

Information transfer during the timber transaction period in West Virginia, USA.

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Abstract

Timber harvesting has long-lasting impacts on the productivity and aesthetics of private forests. In many instances, landowners who possess high quality timber are at a competitive disadvantage during timber transactions—the time between a decision by the landowner to sell timber and the completion of the timber harvesting operation—as they may lack understanding of markets, the value of their trees, or the amount of wood that is standing in their woodlots. In order to improve forestry outreach efforts to private forest owners, we surveyed 3166 landowners who experienced a timber transaction between 2000 and 2001 to assess the amount of silvicultural information conveyed during these transactions. We found that only 21% of the transactions were conducted on properties that contained a forest management plan. On 52% of the transactions, wood volume was estimated by either the timber purchaser (28%), the logger (12%), or not inventoried at all (12%). Satisfaction ratings for information provided to the landowner during the transaction indicated that little information was conveyed on topics like timber harvesting methods, regeneration, deer and wildlife, and undesirable vegetation. Satisfaction of respondents with the condition of their woodlands following the timber transaction was related to having a timber management objective, seeded skid roads, and satisfactory information on timber harvest methods and future timber values.

Introduction

Over 90% of the forestland in West Virginia, USA is privately owned. During the past decade, dramatic increases in the value of the broadleaved trees that dominate the landscape have led to increased timber harvesting in the state, especially on these private lands. Timber harvesting has long-lasting impacts on the productivity and aesthetics of private forests. In many instances, landowners who possess high quality timber on their properties are at a competitive disadvantage during timber transactions as they may lack understanding of markets, the value of their trees, or the amount of wood that is standing in their woodlots. Timber transactions—the time between a decision by the landowner to sell timber and the completion of the timber harvesting operation—are complex processes involving interactions of multiple participants: landowners, foresters, lawyers, loggers, purchasing agents, and the West Virginia Division of Forestry (WVDOF).

The forest products industry generates the local and regional demand for timber and is one of the most important and fastest growing industries in West Virginia. In the 1990's, wood products industries generated over \$1 billion in manufacturing output (U.S. Census Bureau 1997), representing 6 percent of the total manufacturing output in West Virginia; this 6 percent is exclusive of logging and forest management activities. Several large mills have been established in the state during this period as well, adding to the demand for timber from private forests. In addition, several new transportation corridors that will facilitate the transport of wood to mills have been opened, or are in the process of opening; however, these may also increase “exurbanization” and the “greening” of rural communities which can lead to changes in conservation perceptions in these communities (Egan and Luloff 2000, Johnson and Beale 1998, Jones et al. 2003) and potentially influence timber transactions in the future.

There are often disagreements even among professional foresters on the best ways to manage the forest resource that supports this growing industry. This is understandable when foresters are confronted with a large number of species, each with different silvical characteristics and growing on a wide range of sites. Despite likely differences of opinions concerning forest management, a recent survey of WVDOF Service Foresters identified harvesting with little regard for desired future conditions and the overuse of diameter-limit harvesting as the second and fourth most important issues facing the forestry sector in West Virginia (Westfall 2001, McGill et al. 2004). Indeed, timber harvesting is frequently carried out guided by diameter-limit cutting, where trees greater

than a designated diameter are harvested (Fajvan et. al 1998). This harvesting practice often leaves only poorly formed or previously suppressed trees as residuals. But timber harvesting is itself a complex subject with landowners, foresters, and loggers influenced by monetary resources, available markets, and personal objectives (Keefer et al 2002).

Loggers harvesting timber in West Virginia are required to use Best Management Practices (BMPs) to control soil erosion and sedimentation during and after harvesting. They are also required to be licensed to conduct logging operations and to file a harvesting notification application with the WVDOF. However, there are no forest practice laws in West Virginia that regulate silvicultural activities except for a set of recommended forest practice standards developed in 1972 that describe various silviculture options (Burke et al. 1972). There is increasing concern among foresters that the partial cutting widely practiced in the Appalachians will not sustain a desirable mix of high value intolerant species in Appalachian forests. Long term research studies on the Fernow Experimental Forest (near Parsons, West Virginia) indicate that high value intolerant species originating from the heavy cutting at the turn of the century are often being replaced with more tolerant species under partial cutting regimes which often have lower wildlife and timber values (McGill and Schuler 2003; Schuler 2004).

When landowner objectives and the confounding effects of deer and other regeneration issues are injected into the mix, it makes management even more complex. Nevertheless it is imperative that the timber resource be properly managed to sustain the forest industry and the multitude of values produced on managed forestland.

The dramatic increases in stumpage prices in conjunction with the cessation of most timber sales on public land, has generated intense competition for hardwood sawtimber size trees on private woodlots. There is concern among some natural resources professionals that "silviculture issues" do not receive the attention they merit in this atmosphere. Decisions made during timber sale transactions can affect future forest values for several generations.

There is a wide disparity in stumpage values among the various species indigenous to the Appalachian region. During the past 10 years, prices for veneer and sawlog-sized trees have continued in an upward spiral. Only individuals actively engaged in marketing wood products can keep abreast of changing market values. Forestland owners of diverse backgrounds are generally open to a wide variety of forestry topics and educational delivery methods offered through extension and outreach organizations (Magill et al. 2004), but most of West Virginia's 270,000 private forestland owners are likely to be at a disadvantaged negotiating position when entering into the timber market with prospective sales of their timber. Not only do these landowners face marketing challenges during timber transactions, but they also risk compromising the future productivity of their timber stands following harvesting.

To support private forestland owners in their forest management efforts, we carried out an investigation of timber sale transactions in order to further our understanding of this crucial period in the management of forest stands. Our underlying assumption is that forestland owners provided with information on sustainable forest management will act to maintain or improve forest resources in their possession. Specifically our objective in this study was to evaluate the amount and quality of silvicultural information conveyed during the timber transaction period.

Methods

The survey instrument and process

We used a mailed questionnaire to investigate West Virginia timber transactions and the amount of silviculture information conveyed during this period. Questions in the survey document can be classified into four major areas: property and management objectives, timber harvest attributes, technical assistance, and information conveyed during the timber transaction period.

Prior to beginning a timber harvesting operation, notification forms must be submitted to the WVDOF. Our mailing list for this survey was taken from the 2000-2001 timber harvesting notification form database and included 3166 addresses. The questionnaire process was implemented following methods proposed by Dillman (2000):

1. Initial introduction postcard
2. Initial mailing of questionnaire

3. Reminder postcard
4. Second questionnaire mailing.

The questionnaire mailings consisted of a cover letter explaining the project, a questionnaire, and a stamped return envelope. All envelopes, including return envelopes were coded to allow us to both assure that duplicate mailings were not made to respondents and to link responses to other data present in the notification list. These mailings were made approximately at two-week intervals beginning in late January 2003. Within days of mailing either postcards or questionnaire packets, many came back announcing insufficient addresses or other reasons why the packet could not be delivered. On some of these it was possible to correct the address and send it again; at times this was successful, but often not.

Data analysis

Summary statistics of survey responses were generated along with an evaluation of variables related to satisfaction levels following the timber transaction. We used logistic regression models (Hosmer and Lemeshow 2000) to assess the relationship between a satisfaction ranking with the condition of the respondents' property after the harvest (Satisfied/ Dissatisfied) and 23 variables that describe the respondents ownership objectives, timber harvest attributes, technical assistance, and satisfaction with information conveyed to them in their recent timber transactions. Regression modeling was conducted using SAS (Allison 1999). We used the STEPWISE option in PROC LOGISTIC for generating a