balanced, built on good science, don't have as much of an ideological agenda as some other sources might."

Listening to points of view and management approaches was mentioned by several owners. These interactions were almost exclusively limited to times during the course. Several participants enjoyed hearing different perspectives and learning from other woodland owners. One mentioned,

"*I do like to see what opinions other people have and how they do it. I mean, I met so many people in those classes, not only learning from [the instructor]. There was other people doing other things that I was able to catch onto too*."

For the most part, the course did not lead attendees to develop relationships and sharing outside of the course. A couple participants did reference meeting neighbors in the class who they previously did not know.

3.4.4 Woodland Management Activities and Outcomes

In terms of motivations for woodland management in general, many owners expressed the norm of being a good steward or woodland owner was important to them, and meeting that norm was "*taking care of the land*," being "*responsible*," or "*lead[ing] by example*." Sometimes they would reference these sentiments when talking about family. For example,

"I mean, just to own something and not care for it is-- my grandmother would beat me to death if I did that. You just got to take care of what you've got."

In other cases, they referred to their legacy and preserving something for future generations.

Several participants shared information they learned in the course with others including family or friends. In some cases they shared basic information such as tree identification, or what trees species to plant for wildlife during informal encounters or gatherings. For a few participants, sharing information with family had a deeper value. For one owner, the information he learned gave him "*credibility*." He mentioned,

> *"It helps me express things in our family meetings what should be done, and I've got some background to say, 'Do this. Don't do that,' rather than just a feeling about it."*

Most owners seemed to keep their network within their family and not communicate woodland management information beyond their family. Other participants shared information with other woodland owners in different ways. In some cases, they talked with neighbors about cost share programs, emerald ash borer, and timber harvesting. One owner was able to share information in more formal means including a farm conference and as a member of his county Extension board.

Timber Harvesting

Many course participants had personal experience with timber harvesting. Some only had observed it either during the course field trips or other properties. Positive attitudes about timber harvesting were associated with forest health. For example, one individual mentioned,

> *"…I didn't actually see a need for it unless there's areas of my forest that really look very unhealthy."*

The presence of dead or dying trees was often an indicator of unhealthy woods. One owner said,

> *"And then, well, they just looked dead to me. Well, that was telling me I needed a timber harvest."*

For a few owners, harvesting timber was tied to the belief that it was important to not let things go to waste. Letting trees die without getting any appreciable utility out of them in terms of dollars or useful material was against a held belief. According to one owner

> *"A lot of trees were dying. I spend a lot of time in the woods, and I guess it bothers me. I don't like to let dollars go to waste. So I always think that I'm doing good…"*

Timber harvesting was also viewed by some as a way to allow for trees to grow and thrive. Removing the canopy trees to allow regeneration growth was a benefit that they could directly observe. For example,

> *"I can go out there now, and …you see new stuff coming up, but…you know that those trees that are coming up that are saplings won't make it when I have 50- and 60-foot tall trees standing there with a huge canopy, that they're not going to make it as well. So something has to change for them to make it so that I can have more growth in my forest."*

While understanding some benefits of timber harvesting, some owners' attitudes were driven by how the woods look after harvesting. For one owner,

> *"[I] would really want to [harvest] right and honestly, I don't want to make the mess right now…I don't have a lot of time…and I don't want the mess and having to clean it up or look at it."*

The appearance of the woods afterwards was emotionally difficult for some participants. According to one owner,

> *"It's tough to see your woods after it's been timbered."*

Other factors such as potential erosion of forest roads or communication issues with the loggers were also mentioned as concerns. Negative experiences with past harvests or perceived negative aspects even precluded some from considering it in the future. For example, one owner mentioned,

> *"…I don't see it happening again in my lifetime."*

The eight-week course played a role in the decision-making process on whether or not to do, or even consider, a timber harvest. Some owners knew what the practice entailed in general, but they lacked an understanding of the ecological benefits. One owner said,

> *"I really did not want to harvest years ago I always thought that tree harvesting was a total joke, that you shouldn't be, that you're killing the woods, that it wasn't a good idea until I took the classes."*

Another owner mentioned,

> *"I was looking about doing something down the road for a harvest, didn't want to do it without knowing what I was doing and had a better understanding of it."*

However, having learning more about timber harvests in the course did not always lead to adoption. Some owners realized it wasn't a good fit for them. For example,

"I had a better understanding of what was involved in timber harvest and decided it just wasn't worth it to me to do it."

Another theme associated with the influence of the course on harvesting timber was how woodland owners felt about the process. According to one individual,

"The class helped me feel much more comfortable in helping make the decision [to harvest timber]."

Referencing what they learned in the course, another owner said,

"That makes you feel a little more comfortable that you're making the right decision, or it gives you something to base that decision on."

While the course didn't always influence the decision to harvest timber, it impacted how some owners viewed the process of selling timber in that they were making more informed decisions. Certainly, generating income was a consideration for some. Statements reflecting this viewpoint include,

"I'd certainly get plenty of money out of [harvesting]", or "[the trees will] probably stay up, unless the price of that poplar goes up to where I'm going to get 15, 20 thousand dollars a tree, then I might change my mind."

Timber was viewed by some as part of a broader approach to management. There had to be reason for it, especially considering how post-harvested woods were viewed by woodland owners.

Invasive Plant Control

For woodland owners who have controlled invasive plants, their attitude towards doing so could be described as the expressed sentiment,

"It makes me feel like I'm not being a good steward if I ignore it and don't remove it."

Once woodland owners became aware of invasive plants in their woods and what to do about it, their attitudes changed. One owner mentioned,

"Well, once you get exposed to methods of control, and you become knowledgeable about how to do it, then I felt an obligation to get out there and do it."

Some had a strong emotional reaction to their presence— "*I hate them*"—and this contributed to their motivation to control them.

The eight-week course facilitated the control of invasive species in multiple ways. Some woodland owners were not aware of the problem prior to the course. Recognizing this, one woodland owner said,

> *"The classes that I took. I didn't know that it was an invasive, I didn't know that multiflora rose was a problem, could be a problem. I didn't realize that."*

Regardless of prior awareness before taking the course, woodland owners recognized how the course helped them identify effective methods of control. For one owner,

> *"Now before I took this class, I would cut [autumn olive and Asian bush honeysuckle], but then I learned that that just makes it come back thicker. It doesn't kill it. So when I took the class and then I learned you need to…[paint] those stumps with [herbicide]."*

The course empowered owners to take action. In part, this was represented by expressions of feeling "*more comfortable*" or "*more confident*" taking action. However, having success was also a positive influence. Seeing fewer invasive plants or dead plants as a result of treatment was confirmation of their actions. A representative statement of this is,

> *"I can really tell the difference. I go back weeks or months or a year later now, and I'm like, 'Well that made a real difference'."*

The perceived never-ending battle was an emotional drain for some. One told a story about how he can't enjoy a walk in the woods anymore because he would see invasive plants all the time. Many owners wanted to do more but couldn't. Not having enough time or lacking the physical ability to do more were barriers. For example, one woodland owner mentioned,

> *"I mean, that's definitely one of those things, though, where time and resources kind of limit how much you can do. There's a lot more I would like to do on that. It's just you can only put so much time on it."*

Physical inability to control invasive plants was sometimes associated with age.

> *"[For] some people [invasive species] is a big deal, some people it's not a big deal. Some people their age makes that decision too. If I'm 80 and I see bush honeysuckle, that's too bad. I'm not going to get it. If a guy's 50, he's out there going nuts on it."*

Since many viewed their control as good stewardship, not being able to control invasive plants impacted them. One owner said,

> *"Places I haven't gotten to yet well I'm not too happy with it but that's just, I'm unhappy I haven't had time to do it."*

Woodland Management Plans

A woodland management plan outlines the goals and objectives of an owner and outlines the tasks to meet those objectives. Some woodland owners had positive attitudes towards written plans. They valued them for guiding their activities and avoiding mistakes. For example, one owner said,

> *"I know there's a plan out there, and it gives me a guideline and something to follow. And knowing that if I don't follow that management plan, I could suffer some consequences, and some of those could be monetary."*

Another emerging theme was that management plans contributed to long-term visions or successional planning for their heirs. One described their management plan as something that

> *"is there to make things better for my kids, my grandkids, whatever, somebody else down the road."*

Some of these owners recognized that progress towards their goals can take 30 years or more. Having a written plan provided some direction to reach these goals.

Not all woodland owners viewed a written plan as an essential activity. According to one owner,

> *"I guess I've never seen a need for it. I mean I do believe I need to be in the woods. I want to be in the woods more. I don't really…have to put it on paper."*

Many had a plan "*in their head*" and didn't see a benefit to writing it down. Some woodland owners only associated the utility of a management plan with certain activities, especially timber harvesting. If they had no plans to harvest timber they saw no need to have a written management plan. For example,

> *"Like I said, I didn't buy it for revenue so [a plan] is not a main concern for me."*

Some woodland owners with plans evaluated their benefit based on how their woods looked. If they were satisfied with the condition of their woods, they were satisfied with their plan. One owner mentioned,

> *"Nobody has told me it's not working. And I like it, so. I mean…the plants are coming in. I saw a lot of ferns coming in that is a sign of a healthy forest and it's good. It's good."*

Negative attitudes toward written management plans stemmed from falling short of goals or management challenges. For example,

"Oh, well, I don't think [the plan] is that effective. The more invasive species I remove, the more I see. So I guess ultimately, I'll see a significant difference, but I'm still fighting that battle…I'm not satisfied yet. I can tell you that."

For many woodland owners, the eight-week course played a direct role taking the first step in formulating a management plan. For some owners, the course helped them realize that having a plan can help them be better woodland owners. One owner mentioned,

"[We have] an overwhelming sense that we needed to-- after the class we just had this overwhelming sense and said, 'We need to do something. We need to get organized. We need to get a plan.'... [The course] motivated us to take the next step."

Having a written management plan was associated with being a good steward and the course facilitated that connection. The course helped participants "*understand*" their plan, "*value*" their plan, and the "*need*" for a plan. One owner said,

"Yeah, I think [the course] had a huge influence on me… making a plan, and not just doing it willy nilly…without that I wouldn't have made a plan, the classes I had taken with it was very valuable to me, and realizing the need for a plan."

Professional Foresters

Woodland owner attitudes towards using the services of professional foresters largely centered on marking and selling timber. Motivations for this was in part due to the finality of harvesting timber. According one owner,

"[Using a forester] gave me confidence in something that I didn't know what I was doing. And in order to do best on our family farm, you want to do what's best long term. So I don't want to make-- when [you] cut a tree, you can't put it back."

Increased scale of timber harvests and the potential amount of monetary gain or loss were factors as well.

Some woodland owners also recognized their shortcomings regarding knowledge about woodland management and viewed professional foresters as a source of information. According to one individual,

"Well, if I hadn't [contacted a forester], I'd be stumbling along the dark right now. I mean, I would just be doing what I thought was best and that might be good, that might be bad. You don't have the breadth of it."

Despite this perceived value, a forester's time they can devote to a woodland owner was a barrier for using their services. Foresters who are "*spread so thin*" led to "*disappointment*" in services that they were able to provide.

Woodland owners didn't necessarily view loggers differently from professional foresters even though that was a part of the course. However, the particular advisor they chose was largely based on trust. One owner said,

> *"I have a knowledge and know that with my plan that I have and with the help that I've received with someone that I trust, I think I did the right thing with my harvest."*

Perhaps just as motivating was a mistrust of people in the timber industry. This mistrust is embodied in the expressed sentiment,

> *"It kind of eases your mind about selling your timber, thinking that everyone's a crook."*

Seeking qualified, professional advisors was a key emphasis of the eight-week course. For some woodland owners, the course influenced their decision to contact a professional forester for the first time. Without taking the course, they "*wouldn't have otherwise [contacted a forester]*." The course also enhanced the experience of interacting with professional foresters. Woodland owners had an improved understanding of the information presented by the forester as well as the reasoning behind it. According to one woodland owner,

> *"I took the course, and took over eight weeks, I had time to digest the information and learn some things. Then when someone talks, I can respond intelligently because I understand what they're talking about."*

For some owners, that lack of dialogue and understanding led to inaction. An example of this sentiment is represented in the statement,

> *"When a forester comes and runs through your woods in an hour or two, and talks about TSI and all these other terms, if you're not familiar with them, it goes over your head and then you won't participate. It all sounded good, but you'll never get around to it."*

The eight-week course also provided an opportunity to meet professional foresters. Public or private foresters from the area would speak at some classes about services foresters provide, cost-share and technical assistance programs, and management plans. Meeting foresters in person and hearing directly what they do and how helped to facilitate action by some woodland owners.

Some participants mentioned talking with foresters after class to get their contact information and then set up an appointment with them at a later date.

3.5 Discussion

Woodland owner decisions to engage in actions related to their property can be complex. The goal of this case study was to determine woodland owner attitudes and motivations for harvesting timber, controlling invasive plants, planning, and use of professional advisors, and how the Forest Management for the Private Woodland Owner 8-week short course played a role in their decisions and attitudes. The course clearly impacted the decision to do certain activities or it affected the way FFOs went about activities or their satisfaction with the process or outcomes. However, it was difficult to always directly attribute these outcomes to participation in the eight-week course. Learning and access to information is a continual process. For some woodland owners, they were attempting to recall information from 10 years and occasionally 20 years earlier. In many cases, participants attributed learning as a result of attendance of an educational program but determining which program was sometimes difficult since several participants had attended other courses throughout the years. Specific courses mentioned included the Master Naturalist Program, Master Gardener Program, and Wildlife Management Short Course for Private Landowners; all of which were 8 weeks or more in length and structured similarly to the course in this study. They sometimes mentioned these programs despite questions being framed specifically in reference to the eight-week course. An additional source of confusion was that instructors who taught during the eight-week short course also taught sessions for other programs they attended. Interviewees in this study were a random sample of participants from classes held during 2012-15 (n=14) and 2007 (n=14). To reduce recall issues, targeting more participants of recent classes may have been a better approach. Getting the perspectives of those attending classes held longer ago was still valuable in understanding behaviors of woodland owners since timber harvesting and seeking professional advice may only occur every 5 to 10 years, or even longer. However, because of the attribution issues, the influence of the eight-week course may be better described more broadly as the influence of their total educational experiences over time.

The structure of the Forest Management for the Private Woodland Owner eight-week short course imparts a significant commitment from both the instructors and attendees. A reasonable question is whether it is worth the effort compared to educational opportunities that require less

investment. Having a course span eight different sessions and two field tours over two months is a significant investment by participants. While some mentioned the amount of information was a lot, it allowed processing between sessions for some. Perhaps more importantly, the length of the course allowed for attendees to build relationships and have social interactions to a certain extent. The value of peer learning and social networks among FFOs can facilitate woodland activities (Kittredge et al. 2013, Kueper et al. 2013). Relationships between attendees did not necessarily extend into long-term informational networks since very few participants had contact with each other after the course was over. However, the course did provide an opportunity for owners to hear different perspectives from other FFOs as well as provide some peer learning. Replicating these experiences and the value they provide would be challenging in other learning experiences or delivery methods of shorter duration. Intentionally designing more peer learning opportunities in the eight-week course and others educational programs would be a benefit.

I used the DoI theory as a framework for evaluating the role of the eight-week course in the woodland owner decision-making process regarding timber harvesting, invasive species control, management planning, and seeking advice from a professional forester. The DoI five-stage decision process includes knowledge, persuasion, decision, implementation and confirmation. The specific way how the course influenced these woodland owners varied depending on the experience of a particular owner, the practice(s) involved, and the interdependence of the practices. Contact with a professional forester often leads to development of a management plan, but not always. Foresters also give advice on timber harvesting and invasive species control. However, not all woodland owners who harvest timber or control invasive species seek the advice of a professional forester nor do so at the direction of a plan.

According to DoI theory, an individual's prior condition in terms of previous experience with a practice, individual innovativeness, perceived need or problem, and the norms of their social system play a role in the diffusion process (Rogers 2003) (Figure 3.1). Many researchers have studied the role of norms in land management decisions. Subjective norms have been associated with activism behavior in the control of invasive species in Hawaii (Niemec et al. 2016). In a study of forest owners in Finland, Karppinen and Berghäll (2015) found that norms were a predictive factor for timber stand improvement intentions and were particularly important for the youngest and oldest age cohorts. Norms have been found to play a role in other landowner activities including participation in conservation programs and willingness to harvest woody biomass

(Becker at al. 2013, Johansson et al. 2013). In my study, some FFOs expressed an obligation to control invasives. However, these viewpoints were more aligned with woodland value orientations regarding the importance of preserving nature rather than specifically as a subjective norm to gain the approval of others. A few referenced these viewpoints in the context of controlling invasive plants. It is unclear why norms were not a prevalent driver of management activities in my study. One owner mentioned his grandmother's lack of approval if he did not take care of the family woodlands. Motivations for management activities expressed by participants were largely related to the outcome. Benefiting nature and the environment, improving the woodlands for their heirs, and generating income from timber sales were common reasons for their management activities. Since the eight-week course participants are not representative of all Indiana woodland owners, it is possible that this group of FFOs overall has an experience level that provides a strong sense of self-efficacy to manage their woodlands. Another explanation as to why the views of others didn't influence their management activities is that their informational networks related to their woodlands was largely centered upon their families. It is possible if this group of woodland owners had more connections outside of their families that the influence of subjective norms would have been more prevalent.

For more experienced woodland owners, the course played more of a role in the implementation and confirmation stages of the decision-making process. For example, some were enrolled in the Indiana Classified Forest and Wildlands Program where a professional forester did a site visit on their property and developed a management plan. In several of these cases, timber harvesting and controlling invasive plants was a part of the plan and the verbal advice given during the site visit. As a result, many of these woodland owners engaged in these behaviors. The information learned during the eight-week course either confirmed the practices they were already doing, improved how they did a practice, or improved their experience with a practice. When information provided by a forester was in line with what they learned in the course, it helped confirm their use of that forester. Dialogue with foresters was also better as a result of their improved understanding of terminology. For controlling invasive species, information they learned in the course such as herbicide selection or timing improved their ability to control invasives. Lastly, several woodland owners were more confident in their approaches to harvesting timber or controlling invasive species. These positive experiences with practices have the potential to confirm their continuance.

Several less experienced or new woodland owners attended the short course. For this group, the course was helpful in increasing knowledge and awareness of all four practices. This was perhaps most prevalent for invasive plant control. Many were simply not aware of the prevalence of invasive species in their woods until after the course. Similarly, a recent survey of FFOs in Indiana found that 26% knew about invasive plants but couldn't identify them and 34% had little to no familiarity with them (Clarke et al. 2019). After learning about them, many eight-week course participants identified invasive plants in their woods, applied control methods, and later evaluated their efficacy.

Characteristics of the innovation (Figure 4.1) play an important role in attitude formation during the persuasion stage (Rogers 2003). The four practices (i.e., innovations) in this study each held one or more characteristics that lend themselves to implementation but they varied by practice. The degree of influence the eight-week course had on these characteristics also varied among the practices. For invasive species control, the eight-week course likely played a significant role in their evaluation of its relative advantage and compatibility, especially for FFOs who were previously unaware of the issue. Protect nature and biological diversity, provide habitat for wildlife, and enjoy beauty and scenery were important reasons for why most FFOs in the course owned woodlands. Learning about the impacts of invasive species to woodland function and biodiversity likely contributed to their realization of how controlling invasive plants was compatible with these values. This characteristic was apparently a key factor in the decision to control invasive plants. Similarly, they were able to learn about effective control methods in the eight-week course which increased their perception of the relative advantage of control. FFOs were able to try out different techniques to control invasive plants in their woods on a small scale, although available time was a barrier to implement control at a desirable scale for some. Many techniques such as using a backpack sprayer may not have been complex for some participants, although their use could be laborious. However, these control methods and other techniques may have been difficult to implement for FFOs with little to no prior experience applying herbicides, especially on larger scales. It could be possible that the course both reduced and increased perceived complexity of controlling invasive plants. FFOs with a land management background may have a better understanding of control methods while those with little experience may be confused or overwhelmed by the number of invasive plants, control methods, and herbicides including their

rate of application and timing. Owners were able to observe parts of woodlands with invasive plants and parts without and determine if there is an advantage in control.

Use of a professional forester was limited to perceptions of its relative advantage related to harvesting timber. Almost exclusively, owners linked professional foresters with this practice. They saw an advantage of using foresters and advisors they trusted in marking or negotiating timber sales. Course participants did not see an advantage of using the services of foresters specifically for other activities. Owners enrolled in Classified Forest receive general advice including information about invasive plants during their five-year inspections. For woodland owners who had no prior experience with professional foresters, the eight-week course may have helped them realize their use provides a relative advantage in terms of maximizing income, enhancing wildlife habitat, or avoiding mistakes when harvesting timber. Beyond some frustration in being able to contact busy foresters, the process of working with a forester requires little investment and an initial meeting can serve as trial to confirm or reject future use of the forester.

In theory, a written management plan provides a benefit of informing good woodland management decisions. Most woodland management plans are written by professional advisors and they can be written to be compatible with a variety of land management objectives. In practice, course participants recognized this benefit and many had a plan. For some FFOs without plans, the eight-week course helped them become aware of the benefits (i.e., relative advantage) that plans provide. The degree management plans directly influenced woodland activities varied. The effect of plans cannot be observed directly, although woodland owners could observe outcomes of different management practices that were in their plan. Many woodland owners have a forester develop their plan as part of a program, but they don't necessarily reference the plan, although some did. Comments by some participants in interviews indicated they didn't need to reference it because they knew what was in it. The need for management plans has been questioned by VanBrakle (2015). He argued that landowners most need to have basic forestry knowledge and know how to contact professional advisors. In the end, the process of planning may be the most critical part for woodland owners (Hicks 2015).

Some traits of practices appeared more salient than other characteristics. Relative advantage and compatibility were important considerations for the evaluation of timber harvesting. For example, some owners who harvested timber viewed its relative advantage based on economic returns or regenerating young trees. For them, harvesting was also compatible with being a good

steward because it enhanced forest health or it didn't waste resources and money. Other owners may see timber harvesting's relative advantage for enhancing wildlife habitat or earning income, but chose not to harvest because it was not compatible with their emotional health or the aesthetic appearance of their woodlands. Both of these perspectives were expressed during interviews. The eight-week course may have played a role in how FFOs perceived the relative advantage and compatibility of harvesting timber. Some participants were not aware of how timber harvesting can mimic natural disturbances that enhance woodland diversity and habitat for some wildlife species. Realization of these outcomes likely enhanced perceived compatibility for many who valued nature and wildlife habitat. With timber harvesting, the lack of trialability and observations made during and after the harvest could inhibit adoption. A couple of landowners mentioned they would not consider a future harvest because of a prior experience with a timber harvest. In addition, timber harvesting is not applicable to all woods in all circumstances. While an owner may have a positive attitude towards timber harvesting, they haven't done it yet because it is inappropriate for their current woodland conditions (e.g., few to no merchantable timber).

The ability to observe an innovation is one characteristic that can influence the diffusion process that educational programs may enhance. Demonstrations have a long history of use in Extension programs. Farm and woodland demonstrations allow landowners to observe a practice in operation and can therefore contribute to its diffusion. Attendance at demonstrations has been associated with increased adoption of farm conservation practices (Singh et al. 2018) and forestry practices (Harmon and Jones 1997). The course provided opportunities to see some practices during field trips. However, the specific role of field trips in decisions to initiate or maintain management activities was not evident.

It was clear that many participants trusted Purdue Extension and the course instructors. Timber harvesting information they learned in class was used as a benchmark to compare to information from loggers or other sources. The level of trust in a professional advisor was also mentioned by several participants as an important part of their decision to use their services. Gaining and maintaining the trust of course participants is essential since trust in a messenger can influence the credibility of their message (Rogers 2003).

There were clearly other motivations and factors involved in the decisions woodland owners made about their property. Being a responsible steward of the land, not wasting resources or money, and leaving the woods in good or better condition for the next generation were all

mentioned by more than one woodland owner as motivating factors for doing different management practices. However, the eight-week course facilitated communication about different practices and information that participants were unaware of. This process occurred through course instruction as well as learning from their peers.

3.6 Conclusions

DoI theory was useful in explaining how education can influence adoption. However, there are limitations to its applicability for all practices. An owner's background and initial condition prior to taking the course plays a role in what practices a landowner may consider and their perceived compatibility. Harvesting timber is not generally compatible for resident woodland owners with small parcels. Also, it is not operationally efficient for loggers to move equipment and harvest trees that would likely be of relatively low volume, and hence, value. In a similar way, motivations and attitudes about woodlands influence woodland owners. Many of the FFOs interviewed in this study discussed family or nature preservation and wildlife habitat as important woodland values. Practices that they perceive as incompatible with these values will likely not be adopted. However, invasive woodland plants was in conflict with these conditions so controlling them was salient to maximizing those woodland values for many course participants.

While my findings are related to this case study and the specific circumstances, there are applications to woodland owner education more broadly. First, there is value in providing information on woodland management concept and approaches, and particularly with invasive plant control. Many woodland owners in this study and others (e.g., Clarke et al. 2019) are not aware of them or at least not able to identify or control them. Controlling invasive plants also aligns with the primary motivations of woodland owners such as protecting nature and biodiversity, and providing wildlife habitat. Second, educational programs should be designed to facilitate communication among woodland owners. Programs themselves act to communicate information about practices as part of the diffusion process, but they have limits. Intentionally designing peer teaching and learning within programs has benefits and successful models exist (Allred and Sagor 2011, Ma et al. 2012). In the eight-week course, the family unit was the focus of communicating and sharing information about woodlands. Participants frequently mentioned family as an important part of what they valued about their woods and their enjoyment. Including participation of family members in at least some components of educational programs (e.g., field tours) and,

when appropriate, couple benefits of management activities with family values. Finally, while the complexity of the different management practices in this study varied, overall woodland management can be very complex which might lead some to not adopt or abandon practices even though they provide benefits to the owner. Using the services of professional forester or other advisors can help overcome this barrier. Connecting individuals directly to professional foresters and other advisors during the eight-week course led directly to their use by some participants. Meeting these advisors in person helped increase awareness of how they can benefit woodland owners, but more importantly, participants were able to immediately initiate verbal contact, and thus, contributed to building a relationship and perhaps trust.

The qualitative evaluation in this study provided insights into course participants' views on management, how the course did or did not play a role in the decision to implement practices or the manner in which they did so, and what aspects about the course made it worthwhile and enjoyable. Insights into incorporating family and peer learning in the eight-week course as well as barriers to implementing practices were only possible through the interviews. Future woodland owner education programs can provide strategies on how to overcome some of these barriers and highlight how management practices are compatible with common or strongly held woodland owner values. While this study provided insights into how the eight-week course plays a role in the decision-making process, it does not provide a complete understanding of all FFO decisions that affect woodland activities. There are too many factors outside the scope of an educational course that can influence one's ability to implement a practice (e.g., time, physical condition or health, financial or labor assistance). Educational programs can introduce woodland owners to new concepts and practices while highlighting their characteristics (e.g., compatibility with existing values, ease of use) that can facilitate adoption. Even when information learned during the eight-week course changed an owner's attitude about a practice (e.g., timber harvesting), it didn't necessarily lead to adoption. Regardless of which decisions FFOs make regarding the management of their woodlands, having them make well-informed decisions that complement their goals and objectives is the ultimate goal. Connecting FFOs with professional advice, expanding woodland owner networks, and providing information (e.g., what different practices do and do not provide, how practices enhance forest health) that can enhance these experiences are ways educational programs have the potential to provide long-lasting benefits to woodland owners.

I randomly selected interviewees from those who attended the eight-week course during 2007-11 and 2012-15 for the purpose of increasing the chance of capturing perspectives on a broad suite of woodland activities. Several behaviors such timber harvesting or seeking professional advice are not likely to occur on an annual basis. I did not stratify my sample based on the lead instructor, region of the state the course occurred, or land or landowner characteristics. Since there were differences in how new woodland owners were impacted by the course compared to more experienced woodland owners, purposefully balancing my sample between these groups may have provided additional insights, although I was still able to identify unique themes with the randomized design.

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CHAPTER 4. COLLABORATION AND THE INDIANA FOREST STEWARDSHIP COORDINATING COMMITTEE

4.1 Introduction

Large public lands offer a unique opportunity to provide many services and opportunities that smaller parcels cannot provide. Making management decisions among a suite of possible choices inevitably results in a suite of ecological, economic, and social tradeoffs (Álvarez and Field 2009, Schwaiger et al. 2019, Hiltunen et al. 2021). Land management agencies must fulfill their stated mission that often includes providing multiple uses that may conflict with each other. As a result, rather than public agencies exclusively making management decisions for lands under their authority, they seek public input and participation in the process (Davis et al. 2017).

Public involvement is an important part of land use decisions (Kennedy and Thomas 1995, Shindler et al. 2002). However, stakeholder groups with an interest in public forests do not always share the same values. An individual's values can influence how they view different aspects of natural resource use and management. Those who are biocentrically oriented see the inherent value of the natural world in of itself while those who are more anthropocentrically oriented measure the value of nature in terms of the benefits nature provides to people (Vaske and Donnelly 1999). Forest managers and public agencies face the challenge of incorporating these sometimes conflicting value orientations into public land policy. Given that "*collaboration can lead to better decisions*." (Wondolleck and Yaffee 2000:23), what process do public agencies use to facilitate collaboration between public forest managers and stakeholder groups or citizens? Indiana, like other states, has gone through a historical change in management philosophies and use of practices that correspond to changing land cover and public attitudes.

Carmen (2013) provided a historical prospective of Indiana forests and their management. In 1800, Indiana had an estimated 19.5M ac (7.89M ha) of forested land. By 1900, the forest lands decreased to just 1.5M ac (0.6M ha). This decrease was due primarily to logging then conversion to other land uses. Whereas today, Indiana's forests cover 4.87M ac due in a large part to conservation efforts beginning in the 20th century (Settle et al. 2016). In 1903, forest land was placed in public trust and authorization was initiated for the purchase of land that would become Clark State Forest. The precursor to the Indiana Classified Forest and Wildlands Program, the Forest Tax Classification Act, was passed in 1921. The last of the 15 Indiana State Forests, Owen-

Putnam, was established in 1948. On public forests beginning in the 1990s, increasing emphasis was placed on forest values (e.g., wildlife, recreation, historic preservation) other than timber (Carmen 2013). Beginning in 2007, Indiana's state forests have been accredited by the Forest Stewardship Council® (FSC) and Sustainable Forestry Initiative® (SFI) (IDNR 2021*b*). Because of this increasing emphasis, citizens have become more involved in formulating management policies. According to Carmen (2013:21),

> *"To better facilitate this process, the Indiana Forest Stewardship Coordinating Committee was established."*

Despite efforts to increase public input, management on public forests is not without controversy.

The issue of public forests and their management is often associated with timber harvesting, and particularly clearcutting (Bliss 2000, Burnett and Davis 2002). Environmental groups have opposed harvesting federal forests on the basis of aesthetics (clearcutting), economics (below-cost timber sales), and environmental preservation (endangered and threatened species) (Burnett and Davis 2002). Beyond environmental groups, citizens have a widespread and strong opposition to clearcutting (Bliss 2000). This opposition stems from a reduction of scenic beauty (Ribe 1989), as well as associations with deforestation, environmental degradation, and exploitation (Bliss 2000). The debate over decisions to harvest timber on Indiana state forests has recently been highlighted in the media. For example, a 2018 article in the *Indianapolis Star* noted that individuals and groups against logging state forests, or at least parts of them, claimed logging comes with collateral damage such as ruts, logging is not necessary to meet other objectives, increased levels of logging since around 2008 is too much, logging is done primarily for profit, or that logging is unnecessary since private woodlands can meet lumber demands (Hopkins 2018). The Division of Forestry and others supporting logging state forests counter by claiming that without disturbances such as logging forests can become less diverse, setting forestland off limits to logging and other management isn't good science, logging is done on a small fraction of state forests each year, and even with recent increases in board-ft removed, volume growth still exceeds removals (Hopkins 2018).

4.2 Background

4.2.1 Stakeholder Engagement and Collaboration

Improving understanding, making wise decisions, building support for policy, and getting results are all possible outcomes of a well-designed collaboration (Wondolleck and Yaffee 2000). Much of the published literature on collaborative forest management focuses on federal forest lands in the western U.S. (McKinney and Field 2008, Schultz et al. 2014, Davis et al. 2017, Urgenson et al. 2017, Gosnell et al. 2020) and Canada (Nenko et al. 2019). Federal statute requires public input in some circumstances. The Collaborative Forest Landscape Restoration Program (CFLRP) was established by Congress in 2009 to encourage the collaborative, science-based ecosystem restoration of priority forest landscapes within the national forest system (USDA Forest Service 2021). Despite forcing collaboration, the CFLRP process has been effective in generating increased trust, stronger relationships, and increased capacity to accomplish work according to both agency and non-agency participants (McIntyre and Schultz 2020). Moreover, the degree to which collaboration occurs may play a role in achieving desirable outcomes. Mattor et al. (2020) studied the association between the level of collaboration and forest stewardship outcomes. In their work, the level of collaboration as measured by number of community roles, outreach methods, interests involved, and who initiated the project were positively correlated with benefits associated with stewardship including reaching specific project outcomes and improved efficiency.

There are different approaches for how land management agencies collaborate with public stakeholders. The specific focus of collaboratives depends on local resource needs and interests (Davis et al. 2017). Also, the manner in which the public provides input varies among different groups. Some input is gathered at public meetings or workshops, while in others, participants may even vote on group decisions or develop detailed agreements or plans (Butler 2013).

In deciding what approach is best, identifying characteristics of successful collaborations can help guide future efforts. Assessing participant attitudes is one way to determine what makes a successful collaboration. In a member survey of 30 collaborative initiatives within the Forest Service, Schuett et al. (2001) found six themes that were keys to success—development and formation, information exchange, organizational support, personal communication, relationships and team building, and accomplishments. Their work suggests that much of what makes a collaborative ultimately successful (i.e., accomplishments) is predicated on member perceptions

of the collaborative process itself. Perceptions of inclusion and fairness also influence how members view effectiveness of collaborative processes (Nenko et al. 2019). Participants in collaboration generally have a positive viewpoint of the process. For example, in a study of 50 community-based collaboratives in the Rocky Mountains, participants were satisfied with their collaborative and believed informed decision-making and valuable outcomes resulted from them (McKinney and Field 2008).

Despite its many benefits, stakeholder collaboration can be a challenging process. Having representation by a diverse group of stakeholders lends itself to conflicting goals and ideas within the group (McIntyre and Schultz 2020). Moreover, power dynamics within a group can derail achievements towards goals. Stakeholders with economic influence over other members or those who act as 'deal breakers' or 'deal makers' can redirect dialogue and the collaborative process (Berkes 2010, Innes and Booher 2018). Every public agency has to some extent institutional or structural barriers (e.g., time, money, staffing) which can impact policy implementation (Wondolleck and Yaffee 2000). Some stakeholder groups are so large that an agency may restrict service to a subset. Programs such as the Indiana Classified Forest and Wildlands program restricts enrollment to those who own at least a minimum parcel size. Because money and technical advice is limited, agencies sometimes focus land enhancement programs to certain geographic areas to maximize benefits with the most potential. For example, the Indiana Division of Fish & Wildlife's Wetland/Grassland Restoration Program is only offered in 11 northeastern counties (IDNR 2021*c*). The USDA Natural Resources Conservation Service ranks applications submitted for the Environmental Quality Incentives Program; lower ranked applications may not get approved because funds are expended on higher-ranked applications (USDA Natural Resources Conservation Service 2021).

Group dynamics between the public agency and the other group members can also affect how a collaboration functions. Some agency staff may approach public input with hesitancy. Giving up decision authority to external parities leads to uneasiness and discomfort for agency staff (Butler 2013). Despite these challenges, involvement of diverse stakeholders is a key component in the collaborative process (Spies et al. 2019).

4.2.2 DIAD Theory

The diversity, interdependence, and authentic dialogue (DIAD) theory is a framework developed to explain what collaborative approaches can achieve and under what circumstances (Innes and Booher 2018:34). In DIAD theory, diversity, interdependence, and authentic dialogue are required conditions for achieving collaboratively rational, productive and adaptive collaboratives (Innes and Booher 2018; Figure 4.1). To achieve collaborative rationality in DIAD, there must be a full diversity of interests represented that could be affected by the outcomes of the process. This variety of interests allows the group discussions to explore different possibilities and strategies. In general, heterogeneous groups in terms of gender, personalities and opinions perform more effectively than more homogeneous groups (Robbins 1996:315). Secondly, there must be an interdependence of interests. Each member of the group must depend on other members in a reciprocal way. Group members who need each other to achieve their goals have an incentive to cooperate (Berge and van Laerhoven 2011). The third aspect of collaborative rationality is authentic dialogue whereby members must engage with each other in an in-depth, face-to-face dialogue. This dialogue is based on Habermas' (1984) ideal speech conditions where claims are legitimate, accurate, comprehensible, and sincere. Dialogue is based on not only specialized expertise, but the common knowledge and experiences of each member. If these three conditions are met, members can then explore reciprocal interests, develop new relationships, learn, and adapt.

The DIAD theory could be used to help evaluate and guide natural resource collaboratives. The characteristics of collaboratives that participants view as important keys to success include both process and outcome criteria that are part of DIAD theory (e.g., Nenko et al. 2019, Schuett et al. 2001). A combination of process and outcome criteria are used to evaluate collaborations (Innes and Booher 1999, Conley and Moote 2003). Process criteria measure the consensus building process and include characteristics such as representation of relevant and diverse views, self-organization, engagement in in-depth discussion, incorporation of high-quality information, challenging ideas, and consensus-based decision making. Outcome criteria could include learning and change both in and outside of the group, producing creative ideas, changes in attitudes or behavior, or implementing new practices (Innes and Booher 1999) (Table 4.1). The process of how a collaborative is developed, how information is exchanged within the group, communication among its members, building new relationships or strengthening existing relationships, and

accomplishments towards goals and mission are all components of the DIAD network dynamics (Figure 4.1).

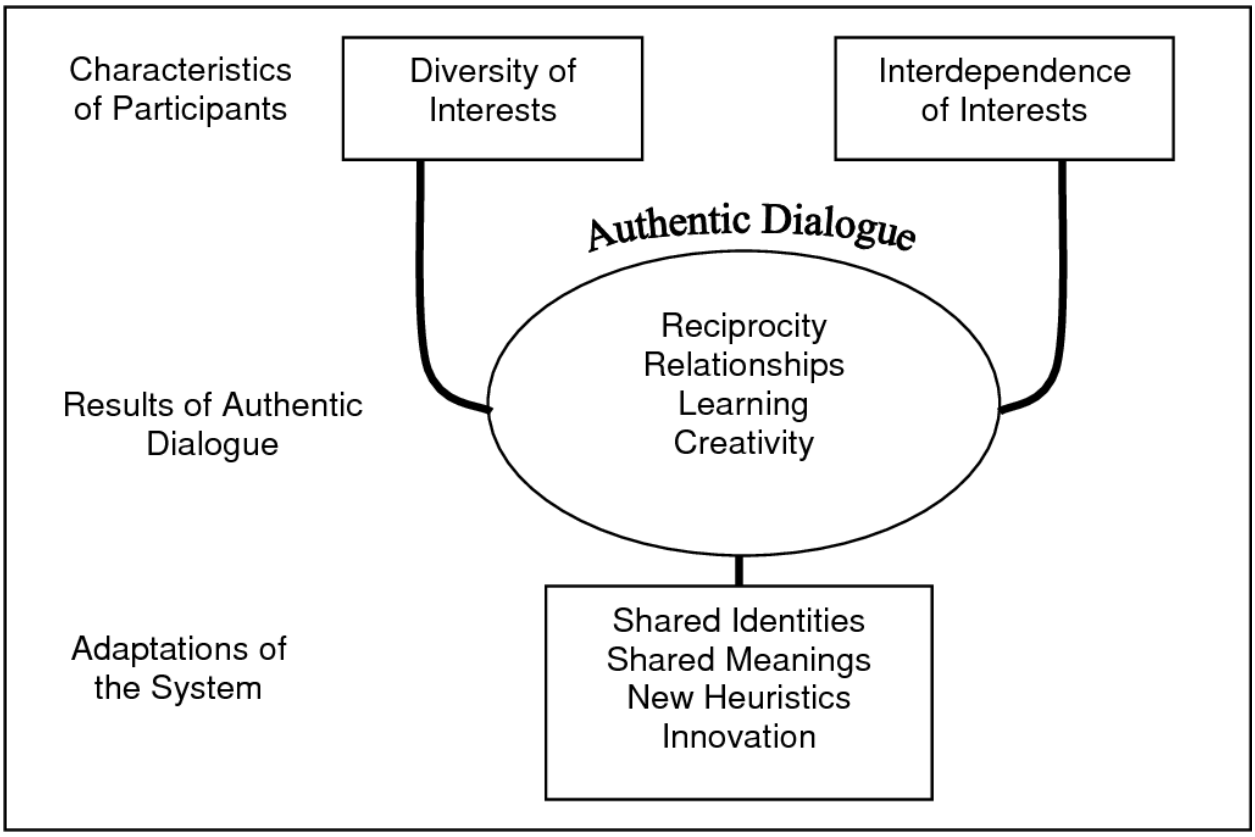

Figure 4.1. Diversity, interdependence, and authentic dialogue (DIAD) theory network dynamics. Adapted from, Innes and Booher (2018).

4.2.3 Indiana Forest Stewardship Coordinating Committee

The mission of the Indiana Department of Natural Resources' Division of Forestry ('the Division', hereafter) is to promote and practice good stewardship of natural, recreational and cultural resources on Indiana's public and private forest lands. Public agencies such as the Division face many complex resource management problems (Game et al. 2014). Improved decisions and outcomes can be achieved by including stakeholder groups with different perspectives in the decision-making process (Lynam et al. 2007). Over the past 20 years, the Division has led the Indiana Forest Stewardship Coordinating Committee (IFSCC) as a way to facilitate public input.

Table 4.1. Process and outcome criteria for consensus building. Adapted from Innes and Booher (1999).

Process Criteria	Outcome Criteria
• Includes representatives of all relevant and significantly different interests • Activities are driven by a purpose and tasks that are real, practical and shared by the group • Is self-organizing, allowing participants to decide on ground rules, objectives, tasks, working groups, and discussion points • Engages participants, keeping them at the table, interested, and learning through in-depth discussion, drama, humor and informal interaction • Encourages challenges to the status quo and fosters creative thinking • Incorporates high-quality information of many types and assures agreement on its meaning • Seeks consensus only after discussions have fully explored the issues and interests and significant effort has been made to find creative responses to differences.	• Produces a high-quality agreement • Ends stalemate • Compares favorably with other planning methods in terms of costs and benefits • Produces creative ideas • Results in learning and change in and beyond the group • Creates social and political capital • Produces information that stakeholders understand and accept • Sets in motion a cascade of changes in attitudes, behaviors and actions, spinoff partnerships, and new practices or institutions • Results in institutions and practices that are flexible and networked, permitting the community to be more creatively responsive to change and conflict

The IFSCC was created in 2000 as an advisory group to the Forest Legacy Program. Established as part of the 1990 Farm Bill, the Forest Legacy Program helps identify and protect environmentally important forest lands that are threatened by conversion to non-forest uses. In 2010, the IFSCC mission was expanded to bring together and maintain communication among interest groups and individuals concerned with the management of Indiana's forest resources (IDNR 2010*a*). Bringing together these leaders provides an opportunity to learn about collective efforts to promote forestland conservation and stewardship. Since 2010,

> *"The IFSCC serves as the leadership body responsible for the implementation of the Indiana Statewide Forest Strategy and insures [sic] meaningful progress on the strategic Action Steps designated in that plan. The Indiana Forest Stewardship Coordinating Committee informs state forest policy functioning to promote*

communication and understanding of current forest management issues. The committee promotes the sustainability of forest resources and the improvement of forest management practices in Indiana. Committee activities are designed to enable groups to more effectively plan their program objectives and to work together in achieving them."

The purpose of the Indiana Statewide Forest Strategy is to address the sustainability of Indiana's statewide forests and develop a plan to ensure a desired future condition for forests in the state (IDNR 2010*b*).

4.2.4 Research Questions

The IFSCC provides an opportunity to assess the role of stakeholder collaboration in the management of Indiana's forests. For 10 years, the Division has worked with the IFSCC to inform management and policy but how the degree to which the IFSCC functions in a collaborative manner and the impact it makes is not clear. Using the DIAD approach as my theoretical context, I will evaluate the IFSCC in terms of its process and accomplishments. Specifically, my research questions are:

1. How do group members perceive the value of the IFSCC?
2. To what extent does the IFSCC follow the DIAD approach of participant characteristics (diversity and interdependence) and authentic dialogue?
3. To what extend did the IFSCC contribute to desirable outcomes?

4.3 Methods

4.3.1 Interviews

I generated my list of potential interviewees from the IFSCC meeting minutes from 2014 through 2016. I limited my pool to groups during this timeframe to reduce recall issues. During this time period 31 groups (Table 4.2) had at least one person listed on the minutes for least one meeting. I removed groups attending only one meeting who were present only as a speaker on the meeting agenda and otherwise never attended another meeting. These groups/individuals were only there to provide some information and not involved in committee dialogue. I sent recruitment emails to the remaining 18 groups (included representation: various levels of government [4], non-

profit groups [13], and education [1]). I followed up with non-responses 1 to 2 weeks later. After the third contact, I considered a non-answer to be a decline to participate. Between March and May 2019, I conducted 11 semi-structured interviews of 12 IFSCC members who represented 15 different groups; three people represented multiple groups either during the same year (n=1) or between different years (n=2). Interviews were conducted in person or over the phone. All interviews were recorded for transcription with permission. The ages of participants ranged from between 34 years old and 75 years old; nine were male. The length of interviews ranged from 25 minutes to an hour.

Interviews were semi-structured where I asked a set of standard questions from an interview guide in a systematic order. I digressed from this order to probe beyond their answers or if content was addressed in a previous question (Berg and Lune 2012). The interview guide centered around four areas—perceptions about the committee, committee function and operation, collaboration and dialogue, and outcomes (see Appendix D). Questions related to committee function and operation pertained to how information (e.g., procedures, progress towards goals) is communicated, how roles and responsibilities are defined, member input, and information evaluation. Collaboration questions addressed personal expression, ability to question information and comments of other members, input on decisions, perceived value to other members, approaches to discussions on contentious issues, and authentic dialogue. Questions on IFSCC outcomes focused on new relationships and networks, organizational changes or actions outside of the committee, and improvements to Indiana forests and the Indiana Statewide Forest Strategy.

Table 4.2. List of organizations with at least one person listed on the minutes for at least one IFSCC meeting, 2014-16.

Organization	Type
Central Hardwoods Joint Venture	Multiple partnership
City of Carmel	Government, local
ECI Duke Energy	Private, for profit
Hoosier Environmental Council	Private, non-profit
Hoosier Hikers Council	Private, non-profit
Hoosier Mountain Bike Association	Private, non-profit
IDNR[1] Division of Entomology & Plant Pathology	Government, state
IDNR Division of Fish & Wildlife	Government, state
IDNR Division of Forestry	Government, state
IDNR Division of Nature Preserves	Government, state
Indiana Association of Consulting Foresters	Private, non-profit
Indiana Association of Soil & Water Conservation Districts	Private, non-profit
Indiana Forest & Woodland Owners Association	Private, non-profit
Indiana Forest Alliance	Private, non-profit
Indiana Forestry Educational Foundations	Private, non-profit
Indiana Hardwood Lumberman's Association	Private, non-profit
Indiana Society of American Foresters	Private, non-profit
Indiana State Department of Agriculture	Government, state
Indiana Tree Farm	Private, non-profit
Indiana Walnut Council	Private, non-profit
Indiana Wildlife Federation	Private, non-profit
National Wild Turkey Federation	Private, non-profit
Private forest owner	Private, independent
Purdue University, Department of Forestry and Natural Resources	Public university
Purdue University, Hardwood Tree Improvement and Regeneration Center	Public university
Southern Indiana Cooperative Invasive Species Management[2]	Private, non-profit
The Nature Conservancy	Private, non-profit
Urban Forestry Council	Private, non-profit
USDA[3] Natural Resources Conservation Service	Government, federal
USDA FS[4] Hoosier National Forest	Government, federal
USDA FS Northeastern Area, State & Private Forestry	Government, federal

[1] Indiana Department of Natural Resources
[2] formerly Southern Indiana Cooperative Weed Management Area
[3] United States Department of Agriculture
[4] Forest Service

4.3.2 Coding

Transcribed interviews were coded in NVivo 12, QSR International. I developed a final codebook (Appendix E) through the following process. I drafted the initial codebook using the interview guide as an outline. I coded one interview using this initial codebook. Working with a second researcher (Laura Esman) we coded one transcript, reconciled differences, and updated the codebook. Over online meetings coders reconciled differences using low Cohen's kappa scores (generated by the coding comparison query in NVivo) to identify problem codes (i.e., those with kappa scores <0.7), visual inspection of coding stripes within NVivo, and negotiated consensus of code meanings. The codebook was revised after each reconciliation. We repeated this process four additional times using one or two new transcripts. I empirically tested the coding framework on the last three subsets of two interviews using Cohen's kappa statistic as a measure of intercoder reliability (Cohen 1960). This statistic considers the level of agreement between coders as well as the element of chance. The last two sets of intercoder reliability tests had acceptable levels of agreement with a final Cohen's kappa of 0.70 indicating acceptable consistency between coders.

During the codebook development, codes were organized into a hierarchy of parent nodes, child nodes, etc. Within the codes, I identified common shared themes of interviewees. As a standard practice with qualitative inquiry, themes were described in the results rather than summarized as the number of interviewees who shared a particular viewpoint since views expressed less frequently are important as well (Berg and Lune 2012, Knoot et al. 2009). Quotations are presented in the results to highlight key findings.

4.4 Results

4.4.1 Perceptions of the IFSCC

Members generally held positive viewpoints of the IFSCC and saw value in the process. They recognized it as a forum to bring together diverse groups for the purpose of providing input on important forestry issues in the state. Perceptions of its purpose and their roles were not always consistent among members or the written mission of the IFSCC. Some members did not see their role in an advisory capacity at all. According to one member,

> *"Some of the decisions that the state forest makes or that they share with us at those committees, again, it's more about, I think, keeping us informed and of what's going*

on than us making decisions or giving information to them that really changes how they're making their decisions."

In this regard the value of the IFSCC was not to provide input to the Division but rather keeping updated on what is going on in the state regarding forests and their management from both the Division and other stakeholders attending the IFSCC meetings.

There was also ambiguity about the purpose of the IFSCC and what the Division specifically wanted from its stakeholders. Some members viewed the IFSCC meetings as simply "*an educational thing*" where there is "*more listening than talking*". Others simply "*enjoyed learning more about the forest*" or thought it is "*interesting to meet folks in person*" who have a stake in Indiana's forests. Not everyone expressed the same level of investment or interest in the meetings. For some, the meetings were an opportunity to increase their understanding of forest issues in the state and to provide input to the Division. Others thought the meetings were "*okay*" or not "*a big part of their life*". One member expressed confusion on the purpose of the IFSCC stating,

"But to be honest, I don't have a great understanding of, I guess, the goals of the committee or the way [the Division] hope[s] the process works."

4.4.2 Diverse Interests and Interdependency

Having diverse interests and stakeholder representation is a part of the DIAD framework. The IFSCC members appreciated the diversity of perspectives at meetings. The statement,

"It's definitely a well-represented group. I don't know how much effort the Division puts into recruiting new stakeholders or finding new stakeholder groups. But when I think of who is there typically, the different issues they represent, it is a very wide and diverse group of stakeholders"

characterized this viewpoint. However, all members did not necessarily evaluate stakeholder representation or even "*really think about [it]*". Some members recognized that not all meetings have equal attendance and they attributed this to what was on the agenda or individual availability. Two members identified a lack of forest recreational viewpoints represented on the IFSCC.

There was a lack of interdependency for most issues among IFSCC members including the Division. The Division has a broad mission which it addresses through many avenues including operation of tree seedling nurseries for conservation tree plantings, private forestland management

assistance, community and urban forestry, fire management, grant and technical assistance, forest certification, and the state forest system. Given this diversity, not every organization represented at IFSCC meetings has a direct stake in each of these areas. According to one member,

> *"…there are certain groups that don't have the opportunity to really engage and provide input because the topics of the discussions are pertaining to very specific roles of the State Forest."*

The one area that most members had interest in was management of the state forest system, and specifically how timber harvesting is conducted on these properties. Despite this shared interest, decisions the Division make regarding timber harvesting on state forests have various types of impact on stakeholder groups beyond simply the well-being of the forests. Timber harvests that result in early-successional habitat benefiting different wildlife species provides bird watching or hunting opportunities. The logistical operation of harvesting the timber where loggers cut trees, and skidders and trucks move trees and logs could impact access to certain areas or impact the trail system. The sound of chainsaws or heavy equipment can impact how users experience the forest. Some might view the Division as a model of forest management. The Division's decisions to implement or avoid particular management practices may affect how individuals perceive the value or usefulness of those practices.

4.4.3 Authentic Dialogue

IFSCC activities were primarily limited to the meetings organized by the Division. For these meetings the Division arranged the location, drafted the meeting agenda, and announced the meetings on their website and by email to stakeholder groups who attended past meetings. It was unclear to members how their input provided at meetings was utilized if at all. According to one member,

> *"It doesn't seem like there is a great feedback loop for letting the committee know what decision was made [by the Division] or what came out of the input from the committee."*

One member even questioned to what degree the Division actually based decisions on IFSCC input by stating,

> *"But the feeling I have is, the decisions have already been made and that they're not really open to input from other stakeholders."*

IFSCC members understood what was on the agenda each meeting and were provided meeting minutes. However, the grounds by which decisions made by the Division outside of IFSCC meetings was questioned. Even so, many expressed the belief that they were "*being listened to*" and that "*[the Division] wants the input.*" One member mentioned that the role of the IFSCC was not "*to tell [the Division] what to do.*" Many members believed the Division listened to and seriously considered member input.

Members were generally satisfied with the information shared at meetings and its relevance to the IFSCC mission. The essence of this theme is captured by one member who commented,

> *"Most of [the information] was pretty much a reporting of what the Division of Forestry had done and what they were trying to accomplish. And I think as far as credibility of the information, I think it was very good. But we didn't have very much input as to what was going to be covered at the meetings."*

Some members questioned the appropriateness of the information at meetings. For example, one member stated,

> *"I don't know how much [the information] really addressed what I felt the committee was there for, and that's to have input on how we're going to manage these forests."*

Another member was,

> *"…frustrate[ed] that timber management has such a dominant role in [the] State Forest…there's no dialogue about recreation or other missions of the forest."*

The meeting agenda, which was set by the Division, determined much of the information presented and discussed within the IFSCC. However, this approach was not necessarily viewed as a "*dictatorial*" approach but rather the Division making an effort to have topics that are "*...appropriate and relevant to the work of the committee and interests of the stakeholders*." The degree to which members could contribute to that agenda was unclear to many, although one member did state,

> *"The stakeholders have opportunity to contribute topics and items for discussion."*

Authentic dialogue requires face-to-face communication where everyone may hear others' perspectives and be able to question those. Members held the viewpoint that they felt they could express their opinions and viewpoints at the meetings. Opinions stated reflected the diversity of the groups represented. This theme is manifested in the comment,

"By and large, everybody has the opportunity, and a lot of people take advantage of the opportunity to share their thoughts, their positions. So yeah, it's a pretty wide-ranging group, and I feel like there's a real diversity of opinions represented at these meetings."

Even though a particular member didn't always agree with the opinions of another member, many appreciated the opportunity for others to voice their opinion; members had "*the right*" to express themselves.

"People are important. Their opinions are important. So we need to know that."

Despite the ability to express opinions and question statements made, there were undertones that one shouldn't cause problems. It was acceptable to speak your mind as long as it was "*done in a constructive way*" or a "*respectful way.*" Maintaining this civil atmosphere was an important part of the process for some members. Several members referenced a level of respect for others in the group despite having different opinions. Some make a point of establishing a relationship with members who have different viewpoints than their own. Part of the motivation of doing so was the desire to "*avoid friction*" with others who disagree. One member said,

"I think there's always a feeling of dancing around some of those more controversial topics…"

Members repeatedly brought up harvesting timber on state forests as the topic that generates the most discussion at IFSCC meetings. One member summarized it as,

"the topic of timber harvesting is up front and center."

This relatively contentious issue was not avoided at IFSCC meetings, but some members expressed disappointment in how it was addressed within meetings. Members on different sides of the issue freely expressed their views, but there was what could be described as a lack of closure or consensus. Some members expressed a desire to "*…deal with the situation directly.*" During meetings,

"….there could be discussion, there could be airing of grievances and concerns, but I'm not sure there would be much resolution that would satisfy certain parties. I just don't think they would come to a resolution that would be collaborative or provide any sort of resolution for certain groups."

Having an in-depth discussion of contentious issues is "*avoided up to a certain extent*" and "*nobody really brings them up*." Information on these topics is presented as "*a generalized report.*"

The authenticity of some member comments was questioned by some. In some instances, opinions were "*…not necessarily on point or relevant to the agenda*." Some felt that others made comments off topic and simply ignored the goal at hand. In other instances, members thought some comments were not completely truthful and made only to support a particular viewpoint. One comment was that,

> *"…folks tend to instead make up kind of false science to make it appear to be more of a factual argument than an emotional one."*

Members with different viewpoints expressed their opinions and agreed with others having that ability, but some were not open to consideration of those opinions. Regarding certain topics, some members felt the science clearly supported their viewpoints and did not consider different perspectives as "*having merit.*" At the same time, this barrier was recognized in other members. According to one member,

> *"…it's a little bit frustrating when there's groups that want to voice those opinions, have a strong position, and they're not really open to a different understanding of the science of the forest or harvesting being done*."

4.4.4 Outcomes

Relationships and Networks

Building new relationships and learning new information are possible first order outcomes of authentic dialogue. According to several members, their involvement in the IFSCC led to meeting new people and new relationships. The networking opportunities that the IFSCC provided were a valuable part of the experience for many members. Often times the breaks and lunches were the most beneficial part of their experience. Referencing these opportunities, one member said,

> *"…that's a great time to sit with people who approach it from different angles. So it really helps to hear what other people are trying around the state and to bounce ideas off of them, see if there are common areas that we can work together on. So I do think there's a networking aspect of those meetings. It's one of the most valuable benefits of going."*

In some cases, these connections changed perspectives about forest management. Interacting with a more diverse group of forest stakeholders "*…provided a broader picture of Indiana and Indiana woodlands…*" A few members expressed a better appreciation and understanding of the challenges faced by the Division. They were able to share these perspectives

and other information they learned within their organizations or the people they serve. There was also a realization by some members that organizations with different perspectives on public forest management actually had a lot of common ground. Part of this was reflected in issues where there was "*consensus.*" This theme is reflected in the statement,

> *"I think we have a lot of common interest on private forests, on seeing that those are a healthy resource, that forests are protected from conversion, and that they're well-managed, and all the values and benefits they provide…"*

Additionally, just being a part of the IFSCC was valued by some members. One member mentioned,

> *"…just by being present sort of indicates that there's a concern-- that we share a concern on how we're managing the forest ground and what we're doing with our state ground."*

A few members expressed their involvement on the IFSCC hadn't led to any new relationships. Part of this might be attributed to the fact that many members know each other through other projects or networks. One referenced the

> *"…tight-knit [forestry] community…"*

in Indiana. One member expressed shock that some on the committee weren't aware that their organization even existed. Another member overcame this barrier by intentionally seeking out people who might have different perspectives. He stated,

> *"I try to pick the people that I know have a different opinion than mine and try to go up and talk to them because I know just through life and my experiences is that the relationship is the most important thing. And then there's an old saying about people don't care what you know until they know that you care. And so I think the relationship is probably the key thing. Build relationships, and then it's a lot easier to discuss your position."*

Changes in Approaches to Forest Management

In a few cases, the IFSCC experience led to new approaches or opportunities outside of committee meetings. Members gained a better understanding and appreciation of what some other organizations do that they otherwise may not have discovered. One member stated,

> *"Well, one of the things that I've learned from going to these meetings is that…the hunting groups do a lot of research and care deeply about habitat management, so it helped us figure out who we might work with and where we might find funding to help make different things happen."*

Another also mentioned how they have updated some of their resources based on the information from the IFSCC.

Participating in the IFSCC had some type of value for Indiana forests although the tangible benefits were sometimes elusive. One member mentioned,

> *"We really appreciate getting invited to participate, and I think it's a very valuable tool that more divisions and agencies could benefit from."*

From this perspective, being involved in the process in some capacity has meaning. The way the IFSCC is organized and conducted serves as a model for other public agencies. The process of bringing together groups with different perspectives and backgrounds is ultimately beneficial to Indiana forests. This viewpoint is represented by the statement,

> *"Certainly, there's a real disparity of viewpoints among the stakeholder with industry folks, and woodland owners, and environmental and conservation groups. There's even differing opinions among the conservation environmental community about some elements of forest management. So I think that that dialogue and interaction is very valuable for the bigger cause of forest protection in Indiana, and for the work that all the groups do, and it can be a kind of forum for finding some common ground."*

While a couple members referenced finding common ground as an outcome of stakeholder engagement, and particularly the IFSCC, there wasn't much evidence to support that it was actually achieved, at least regarding harvesting timber on state forests. The topic was discussed at some meetings, but apparently not at a depth that resulted in finding common ground. One member described the dialogue as an "*airing of grievances*", but there was a lack of evidence the committee continued to discuss different viewpoints and came to any consensus.

4.5 Discussion

DIAD theory can be applied to decisions and policy involving natural resource issues. I used this theoretical framework to evaluate the IFSCC in terms of its organization, process for engaging stakeholder input, and outcomes. While the IFSCC did not meet every part of the DIAD framework, members held a generally positive perspective on their role and its value. Their involvement in the committee had personal and organizational value but it also benefited Indiana's forests although members had difficulty explaining how. In a study of federal forest governance in Oregon, Davis et al. (2017) had similar findings. The majority of participants in their study were satisfied with their collaborative and they perceived them as successful although many fell short

of achieving specific outcomes. Member satisfaction with the process of being involved in a collaborative and its outcomes is common (McKinney and Field 2008).

The IFSCC fell short of adhering to the DIAD theory in several regards. The function of the IFSCC was mostly a top-down approach with the Division setting the agenda and apparently the operating procedures. Members were generally unclear to what degree they could provide input on the agenda and what the process was for doing so. Ideally, collaboratives are self-organizing with all members working collectively to determine meeting agendas and committee rules (Innes and Booher 1999, Ansell and Gash 2008). According to the operating procedures, decision-making is largely determined by consensus but voting can be used (IDNR 2010*a*). The reason some of their procedures were not followed is unclear. Members suggested the meetings were more educational and informational where they were not involved in any decisions. They may have thought that was how they were supposed to be organized, or perhaps they saw value in the current format and simply accepted it.

The purpose of involving stakeholders in a resource planning and decision-making process is to improve outcomes. Instrumental to the process according to DIAD theory is having authentic dialogue which includes deliberations that closely align to Habermas' (1984) ideal speech conditions that are legitimate, sincere, accurate, and comprehensible. For most members, these conditions were met. Members felt allowed to express their opinions and ask questions of opinions of others and information presented. However, a couple members expressed concerns that some comments were not truthful or were inappropriate. These actions suggest that at least some committee members participated only to promote a specific agenda or lacked an open mind about alternative viewpoints.

Another factor that may have limited authentic dialogue was the absence, or at least the lack of awareness, of dialogue guidelines (e.g., no criticism of others' viewpoints). The apparent operative norm of maintaining a respectful environment may have prevented challenges of insincere comments. Tensions can and do arise when collaborations bring together different viewpoints, and particularly when those individuals have a prior history of conflict (Ansell and Gash 2008). However, a well-designed collaborative process can allow these groups to come together to discuss differences and common ground (Monroe and Butler 2016). In the absence of guidelines on how to challenge opposing or illegitimate views, members simply did not question certain comments. Even though many members felt free to express opinions, they may not have

understood they were allowed to challenge comments when it might violate unwritten rules or norms. It could also be that the IFSCC focused more on issues that members already had a high level of agreement. Some collaboratives may address less divisive issues early in their formation then address more contentious issues later in their maturity (Walpole et al. 2017). However, avoidance was not supported by the members who were interviewed. The "*elephant in the room*" was timber harvesting on state forests and most members mentioned that it was a topic of several meetings. Some of their dissatisfaction was with the way it was covered— that is, a lack of in-depth discussion or agreement on the issue of timber harvesting.

Some of the outcomes of authentic dialogue outlined by Innes and Booher (2018) were apparent among member comments. IFSCC members specifically mentioned networking as a benefit of participation. Improved or new relationships are one beneficial outcome of other collaborations (Walpole et al. 2017, McIntyre and Schultz 2020). From this process some members developed new relationships, although almost none were extended beyond the IFSCC meetings. Additionally, members considered the committee to be a diverse representation of forest stakeholder groups. Despite disagreement with certain perspectives of some individuals, a mutual respect was apparent among members. Even realizing that members with apparently diametrically viewpoints on forests and their management had a lot of common ground related to the value of planning, meeting, and forest issues outside of state forest management. Lastly, some members were able to adopt information they learned from the IFSCC into their own woodland activities or share new information and perspectives within their organizations.

4.6 Conclusions

Interviews with IFSCC members brought to light many positive aspects of their participation in the IFSCC. However, there were areas that need modified to increase alignment with DIAD theory. Based on the findings of this study, I present the following recommendations for consideration by the IFSCC. Adoption of these will benefit both the process and outcomes.

- The Division should in writing clarify member roles, responsibilities, and operational procedures including how the agenda is formulated. The IFSCC has written operating procedures, goals, and a mission statement. Many members were unaware of most of these with one member who was unaware of the purpose of the committee. Moreover, the Division should involve IFSCC members in this process. Final guidelines and

procedures should be made available to IFSCC members in writing and pertinent procedures should be briefly reviewed at the start of each IFSCC meeting.

- The Division should seek member input on ways to facilitate networking and build new relationships among committee members. Members valued the networking aspects of the IFSCC. Even so, not all members were able to network. The Division should also consider using meetings to conduct field trips or property visits that pertain to important forest issues in Indiana. These could enhance learning and understanding within the group while helping to strengthen relationships within the committee.
- The Division should consider using a neutral facilitator during discussion sessions. Members saw value in the information presented at meetings. However, there was an apparent lack of depth in discussions, and especially regarding potentially contentious issues. Defining the process and rules would be essential. Another barrier to more in-depth discussion was the frequency of meetings. In some years, the committee only met once and no meetings occurred in at least one year.
- The Division should clarify how it utilizes input from the IFSCC. Current operating procedures mention coming to consensus and voting as possible methods of decision-making. However, there is no guidance how the committee determines what is consensus, under what circumstances which method (voting or consensus) is appropriate, or how voting will occur.

The Division released the new Indiana Forest Action Plan in 2020. Along with this new plan, they made some changes to the IFSCC, which is now named the Indiana Forest Stewardship Advisory Council. In its current form, the Indiana Forest Stewardship Advisory Council

> *"informs state forest policy functioning to promote communication and understanding of current forest management issues. The committee promotes the sustainability of forest resources and the improvement of forest management practices in Indiana extending the health, productivity, extent and usefulness of Indiana's forest resources (IDNR 2021a)".*

It is not yet clear how the group will function compared to the IFSCC. However, they now list 31 member organizations who alone make up the committee. Most, but not all the groups, are the same as the 31 groups considered in this study.

The findings of this study are based completely on the perspectives of the IFSCC members, some of whom I have known previously. That relationship may have impacted their ability to speak open and candidly with me. Similarly, others may have doubted my neutrality since I have worked with the Division of Forestry staff on many projects in a professional capacity including professional development programs and researching the impacts of timber harvesting on wildlife in state forests (Currylow et al. 2012, MacGowan et al. 2017). Having another researcher conduct the interviews may have helped reduce these potential biases. Direct observation and documentation of IFSCC meetings would have strengthened this study as well. These observations would have served as a benchmark to compare with member observations and perspectives. It also would have provided me with a better perspective on how meetings were conducted and dialogue among members as well as Division staff. However, the infrequency of meetings would have limited this benefit to some extent.

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CHAPTER 5. CONCLUSIONS

Woodland owners have diverse interests and reasons for owning woodlands (Butler et al. 2020). This makes designing statewide educational programming to meet their needs challenging. The Wisconsin Learn About Your Land Program (LAYL) overcomes this barrier by targeting unengaged woodland owners and tailoring course content to local needs based on input from area foresters (Genskow and Blasczyk 2013). Even so, not all woodland owners will have the same level of interest in a particular topic, nor is every practice a good fit for each owner or their land. The question really becomes what should be the primary focus of woodland owner Extension programs? Focusing on key management practices such as controlling invasive plants and harvesting timber will always have a role in education. However, increasing the capacity for FFOs to become more engaged with professional foresters and woodland owner organizations might be a better primary focus of educational programs for FFOs. Most woodland owners will never have the knowledge level and experience of professional foresters to be able to recognize and address every issue on their property. However, FFOs who have access to the informational networks that woodland organizations provide will be better prepared to deal with new pests, diseases, and other problems as they arise. Regardless of the future problems FFOs face and which management practices they decide to implement, engaged woodland owners who have access to sound, trusted advice will be better prepared.

The Forest Management for the Private Woodland Owner eight-week short course is an Extension program with an over 25-yr history. The course is offered throughout Indiana at different locations each year. Extension foresters within the Department of Forestry and Natural Resources at Purdue University develop the course content in partnership with other groups including the Hardwood Tree Improvement and Regeneration Center (HTIRC), Purdue University Cooperative Extension Service, the Indiana DNR Division of Forestry, and local Soil & Water Conservation District offices. Classroom sessions include tree identification, forest biology, planning, management practices, invasive species control, selling timber, financial management, wildlife, and informational resources and assistance. Two outdoor field tours are also included to reinforce concepts learned in class. The eight-week course was viewed positively by participants and they clearly saw value in it despite the significant investment in time. However, based on the findings of this research, improvements could be made to this course that would be applicable to other

woodland education courses. First, new or less experienced woodland owners were impacted differently than more experienced woodland owners. For the latter group, information learned in the course tended to be used to adjust how they implemented practices or confirm continued implementation of some practices. In the former group, the course played a more foundational role in increasing knowledge about practices and subsequent formation of attitudes about the practice. The amount of new information, even though it is of good quality, may be overwhelming and contribute to lack of adoption for certain practices. Because of these differences, splitting course participants into new and experienced tracts has the potential to produce more desirable results. This could be done by offering entirely separate programs that are delivered concurrently or on consecutive evenings. Field tours could either be on separate days or be done together, which may facilitate peer learning or dialogue. Any of these options would likely require additional investments in time and money.

Secondly, incentivizing more engagement both within and beyond the course could provide longer-term benefits described above. Many forestry education programs provide peer learning opportunities including leading tours, serving as guest speakers, and more (Kueper et al. 2014). Attendees of the eight-week course enjoyed hearing perspectives from other woodland owners in the course, but it wasn't necessarily intentionally planned in the program design. Providing previous eight-week course participants opportunities to get involved in the instruction of subsequent courses could provide benefits. Similarly, adding structured discussion activities in the course would allow participants to learn about others in the class and their past and future woodland activities. During the eight-week course, participants learn about professional resources and woodland organizations including the Indiana Forestry and Woodland Owner Association, Indiana Tree Farm Program, and the Indiana Walnut Council. Making FFOs aware of these organizations does not necessarily lead to participation. Offering a discounted or free 1-yr membership to one or more organizations could help build their network in the future. Having members who are interested in learning more about their woods and practicing good management would be a benefit to these organizations.

Lastly, connecting woodland owners with other key people could increase participation and program impact. FFOs in the eight-week course discussed the importance of families in the context of what owning woodlands means to them. Spending time with family in their woods was valued by many. Attending educational programs was a way to improve intra-family communication

about their woodlands as well as get other family members more involved in woodland activities. Many FFOs who attended the eight-week course did so because they were specifically invited or encouraged to attend by a family member, professional advisor, or friend. Awareness of the course being offered was not by itself enough to lead to enrollment. Some programs, including the eight-week course, offer discounted rates for spouses or others where they do not receive printed materials but can attend all of the sessions. However, taking a more active approach to program design and marketing could increase participation. Decreasing registration costs for attendees who bring a family member or another woodland owner would financially incentivize others to participate. Making this value a prominent feature in program marketing materials would be key.

This study provided an in-depth evaluation of the eight-week short course. The results of which provided insights in approaches to evaluating Extension programs moving forward. I used a combination of quantitative and qualitative methods to assess participant attitudes about the course and how the course influences woodland activities. Each method provided unique information on the impact of the course. While the surveys provided information on perceived increases in knowledge and the extent information learned in the course influenced their decision to perform various management activities, applying this technique years after attending the eight-week course was not ideal. It was clear from the interviews that attributing specific actions to the course was difficult for many woodland owners. Even so, the surveys allowed data summarization across all classes that could be directly compared to other class formats. If longitudinal data spanning many years is desirable, repeated evaluations on an annual or semi-annual basis would be required. The qualitative evaluation in this study provided insights into participants' views on management, how the course did or did not play a role in the decision to implement practices or the manner in which they did so, and what aspects of the course made it worthwhile and enjoyable. Insights into incorporating family and peer learning in the eight-week course as well as barriers to implementing practices were only possible through the interviews. Interviews could be helpful to improve program design during pilot stages of program implementation.

Rather than doing intermittent evaluations of behavioral change, Genskow and Blasczyk (2013) used multiple components in a continuous evaluation approach of the LAYL program in Wisconsin. Other than some interviews of instructional partners after the pilot years, they implemented a combination of in-class questionnaires, end-of-session questionnaires, and 6- to 8-month post-class surveys in the years they evaluated. The latter mail surveys included multiple

attempts to maximize response rates. Using this approach, they obtained a high response rate (66% for their pilot program) and impactful data and likely avoided the recall and attribution issues associated with my study. Because they had a mailing list of unengaged woodland owners (owned ≥10 ac woods, not enrolled in state tax-incentive programs, not involved in woodland owners associations, generally do not have management plans, and have no or limited involved in woodland owner educational programs), they also surveyed non-attendees who were mailed an invitation. This approach allowed them to assess short- and medium-term outcomes regarding increase in knowledge, contact with a professional forester, and doing some type of action on their woodlands as a result of attending the LAYL class (Genskow and Blasczyk 2013).

If more detailed information regarding scope and success of practice implementation is desired, a different approach might be warranted. In this study, surveys were used to determine what practices woodland owners implemented and the level of influence the course had on their decision to do so. The interviews provided more information on the issues they faced and how they approached them. For example, I asked interviewees to describe actions they took to control invasive plants in their woodlands and how the course did or did not inform or change their approach. While this provided valuable insights, it did not allow me to begin to empirically quantify the scope of their work. Attendees were recalling information from memory and likely described things that they viewed as most salient. While many had a management plan, they didn't necessarily record what they did or when they did it. Specific questions related to hours spent controlling invasive species, acreage treated, and estimations of plant coverage before and after for each method used would be required to truly quantify the extent and effectiveness of their invasive plant control efforts. Since having FFOs collect this data would require some training and commitment, incorporating these activities in the educational program would be required. Doing so would also provide insights into what can be reasonably expected and what the benefits would be. However, balancing practicality with what is really critical to evaluating program success is key. Any evaluation approach should be purposeful and tie directly to the program objectives as well as inform future program improvements.

If increasing the level of engagement in FFOs is the ultimate goal of educational programs, then getting them to think about their woods on a regular basis could enhance learning experiences. An intervention-oriented evaluation approach interjects evaluation data collection in ways that enhance program outcomes (Patton 2008:166). Woodland owners attending the eight-week course

or other programs that have multiple classes over time could keep a journal about their woods. Between classes they could reflect upon certain aspects of their woodlands that connect with the focus of the previous or next class. Instructors could devote class time for people to share passages from their journal. These shared experiences could help focus dialogue on areas that are the most important or valuable for woodland owners in the course. They could also enhance interpersonal relationships and peer learning.

Ultimately, there is no perfect evaluation approach that fits every single educational program. Educators should work with evaluators at the onset of designing an educational program for optimal results. The standard 'post-workshop' survey will likely have a role in many Extension program evaluations. However, educators should be open to new ideas and evaluation approaches that could enhance both learning and measuring program outcomes. Education programs for FFOs should be designed to facilitate connections with professional advisors and expand networks with other woodland owners. Evaluation questions for these programs must be designed to measure these. Given the importance of attitudes about management practices and woodland values in regards to the decision to implement an activity, educators should also include questions that assess these before and after the program. These would provide value in how a particular program may change an individual's attitude towards a practice.

In its current role, the Indiana Forest Stewardship Coordinating Committee (IFSCC) informs state forest policy functioning to promote communication and understanding of current forest management issues. I used the diversity, interdependence, and authentic dialogue (DIAD) theory as a framework to evaluate how it functions (i.e., process) and what benefits resulted from the group's activities (i.e., outcomes). According to Innes and Booher (2018), no group process will likely achieve complete collaborative rationality. However, use of this approach underlined (according to the viewpoints of its members) what the IFSCC does well and areas that could be improved. The overarching conclusion from this study is that collaboratives need to define clear goals of what they are trying to accomplish, operational guidelines and rules, and perhaps most importantly, transparency in all aspects of the collaborative including setting agendas, how the group functions, how input is used, and ultimately how and why decisions are made based on that input.

A second conclusion of this research is that evaluation should be a principal component of collaboratives. Extension programs have evolved from simply summarizing activities in terms of

number of events and resources created to quantifying impact for outcomes of behavioral change and improved conditions. Similarly, collaboratives should consider a corresponding evaluation approach. An antecedent to doing so is identifying clear goals and objectives. However, once these are defined, formulation of specific evaluation criteria that measures applicable indicators would be required. Development of this evaluation approach should also include members of the collaborative throughout the entire process. Doing so would draw on their diverse viewpoints while adding value to the selected evaluation criteria. It could also improve their perceived value to the collaborative and as well as group dynamics. Conley and Moote (2003) suggest using a combination of process, environmental outcome, and socioeconomic outcome criteria to evaluate natural resource collaboratives. These also align well with the diversity, interdependence, and authentic dialogue components of DIAD. Involving professionals trained in evaluation throughout the process would be beneficial since most agencies and stakeholders lack formal evaluation training. Ultimately, a purposeful evaluation approach starting with collaborative formation would not only improve desired outcomes, but would likely improve the process of collaboration.

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APPENDIX A. WOODLAND OWNER SURVEY

Dear Woodland Owner,

The Forest Management for the Private Woodland Owner 8-week short course is a long-running extension program offered throughout Indiana at different locations. The educational programming is provided by extension foresters in the Department of Forestry and Natural Resources at Purdue University, in partnership with other groups including the Hardwood Tree Improvement and Regeneration Center (HTIRC), Purdue University Cooperative Extension Service, the Indiana DNR Division of Forestry, and local Soil & Water Conservation District offices.

You are receiving this survey because you have attended at least one of these courses between 2007 and 2015. Purdue University is working to improve educational programming for woodland owners in Indiana. As a past participant, we would greatly appreciate your participation in this survey to help us learn how we might best serve your needs.

There are two ways to complete this survey: 1) online or 2) on paper.

1) If you prefer online, enter the following website address into your web browser and provide your responses securely online: www.tinyurl.com/WoodlandCourse

If you choose to complete the survey online you will need to enter the following code: _____. This will let us know you have completed the survey so we will stop sending reminders. ***OR***

2) If you prefer a paper version, complete the following booklet and send by mail with the postage-paid return envelope .

The information you provide is confidential and will never be linked to your name, only to this code, which is used only for the purpose of tracking who has responded to the survey.

We ask that this survey be completed by the person in your home who attended the Forest Management for the Private Woodland Owner course, and is at least 18 years old. If more than one person attended, the person who makes most of the woodland management decisions should complete the survey. Your participation in this survey is voluntary. Your answers will be kept confidential and will be released only as summaries where individual answers cannot be identified. The survey should take approximately 25 minutes to complete.

For information regarding the survey, please contact Brian MacGowan at macgowan@purdue.edu or at (765) 647-3538. Thank you in advance for your help!

Lenny Farlee, Extension Forester
Purdue University/HTIRC

Ron Rathfon, Extension Forester
Purdue University

Brian MacGowan, FNR Extension Coord.
Purdue University

Section I – Forest Management for the Private Woodland Owner Course

1. How IMPORTANT were each of the following factors in determining why you enrolled in the Forest Management for the Private Woodland Owner course?

	Not important	Slightly important	Moderately important	Extremely important	Not sure
a. To learn more about woodlands before purchasing woodland property	☐	☐	☐	☐	☐
b. To find out more about my woodlands	☐	☐	☐	☐	☐
c. To meet other woodland owners	☐	☐	☐	☐	☐
d. To learn how to improve wildlife habitat on my woodlands	☐	☐	☐	☐	☐
e. To learn how to identify trees in my woods	☐	☐	☐	☐	☐
f. To learn how to manage forests for timber	☐	☐	☐	☐	☐
g. To learn about financial considerations of harvesting timber	☐	☐	☐	☐	☐
h. Other (specify): _____	☐	☐	☐	☐	☐

2. Overall, how SATISFIED were you with the Forest Management for the Private Woodland Owner course?

Not at all satisfied ⟷ Extremely satisfied

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

3. Have you had some form of CONTACT WITH THE INSTRUCTOR since you completed the Forest Management for the Private Woodland Owner course?

☐ Yes → If yes, what was it about?

☐ No → If no, why not?

Please indicate your level of AGREEMENT OR DISAGREEMENT with each of the following two statements.

4. Participation in the Forest Management for the Private Woodland Owner course was important in helping me determine management objectives for my woodlands.

- ☐ Strongly disagree
- ☐ Somewhat disagree
- ☐ Neither disagree nor agree
- ☐ Somewhat agree
- ☐ Strongly agree

5. Management of my woodlands improved because of what I learned in the Forest Management for the Private Woodland Owner course.

- ☐ Strongly disagree
- ☐ Somewhat disagree
- ☐ Neither disagree nor agree
- ☐ Somewhat agree
- ☐ Strongly agree

6. Please answer the following questions for the time period BEFORE and AFTER you attended the Forest Management for the Private Woodland Owner course.

	BEFORE the program					AFTER the program				
	Not at all 1	2	3	4	Very much 5	Not at all 1	2	3	4	Very much 5
a. How knowledgeable were you about YOUR woodlands?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b. What extent were decisions about your woodland informed by a long-term plan?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c. What extent did you use the services of a professional forester?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d. What extent did you talk to other woodland owners about woodland management?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e. What extent did you feel you were able to manage your woodlands?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f. What extent did you feel comfortable with the process of selling and harvesting timber?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g. What extent did you understand where to find professionals who can help you manage your woodlands?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h. What extent were you aware of groups and organizations that offer information, assistance or cost-share to woodland owners?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
i. What extent did you have trust in Purdue Extension as a source of information on woodland management decisions?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. In your own words, describe how the Forest Management for the Private Woodland Owner course INFLUENCED decisions you make about your woodlands.

8. How USEFUL was the Forest Management for the Private Woodland Owner course for each of the following?

	Not useful	Somewhat useful	Moderately useful	Very useful	Not sure
a. Meeting new people/social networking	☐	☐	☐	☐	☐
b. Meeting and interacting with professionals	☐	☐	☐	☐	☐
c. Finding out what other woodland owners are doing	☐	☐	☐	☐	☐
d. Gaining more satisfaction from my woodlands	☐	☐	☐	☐	☐
e. Seeing woodland management practices for myself	☐	☐	☐	☐	☐
f. Other (specify):	☐	☐	☐	☐	☐

9. How did what you learned in the Forest Management for the Private Woodland Owner course INFLUENCE your decision to do the following activities?

	Did not influence	Slightly influenced	Moderately influenced	Strongly influenced
a. Develop a new management plan or stewardship plan for my woodlands	☐	☐	☐	☐
b. Modify an existing management plan or stewardship plan for my woodlands	☐	☐	☐	☐
c. Plant trees or shrubs on my property	☐	☐	☐	☐
d. Plant grasses, wildflowers, or legumes on my property	☐	☐	☐	☐
e. Enhance wildlife habitat on my woodlands	☐	☐	☐	☐
f. Conduct/contract timber stand improvement (e.g., thinning, vine control) in my woodlands	☐	☐	☐	☐
g. Harvest timber (e.g, sawlogs, veneer) from my woodlands	☐	☐	☐	☐
h. Control invasive plants on my woodlands	☐	☐	☐	☐
i. Use services of a professional forester	☐	☐	☐	☐
j. Recommend the services of a professional forester to others	☐	☐	☐	☐
k. Speak to others about woodland management	☐	☐	☐	☐
l. Use my property to inform others about woodland management	☐	☐	☐	☐
m. Other (specify):	☐	☐	☐	☐

10. Have you participated in the Forest Management for the Private Woodland Owner course more than once?

☐ Yes
☐ No

11. In general, what is the LIKELIHOOD THAT YOU WOULD ATTEND a woodland educational program in your area in the future?

Not at all likely ⟷ Extremely likely

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

12. How much would each of the following INFLUENCE your decision to attend an educational program about woodlands?

	No influence	Slightly influence	Moderately influence	Strongly influence
a. Proximity to home	☐	☐	☐	☐
b. Fit within schedule	☐	☐	☐	☐
c. Length of program	☐	☐	☐	☐
d. Free food or drink	☐	☐	☐	☐
e. Program has a field demonstration component	☐	☐	☐	☐
f. Opportunity to learn about a new practice	☐	☐	☐	☐
g. Opportunity to learn more about a practice I already know	☐	☐	☐	☐
h. Encouragement by family, friends, or neighbors	☐	☐	☐	☐
i. Encouragement by local conservation staff (e.g., forester, Purdue Extension, Soil & Water Conservation District)	☐	☐	☐	☐
j. Trust in program organizer	☐	☐	☐	☐
k. Opportunity to socialize and/or meet new people	☐	☐	☐	☐

Woodlands cover 19% of Indiana. For the purposes of this survey, **woodlands** include:

⇒ Land at least 1 acre in size, 120 feet wide, and with at least 10 well-spaced trees per acre;
or
⇒ Land at least 1 acre in size, where trees were removed and trees will grow again (not converted to another use, such as cropland, pasture land, or residential)

Woodlands do NOT include:

⇒ Christmas tree farms, orchards, or nurseries
or
⇒ Land that is mowed for lawn

If you have NEVER OWNED WOODLANDS, please check the box below and return the survey in the enclosed stamped envelope. **Thank you.**

☐ I have never owned woodlands.

If you currently own woodlands, or have owned woodlands in the past, please continue to question #11 on the next page. ➡

13. Do you still own woodlands?

- ☐ Yes, continue to question #14 directly below
- ☐ No, skip to question #16

14. Do you live on the property where your woodlands is located?

- ☐ Yes
- ☐ No

15. If you own more than one woodland parcel, what is the acreage of your largest parcel? _____ acres

16. In what year did you first acquire woodlands? _____

17. How did you acquire your woodlands? ***CHECK ALL THAT APPLY.***

- ☐ Purchased
- ☐ Inherited
- ☐ Received as gift
- ☐ Other (specify): _____

18. Please estimate the total acres of each type of property you currently own below.

Woodlands	_____	acres
Row crop	_____	acres
Pasture	_____	acres
Other	_____	acres → (specify): _____

19. How many acres of woodlands have you sold or given away in the last 5 years?

_____ acres

20. People own woodlands for many reasons. How IMPORTANT are the following reasons for why you own woodlands?

	Not important	Slightly important	Moderately important	Extremely important	Not sure
a. Enjoy beauty or scenery	☐	☐	☐	☐	☐
b. Protect nature and biological diversity	☐	☐	☐	☐	☐
c. Land investment	☐	☐	☐	☐	☐
d. Privacy	☐	☐	☐	☐	☐
e. Pass land on to my children or heirs	☐	☐	☐	☐	☐
f. Provide habitat for wildlife	☐	☐	☐	☐	☐
g. Cultivation/collection of non-timber resources (such as berries, mushrooms, etc.)	☐	☐	☐	☐	☐
h. Production of firewood	☐	☐	☐	☐	☐
i. Timber products, such as logs or pulpwood	☐	☐	☐	☐	☐
j. Hunting or fishing	☐	☐	☐	☐	☐
k. Recreation, other than hunting or fishing	☐	☐	☐	☐	☐
l. Part of my home site/primary residence	☐	☐	☐	☐	☐
m. Part of my vacation home or cabin	☐	☐	☐	☐	☐
n. Part of my farm	☐	☐	☐	☐	☐
o. Other (specify): _____	☐	☐	☐	☐	☐

21. Of the reasons listed above, please indicate which three are the most important to you by writing the *LETTER* *(lower case a —o from the list above in question #18)* below .

☐ Most important
☐ Second most important
☐ Third most important

22. Please select the answer that best describes your ENROLLMENT in the Classified Forest and Wildlands Program offered through the Indiana DNR Division of Forestry?

- ☐ I have never been enrolled
- ☐ I am not currently enrolled but have been in the past
- ☐ I am currently enrolled

23. Have you ever participated in any of the following conservation programs?
CHECK ALL THAT APPLY.

- ☐ Conservation Reserve Program (CRP)
- ☐ Forest Improvement Program (FIP)
- ☐ Environmental Quality Incentive Program (EQIP)
- ☐ Wildlife Habitat Incentive Program (WHIP)
- ☐ Other (specify): _____

24. In the last 5 years, have you ever leased or collected money for others to conduct NON-LOGGING ACTIVITIES (e.g., hunting, gathering firewood, collecting ginseng) on your woodlands?

- ☐ Yes
- ☐ No
- ☐ Not sure

25. In the last 5 years, have any of the following activities occurred on any of the woodlands that you own? *CHECK ALL THAT APPLY.*

- ☐ Prepared land and/or planted trees
- ☐ Applied herbicide, pesticides or fertilizers
- ☐ Wildlife/fish habitat improvement projects (e.g., constructed brush piles, planted native shrubs or wildflowers)
- ☐ Controlled/prescribed fire
- ☐ Reduced fire hazard
- ☐ Controlled invasive species
- ☐ Conducted a timber harvest
- ☐ Built or performed maintenance on roads/trails
- ☐ Hunted
- ☐ Fished
- ☐ Viewed wildlife
- ☐ Hiked/walked
- ☐ Other (specify): _____

26. How LIKELY are you to do each of the following for your woodlands over the next 5 years?
CHECK ALL THAT APPLY.

FOR THE WOODLANDS YOU PLAN TO KEEP	Extremely unlikely	Somewhat unlikely	Somewhat likely	Extremely likely	Not sure
a. Leave as is – no activity	☐	☐	☐	☐	☐
b. Do minimum activity to maintain as woodlands	☐	☐	☐	☐	☐
c. Harvest firewood	☐	☐	☐	☐	☐
d. Harvest sawlogs and/or veneer	☐	☐	☐	☐	☐
e. Collect/harvest non-timber forest products (e.g., ginseng, nuts, etc.)	☐	☐	☐	☐	☐
f. Enhance wildlife habitat	☐	☐	☐	☐	☐
g. Enroll woodlands in a conservation easement	☐	☐	☐	☐	☐
h. Convert another land use type (e.g., rowcrop, pasture) into woodlands	☐	☐	☐	☐	☐
i. Buy more woodlands	☐	☐	☐	☐	☐
j. Other (specify): _____	☐	☐	☐	☐	☐

FOR THE WOODLANDS YOU DO NOT PLAN TO KEEP	Extremely unlikely	Somewhat unlikely	Somewhat likely	Extremely likely	Not sure
k. Give some or all of woodlands to a land trust	☐	☐	☐	☐	☐
l. Give some or all of woodlands to children/heirs	☐	☐	☐	☐	☐
m. Divide woodlands and sell the subdivisions	☐	☐	☐	☐	☐
n. Convert some or all of woodlands to another land use type (e.g., rowcrop, pasture)	☐	☐	☐	☐	☐
o. I intend to sell woodlands – For what purpose? (specify): _____	☐	☐	☐	☐	☐

27. In your opinion, how IMPORTANT are each of the following items for maintaining the health of your woodlands?

	Not at all important	Slightly important	Moderately important	Extremely Important	Not sure
a. Harvesting trees	☐	☐	☐	☐	☐
b. Not harvesting trees	☐	☐	☐	☐	☐
c. Controlling invasive plants	☐	☐	☐	☐	☐
d. Management or stewardship planning	☐	☐	☐	☐	☐
e. Conducting timber stand improvement	☐	☐	☐	☐	☐
f. Enhancing wildlife habitat	☐	☐	☐	☐	☐

28. Do you have a management plan for your woodlands?

- ☐ Yes, continue to question #29 directly below
- ☐ No, skip to question #30

29. To what extent are your woodland management decisions influenced by your woodland management plan?

- ☐ Not at all influenced
- ☐ Somewhat influenced
- ☐ Moderately influenced
- ☐ Extremely influenced

30. Thinking about your woodlands, please indicate your level of AGREEMENT OR DISAGREEMENT with each of the following statements.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
a. My neighbors' opinions influence my woodland management decisions.	☐	☐	☐	☐	☐
b. It is my responsibility as a woodland owner to maintain healthy woodlands.	☐	☐	☐	☐	☐
c. My quality of life depends on my woodland management decisions.	☐	☐	☐	☐	☐
d. Management is necessary to maintain healthy woodlands.	☐	☐	☐	☐	☐
e. I should actively manage my woodlands.	☐	☐	☐	☐	☐
f. Timber harvesting threatens the health of my woodlands.	☐	☐	☐	☐	☐
g. It is important to me that I do the right thing with my woodlands.	☐	☐	☐	☐	☐
h. It is important to me that others believe I maintain healthy woodlands.	☐	☐	☐	☐	☐
i. I have the necessary resources to manage my woodlands.	☐	☐	☐	☐	☐

31. In your own words describe how your woodlands contribute to your QUALITY OF LIFE.

Section IV – Woodland Information Sources

32. How often do you USE the following sources of information for your woodland management decisions?

	Never	Rarely	Sometimes	Often	Not sure
a. Newsletters, fact sheets	☐	☐	☐	☐	☐
b. Workshops, field days, meetings	☐	☐	☐	☐	☐
c. Purdue Extension materials	☐	☐	☐	☐	☐
d. In-person communication with family, friends or neighbors	☐	☐	☐	☐	☐
e. In-person communication with professional forester	☐	☐	☐	☐	☐
f. In-person communication with logger	☐	☐	☐	☐	☐
g. In-person communication with Purdue Extension staff	☐	☐	☐	☐	☐
h. Federal government agency	☐	☐	☐	☐	☐
i. State or local government agency	☐	☐	☐	☐	☐
j. Radio	☐	☐	☐	☐	☐
k. Television	☐	☐	☐	☐	☐
l. E-mail	☐	☐	☐	☐	☐
m. Webinars	☐	☐	☐	☐	☐
n. YouTube	☐	☐	☐	☐	☐
o. Blogs and internet forums	☐	☐	☐	☐	☐
p. Podcasts	☐	☐	☐	☐	☐
q. Facebook	☐	☐	☐	☐	☐
r. Twitter	☐	☐	☐	☐	☐
s. Other social media	☐	☐	☐	☐	☐
t. Other internet websites	☐	☐	☐	☐	☐
u. Other (specify): _____	☐	☐	☐	☐	☐

33. How would you PREFER to get information for your woodland management decisions?

	Not at all	Slightly	Moderately	Very much	Not sure
a. Newsletters, fact sheets	☐	☐	☐	☐	☐
b. Workshops, field days, meetings	☐	☐	☐	☐	☐
c. Purdue Extension materials	☐	☐	☐	☐	☐
d. In-person communication with family, friends or neighbors	☐	☐	☐	☐	☐
e. In-person communication with professional forester	☐	☐	☐	☐	☐
f. In-person communication with logger	☐	☐	☐	☐	☐
g. In-person communication with Purdue Extension staff	☐	☐	☐	☐	☐
h. Federal government agency	☐	☐	☐	☐	☐
i. State or local government agency	☐	☐	☐	☐	☐
j. Radio	☐	☐	☐	☐	☐
k. Television	☐	☐	☐	☐	☐
l. E-mail	☐	☐	☐	☐	☐
m. Webinars	☐	☐	☐	☐	☐
n. YouTube	☐	☐	☐	☐	☐
o. Blogs and internet forums	☐	☐	☐	☐	☐
p. Podcasts	☐	☐	☐	☐	☐
q. Facebook	☐	☐	☐	☐	☐
r. Twitter	☐	☐	☐	☐	☐
s. Other social media	☐	☐	☐	☐	☐
t. Other internet websites	☐	☐	☐	☐	☐
u. Other (specify): _____	☐	☐	☐	☐	☐

34. To what extent do the following people or organizations INFLUENCE your woodland management decisions?

	No influence	Slightly influence	Moderately influence	Strongly influence	No contact
a. Family	☐	☐	☐	☐	☐
b. Other woodland owners	☐	☐	☐	☐	☐
c. Neighbors and friends	☐	☐	☐	☐	☐
d. Professional forester	☐	☐	☐	☐	☐
e. Logger	☐	☐	☐	☐	☐
f. Financial adviser	☐	☐	☐	☐	☐
g. Woodland owner organizations (e.g. Indiana Forestry and Woodland Owners Association)	☐	☐	☐	☐	☐
h. Soil and Water Conservation District (SWCD)	☐	☐	☐	☐	☐
i. Natural Resources Conservation Service (NRCS)	☐	☐	☐	☐	☐
j. Indiana Department of Natural Resources	☐	☐	☐	☐	☐
k. Purdue Extension	☐	☐	☐	☐	☐

35. To what extent do you TRUST the following sources for your woodland management decisions?

	No trust	Slightly trust	Moderately trust	Strongly trust	Not familiar
a. Family	☐	☐	☐	☐	☐
b. Other woodland owners	☐	☐	☐	☐	☐
c. Neighbors and friends	☐	☐	☐	☐	☐
d. Professional forester	☐	☐	☐	☐	☐
e. Logger	☐	☐	☐	☐	☐
f. Financial adviser	☐	☐	☐	☐	☐
g. Woodland owner organizations (e.g. Indiana Forestry and Woodland Owners Association)	☐	☐	☐	☐	☐
h. Soil and Water Conservation District (SWCD)	☐	☐	☐	☐	☐
i. Natural Resources Conservation Service (NRCS)	☐	☐	☐	☐	☐
j. Indiana Department of Natural Resources	☐	☐	☐	☐	☐
k. Purdue Extension	☐	☐	☐	☐	☐

36. Are you retired?

- ☐ Yes
- ☐ No

37. What is or was your main occupation? _____

38. What year were you born? _____

39. What is your gender? _____

40. Are you a member of any organizations listed below? *Check ALL that apply.*

- ☐ Indiana Forestry and Woodland Owner Association
- ☐ Tree Farm
- ☐ Walnut Council

41. What is the highest level of school you completed?

- ☐ Some formal schooling
- ☐ High school diploma/GED
- ☐ Some college
- ☐ 2-year college degree
- ☐ 4-year college degree
- ☐ Advanced degree

42. What is your approximate household income from all sources before taxes?

- ☐ Less than $25,000
- ☐ $25,000 - $49,999
- ☐ $50,000 - $99,999
- ☐ $100,000 - $199,999
- ☐ $200,000 or more

43. What percent of your annual household income is derived from the following land use types on your property?

Woodland	_____	%
Row crop	_____	%
Pasture	_____	%

44. The *Indiana Woodland Steward,* a free publication about woodland management, is mailed to woodland owners three times annually. Do you receive the *Indiana Woodland Steward*?

☐ Yes, proceed to question #45 directly below

☐ No, skip to question #46

45. Indicate your level of AGREEMENT OR DISAGREEMENT with the following statements about the *Indiana Woodland Steward*.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
a. I consider myself to be a regular reader.	☐	☐	☐	☐	☐
b. The information I learn influences decisions I make about my woodlands.	☐	☐	☐	☐	☐
c. The *Indiana Woodland Steward* is a trusted source of information about woodland	☐	☐	☐	☐	☐

46. The *Got Nature? blog* is an online resource for woodlands and natural resources with content provided by Purdue University faculty and staff. Have you ever read the *Got Nature?* blog?

☐ Yes, proceed to question #47 directly below

☐ No, skip to end

47. Indicate your level of AGREEMENT OR DISAGREEMENT with the following statements about the *Got Nature?* blog.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
a. I consider myself to be a regular reader.	☐	☐	☐	☐	☐
b. The information I learn influences decisions I make about my woodlands.	☐	☐	☐	☐	☐
c. The *Got Nature?* blog is a trusted source of information about woodland management.	☐	☐	☐	☐	☐

Thank you for your valuable time!

Please make any additional comments you may have in the space below.

APPENDIX B. WOODLAND OWNER INTERVIEW GUIDE

FFOs Eight-week Short Course Interview Guide

Thank you for meeting with me today and participating in our research on the effectiveness of educational programs on woodland management decision-making. In this interview, I will ask you several questions regarding your experience with woodland education and management. We will use your responses to achieve a clearer picture of what is and isn't working with regards to educational programs for woodland owners.

Before we begin I would just like to remind you that you are under no obligation to participate. Non-participation will not result in a change of relationship between you and Purdue University, Purdue Extension, or any other services provided by the university. If you feel uncomfortable answering one or more of the questions you are free not to answer. Information gathered during this interview will be collected and stored under the guidelines given to us by our Institutional Review Board which regulate human subject research. Your responses will be in confidence and your name will never be used in any report or publication, or provided to a third party. If you would like to speak with someone about your rights you may contact the Purdue Human Research Protection Program at (765) 494-5942.

Are you willing to continue to participate?

Do you have any questions before we begin?

Do you mind if I record this interview for transcriptions purposes?

Woodland Management

1. Tell me what owning woodlands means to you. (Open ended; prompt if needed: family, nature investment, recreation)

2. In your own words, describe what makes a woodlands healthy?

   What makes woodlands unhealthy?

3. What comes to mind when you hear the term woodland management? (Open ended; prompt if needed; scale, types of activities, duration)

   What types of actions do you associate with a managed woodland?

   Do you think managed woodlands differ from unmanaged woodlands? How and why?

What influences your decision to perform woodland management practices?

___ advantages/disadvantages of managing woodlands

Is it important for woodland owners to manage their woodlands? Why, why not?

___ norms

Do you know of other woodland owners in your area who manage their woodlands? Why? Why not?

Is it important that other woodland owners know you manage your woodlands?

___ decision criteria for adoption (no targeted questions; questions below)

Farm characteristics, cost, maintenance, timing, farm benefits

___ environmental awareness and concern

What environmental issues do managing your woodlands address?

Are you concerned about this (these) issue(s)? Why or why not?

How do you think the decisions you make on your woodlands influences these?

eight-week short course information

1. Do you recall what first got you interested in educational programs about woodlands?
   Can you tell me about your first experience?

2. Can you tell me about your experience with the eight-week forest management course?

3. Did you share what you have learned with others?
   If yes, who did you speak with?

4. Was this course useful or not useful in informing your forest management activities? How?

5. Do you think your woodland management has improved as a result of this course? How has it changed or how not?

6. Can you talk about other benefits to the eight-week forest management course aside from the course itself? (e.g., confidence when making forest management decisions, making connections)

7. Why would you go to Purdue Extension for information about your woodlands rather than other sources?

    What is the advantage of going to extension? Disadvantages?

    Do you use other information from Purdue Extension?

    Do you go to sources of information on the internet?

8. Other than the short course, how can Purdue Extension help you get the most out of your woods?

Woodland Activities Scope and Success

1. How do you determine if a stewardship practice (give examples if necessary) is right for you?

2. Have you done any of the following?
   _____ Use the services of a professional forester
   _____ Created a new, or altered an existing, woodland management plan
   _____ Harvested timber
   _____ Controlled invasive plants in your woodlands

Professional Forester

If yes,

Approximately how frequently do you contact a professional forester?

When was the most recent time?

For the most recent contact:

What motivated you to contact him/her?

What type of services did you discuss?

How did the short course help you in making a decision on whether or not to contact a professional forester?

Do you think you would have contacted a forester anyway if you didn't take the course? If so, would it have been as productive? (prompt: terminology, possible practices)

Are you satisfied with the outcome? In what ways? Can you describe how the short course influenced your satisfaction with this?

How would you decide whether your contact with a professional forester was beneficial? What would be your criteria for evaluating benefit?

If no,

Why have you not contacted a professional forester? (Prompt with potential barriers: knowledge, time, no interest in services provided)

How did the short course help you in making a decision on not to contact a professional forester?

Management Plan

If yes,

Approximately when did you revise/create your plan?

What motivated you to create your plan?

Have you ever revised your plan?

What motivated you to do so?

How did the short course help you in making a decision on whether to develop or revise your plan?

Do you think you would have revised/created your plan anyway if you didn't take the course? If so, how might it have been the same or different?

Can you describe how the plan influences your woodland activities (prompt if needed: how often you reference, identify and reach goals)

Are you satisfied with the outcome? How so? Can you describe how the short course influenced this satisfaction?

How would you decide whether your plan was effective? What would be your criteria for evaluating effectiveness?

If no,

Why didn't you revise or implement your woodland management plan? (Prompt with potential barriers: didn't need to; lacked knowledge, time, money; did not fit with other goals)

How did the short course play a role in your decision not to implement or revise your plan?

Harvest Timber

If yes,

Approximately when did you have your most recent harvest? Was this your first harvest?

Can you describe what was done for your most recent harvest? (prompt if needed:, size, type)

What motivated you to harvest trees (followed a plan, advice from a professional forester, need money)? How did the course play a role if any in making the decision to harvest trees? Of how you went about it?

Do you think you would have harvested trees anyway if you didn't take the course? If so, would it have been done the same?

Are you satisfied with the outcome? Can you describe how the short course influenced your satisfaction with your most recent harvest?

How would you decide whether a timber harvest was effective? What would be your criteria for evaluating effectiveness?

If no,

Why have you not implemented a tree harvest? (Prompt with potential barriers: no need at this time, knowledge, time, money, did not fit with other goals)

How did the short course play a role in your decision on not to harvest trees?

Invasive Species Control

If yes,

What invasive species have you attempted to control since taking the course? (e.g., bush honeysuckle, tree-of-heaven, autumn olive, Japanese honeysuckle, garlic mustard)

Which have you done the most work to control?

For the invasive species you have done the most, can you describe what you have done regarding control in your woodland? (prompt if needed: followed a plan, advice from a professional forester, types of plants controlled, scope, frequency, methods)

What motivated you to control _____? How did the course play a role if any in making the decision to do invasive species control? Of how you went about it?

Do you think you would have controlled _____ anyway if you didn't take the course? If so, would it have been done the same?

Are you satisfied with the outcome? Can you describe how the short course influenced your satisfaction with _____ control in your woodlands?

If no,

Why have you not controlled invasive species in your woodlands? (Prompt with potential barriers: don't have them, no need at this time, knowledge, time, money, too hard, did not fit with other goals)

How did the short course play a role in you making a decision on not to control invasive plants?

Summary

Is there anything else you would like to share with me about your woodlands?

APPENDIX C. WOODLAND OWNER CODEBOOK

Code Name	Description
1 Education	
1-1 Motivation	Regarding education about woodlands in general; not just the eight-week course (although it may be the first and only experience for some). How they got involved at first.
1-2 Attitude 8wk	General attitudes towards the course; NOT towards a specific practice or how the course changed or reinforced an attitude towards
1-3 Knowledge and learning 8wk	What did you learn?
1-4 Outcomes 8wk	Anything action or feeling that happened as a result of the course. Not associated with harvesting timber, controlling invasive species, management plans. or professional advisement.
1-4 Outcomes 8wk\1-4-1 Sharing	Ability to share information with other woodland owners outside of class.
1-4-2 Confirmation	Belief that they are doing the right thing or making good decisions
1-4-3 Inform decisions	How the course information was used to inform actions. Again, not the "big 4"
1-4-4 Other	Outcomes not listed otherwise
1-4-5 Where to go for information	Learning about web sites, resources, people who can help them with forest management. E.g., "I-- beginning to get a little idea of what I don't know and then how to come to know things and where to go for that."
1-5 Structure 8wk	Aspects of the course that was beneficial or viewed positively.
1-5-1 Leadership Instructor	Thoughts about the instructors for the course, not just Lenny or Ron but other guest speakers.
1-5-2 Field trips	The value of seeing things demonstrated
1-5-3 Resources	Materials from class (NOT where to go for help and information outside of class)
1-5-4 Social	Talking to people during class, and associated social interactions with classmates
1-5-5 Other	Items not listed in the nodes above
1-6 Barriers 8wk	Anything that made attendance and participation difficult for participants.
1-7 Purdue Extension	Attitudes and beliefs about Purdue Extension; also includes comments about the value of the course being/not being offered through Purdue Extension. Eg. "Although I would have more confidence I guess in the overall approach and the scope of the subject matter coming from Purdue compared with commercial operation."
1-8 Other Courses	References to other classes (NOT 8wk class)
2 Harvest Timber	
2-1 Attitude	Attitudes towards timber harvesting

2-2 Course influence	How did the course influence them harvesting or how they did it.
2-3 Other influences	Other than course, what influenced whether or not to harvest or how to do it. Does NOT contact with forester/logger.
2-3-1 Regeneration	Oak regeneration, include other desirable hardwoods
2-3-2 Salvage downed or dead trees	This includes feelings about not wanting things to go to waste.
2-3-3 Financial	Needed money or income so they harvest trees. Also references to things they do to ensure future financial value of trees that could be harvested. They are not planning a harvest, but recognize others would if they sold the property. Is having the trees stand more of an asset to resale to somebody.
2-3-4 Utilize Material Themselves	Have access to Woodmizer, can use the lumber to build a barn, sell, etc. Also includes firewood.
2-3-5 Resources available	How resources (time, skill, ability to do it) influence timber harvesting
2-3-6 Other	Other influences not listed in the nodes above
2-4 Type and Scope	Describes what they did with their most recent event.
2-5 Barriers	Why landowners did not harvest timber
2-6 other	Other information related to harvesting not in other nodes.
3 Invasive Species control	
3-1 Attitude	Attitude towards invasives species and their control
3-2 Course Influence	Things they have changed because of the course
3-3 Other influences	Factors that contributed to initiate control
3-3-1 Land ethic and stewardship	Control was the "right" thing to do. Feels a responsibility to do it.
3-3-2 Resources available	Includes people, equipment
3-3-3 Aesthetics	Invasives contributed to less beauty or ability to see features of the property.
3-3-4 Financial	Invasives in the woodland will have negative $ consequences; references for regeneration also (e.g., I want to get the invasives out first so that there can be some regeneration in a few places)
3-3-5 Visits Property	Trails, access ability but also they go out into their woods. References to being out in the woods regularly. E.g., "Yeah I see most of the property a few times a year."
3-3-6 Wildlife	Invasives impacted wildlife in a negative way
3-3-7 Awareness BEFORE	Prior to taking the eight-week course
3-3-8 Efficiency	Desire to control before it becomes a larger problem
3-3-9 Other	Other influences not listed in the nodes above
3-4 Type and Scope	Describes details about the type, extent and species they have controlled
3-5 Barriers	Barriers to making it difficult to do invasive control or prevent control all together
3-5-1 Information deficit	Lacked the knowledge on how to do it
3-5-2 Cultural or personal	Didn't fit with what they want to get out of their property
3-5-3 Financial	Cost in terms of hiring people, equipment, materials
3-5-4 Physical ability	Lack the actual physical ability to do the work;

3-5-5 Timing Conflicts	Anything related to time - missed the right time to kill a plant; too busy
3-5-6 Seed Sources	Neighbors are not controlling them, so their problem becomes your problem.
3-5-7 Control	Things out of the direct control of woodland owners
3-5-8 Other	Other barriers not listed in the nodes above
4 Management Plan	
4-1 Attitude	Towards a stewardship plan - include references to management plan, and classified forest
4-2 Course influence	How the course influenced their planning; includes reviewing plan (then confirm that they are ok or change the plan) or developing a new plan.
4-3 Other influences	Things other than the course that motivated them to get a management plan.
4-4 Type and scope	How the course changed how they use their plan, what is in the plan
4-4-1 Invasive species	Invasive control was specifically outlined in their management plan
4-4-2 TSI	Timber stand improvement done as a result of the plan
4-4-3 Timber harvest	Timber harvesting done as a result of the plan
4-4-4 Other	Other practices the plan dictated not listed in the nodes above
4-5 Barriers	Factors that limit use or eliminate use of a plan
4-7-1 Information deficit	They don't have the knowledge to interpret the plan
4-7-2 Cultural or personal	They don’t' think they will use the plan or don't use one they already have
4-7-3 Financial	Costs attributed to developing or maintaining a plan
4-7-4 Other	Other barriers not listed in the nodes above
4-6 Changes to the plan	Any changes they have made to the content of the plan itself
4-7 Use of plan	Extent they use it, look at it, reference it. Includes changes as to HOW they use the plan. Does not include changes to the content of the plan.
5 Professional Advisor	
5-1 Attitude	Attitudes towards advisors and their use; could be related to trust, past experience, perceptions. A generic attitude and not related to them coming on the land and influencing.
5-2 Course influence	Ways the course has changed how they interact with an advisor - frequency, content, the types of things discussed
5-3 Other influences	Factors that contribute to their decision on consulting with a professional advisor or hiring a professional advisor
5-3-1 Previous contact	BEFORE the class, they had already worked with a professional advisor
5-3-2 Trust of advisor	The level of trust of a specific professional advisor or lack of trust in a specific advisor.
5-3-3 Financial	Using a professional advisor will save or earn them more money
5-3-4 Part of other program	Classified woodlands or other program that meeting with a professional advisor is a part of it.

5-3-5 Other	Other influences not listed in the nodes above
5-4 Type and Scope	Things they have discussed with an advisor
5-4-1 Knowledge about woods	General information about their woods. Includes regular inspections or walk through the woods.
5-4-2 Planning	Contacted a professional advisor to develop or modify a management plan. Also general planning not associated with a written plan.
5-4-3 Timber harvest	The advisor facilitated a timber harvest (either recommend it, marked, sold, etc.).
5-4-4 Tree Planting	Advisor facilitated tree planting on their property (recommended it, or managed/conducted it)
5-4-5 Wildlife habitat	Advisor provided information about wildlife habitat or did practices to enhance wildlife habitat.
5-4-6 Invasive species	Advisor provided information about invasive species, made recommendations, and/or did invasive species control. This does include invasive species control as part of preparation for other management (e.g., timber harvest). Does not include grape vine control (which is TSI).
5-4-7 Succession Planning	Advisor discussed how to transfer the woods/land to heirs. Would include discussion about trusts, conservation easements.
5-4-8 Other	Other practices/behaviors discussed with advisor not listed in the nodes above
5-5 Barriers	Factors that limit or eliminate consultation with a professional advisor
5-5-1 Information deficit	Lack knowledge about what services the professional advisor offers, or how to contact them
5-5-2 Cultural or personal	Personal or family reasons why they do not use a professional advisor, examples may include prefer to do themselves, do things as a family activity
5-5-3 Financial	Monetary reasons for not using a professional advisor
5-5-4 Other	Other barriers not listed in the nodes above
6 Woodlands	
6-1 Information Sources	Where they get information about woodlands
6-1-1 Other woodland owners	Get information from other owners, Includes if they know of others in their area who manage woodlands. Information may or may not lead to actions. Code 6-5-4 if information inspired or directly led to management.
6-1-2 Family	Aware of relatives who own/manage woods. Gets information from relatives. Information may or may not lead to actions. Code 6-5-4 if information inspired or directly led to management.
6-2-3 Other	Other information sources not listed in the nodes above. Information may or may not lead to actions. Code 6-5-4 if information inspired or directly led to management.
6-2 Woodland Values and Enjoyment	Things they value about woodlands or the reasons why they own woodlands.

6-2-1 Family	Associations of family with their woodlands. Includes intergenerational transfer or doing things with family on the property or discussions with family about the woods.
6-2-2 Consumptive and Utilitarian	Uses they get from woodlands including timber and non-timber products
6-2-3 Non-Consumptive Use and Recreation	Recreation that includes wildlife/bird viewing, hiking, walking. Includes things that facilitate those including enhancing wildlife habitat, trails
6-2-4 Nature Preservation	The value of woodlands as nature; including "healthy" and "diverse" These are separate from the act of walking and viewing nature and wildlife. They value woods for what is in them and the values that woodlands provide all.
6-2-5 Get away	Woodlands are their time to get away from work, stress, or to unplug.
6-2-6 Other	Other values of woodlands not listed in the nodes above
6-3 Woodland Health	Woodland health is a term people use. This section relates to how they determine what healthy woodlands are.
6-3-1 Wildlife	The presence any wildlife species; references to abundance or diversity specific to wildlife
6-3-2 Diversity	Relationship between more animal and plant species and health; could also include other aspects (structure, age of stands)
6-3-3 Invasives	General relationship between invasives and woodland health.
6-3-4 Aesthetics	How the woods looks as it relates to poor woodland health
6-3-5 Harvesting	Timber harvesting and related activities; includes references to regeneration, the next generation of trees.
6-3-6 Disease	Discussion on anything related to disease (or lack thereof) or pests; includes references to dying trees, dead trees.
6-3-7 Other	Other factors identified with healthy woods not listed in the nodes above
6-4 Unhealthy	Anything they attribute to what unhealthy woods look like. This is their perception.
6-5 Woodland management	Outside of the four major practices, what things come to mind about woodland management in general. Explores what is the construct of "management". Stewardship practices are a type of management.
6-5-1 Attitudes	Thoughts on importance of managing. Consequences of not managing woodlands.
6-5-2 Definition	How do they define woodland management and activities they associate with management
6-5-3 Motivation to manage	Things that come to mind or are a part of woodland management construct. Includes attitudes about management
6-5-3-1 Natural Resources	Motivation to manage from anything related to benefit natural resources, biological health. Examples include wildlife, diversity (plant and/or animal), invasive species control, erosion control, clean air or water.

6-5-3-2 People	Motivation to manage related to benefiting themselves, family or friends. Examples include enjoyment of managing (or the results of managing), doing things with family or friends (either the management activities themselves or their results). Also includes related to passing on their woods to family or others.
6-5-3-3 Norm	Motivation to manage due to desire or feeling to take care of the woods, management is the right thing, management activities are viewed positively by others. Also includes doing management based on observations of what others do or have done.
6-5-3-4 Consumptive & Utilitarian	Motivation to manage is based on gains including financial gains, or making use of products they collect. These include timber, firewood, non-timber products (mushrooms, ramps, and berries), hunting, and fishing.
6-5-3-5 Other	Other motivations to manage not listed in the nodes above
6-5-4 Facilitation	Things that help to facilitate management activities in some fashion; See examples and demonstrations (even though they may not do the exact same thing. E.g., saw someone plant trees, it was easy so they decided to do it. For Harvest Timber, Invasive Species Control, Management Plan, or Professional Advisor, code in their respective "other influences".
6-5-5 Barriers	Factors that inhibit management activities, their scope. Work is too hard, not enough resources (people, money, equipment)
6-5-6 Uncontrollable	Management doesn't control for all things

APPENDIX D. INDIANA FOREST STEWARDSHIP COORDINATING COMMITTEE INTERVIEW GUIDE

FSCC Interview Guide

Thank you for talking with me today and participating in our research on stakeholder input and the Indiana Forest Stewardship Coordinating Committee, which I'll simply refer to as committee. In this interview, I will ask you several questions regarding your experiences on the committee. We will use your responses to achieve a clearer picture of collaborative decision-making process and the role it has in shaping the Indiana statewide forest strategy.

Your participation in this interview is completely voluntary. Although findings will be shared in public reports and presentations, your individual responses will be kept completely confidential—meaning your name will not be linked in any way to comments you provide. You may skip any questions you do not wish to answer and you may stop the interview at any time. The interview should take 45 to 60 minutes.

May I record this interview for transcription purposes so that we accurately capture your comments?

Background information

1. Could you describe how you first became involved the Forest Stewardship Coordinating Committee?

2. Please describe your role on the committee.

3. Why do you come?

4. What do you think is the value of stakeholder engagement?

Operation

1. How are the rules of the committee operations communicated to you? Objectives? Tasks? Working groups?

2. How are your roles and responsibilities defined?

3. How are you informed about progress towards meeting goals and objectives?

4. What type of input have you had about how the committee functions?

Prompts: Design/content of meetings? How to deal with difficult situations? Rules for making decisions?

5. What do you think about the information presented at meetings? (Prompts: appropriate, level of merit, sincerity, source)
    a. Can you describe a good example?
    b. Can you describe a poor example?

Collaborative decision making

1. To what extent are you allowed to express your opinions and views?
    a. To what extent are all members allowed to express their views? What do you think determines this?

2. How are **you** able to ask questions about points of view of other members? What about information provided to the committee?
    a. To what extent are all members able to do this?
    b. Prompt stakeholder types (NGOs, Government agency, DoF as the decision maker)

3. To what extent are committee decisions based on your input?
    a. How do you know?

4. To what extent are decisions of leadership based on your input?

5. How do you think other committee members value your opinions?
    a. How do you know?

6. How does the committee approach discussions on difficult or contentious issues?

7. Authentic dialogue among members
    a. How do you feel about other members' comments that differ from your views? Prompt stakeholder types (NGOs, Government agency, DoF as the decision maker)
    b. Can you provide an example that stands out?
    c. How do you feel about the merit of other members' comments?

8. To what extent do all relevant stakeholders participate in committee activities? If not, who should be?

Outcomes

1. How does your involvement on the committee impact you (and your organization)?
    a. Leadership decisions?
    b. Enable you to more effectively plan program objectives
    c. Work together with other stakeholders?

2. How has your involvement on the committee contributed to you building new relationships?
    a. Are these extended beyond the committee meetings?

3. How has your involvement with the committee changed the way you or your organization approaches promoting forestland conservation and stewardship?

4. To what extent has the committee process brought about a feeling of reciprocal interests among members (which might have brought about change in strategies or goals etc.)?

5. How has the work of the committee made a difference for Indiana forests? (Prompt: Implementation of the Statewide Forest Strategy, meaningful progress on the action steps)

6. To what extent have your ideas been incorporated into the Indiana Statewide Forest Strategy?

    a. What about its implementation?

7. Is there anything you would like to see changed or improved on the committee?

8. I appreciate your time with me today. Is there anything else about your experience with the Forest Stewardship Coordinating Committee that you would like to share that we haven't discussed?

FSSC Interview Questionnaire [1]

1. Gender _____

2. Age _____

3. Organization you represent on FSSC _____

4. How many years have you been involved with the FSSC? _____ years

5. Have you read the Indiana Statewide Forest Strategy?

[1] This was provided in hard copy for in-person interviews. The interviewer asked these questions at the conclusion of phone interviews.

6. Approximately how often do you reference the plan?

◯ Never ◯ Less than once a year

◯ 1 – 3 times per year ◯ >3 times per year

APPENDIX E. FOREST STEWARDSHIP COORDINATING COMMITTEE INTERVIEW CODEBOOK

Code Name	Description
1 Background	
1.1 Start	How they first became involved in the committee
1.2 Role	Their role on the committee (their view)
1.3 Motivation	Why they come
1.4 Belief	Beliefs regarding forests and their management; includes what works and doesn't, good/bad
1.5 Stakeholder engagement	Their view of the value of stakeholder engagement
1.6 FSSC definition	How they define what the committee is or isn't
2 Operation	
2.1 Communication	Things related to communication from the leadership to members/committee as a whole.
2.1.1 Organization	How the rules of the committee operations communicated to you
2.2 Roles	How YOUR roles are communicated
2.3 Progress	How are you informed about progress towards meeting goals and objectives
2.1.4 Information	What information is communicated to the group, or among group members
2.2 Member input	Type of input have you had about how the committee functions
2.3 Information evaluation	Evaluation of information presented. The extent that the information is valuable and why that is so. For example, is the information being used to achieve a goal or end, does it improve forest management, does it lead to a desirable change?
3 Collaborative Decisions	
3.1 Dialogue	Communication among members and leadership. NOT related to the how the group functions, rules, etc. (Nodes 2). How views are expressed.
3.1.1 Opinion	Thoughts related to extent that people freely express opinions. How people evaluate this. What determines this this among group members? For example, certain background, organization, demographics may be viewed as more acceptable or more comfortable to speak.
3.1.2 Merit	Interpretation of the merit of information communicated; includes truthfulness and authenticity.
3.1.3 Learning	Information communicated contributes to learning and new knowledge
3.1.4 Diverse views	How members evaluate the views of others including your perceptions. NOT one's ability to express themselves, but the degree to which these views are respected and considered.

3.1.5 Issues	The level Issues/topics discussed are appropriate; includes avoidance of topics
3.1.6 Leadership	How leadership has (or avoids) dialogue with committee members. How they communicate with members during meetings about decisions PROVIDE EXAMPLES.
3.1.7 Participation	This is the process OR is everything describe all the other components. Does this code provide something unique and of value?
3.1.8 Stakeholder participation	The extent that diverse stakeholders are at the meeting and included in dialogue.
3.1.9 Other	Not included in other nodes in this category
3.1.10 Content	Topical focus of discussion/presentations in the group meetings.
3.2 Decision process	How committee decisions are formed.
4 Outcomes	
4.1 Benefits Internal	Involvement on the committee impact you (and your organization). What is the value to you (and your organization) of going to the meetings?
4.1.1 Group function	Impacts to how you go about your work. Includes goals, planning.
4.1.2 New Relationships	Involvement on the committee contributed to new relationships (both inside and outside of committee meetings); includes descriptions of networking, expansion of their networks or partnerships.
4.1.3 Forest Conservation	Involvement with the committee changed the way you or your organization approaches promoting forestland conservation and stewardship
4.2 Impacts External	Impacts and values outside of themselves or the group they represent.
4.2.1 Forests	Impacts to Indiana's forests. These include public or private.
4.2.2 State Plan	Implementation of the Statewide Forest Strategy, meaningful progress on the action steps
4.3 Committee Function	Things they would like changed on the committee in the future.
4.4 Barriers	Things that prevent impacts/improvements from happening.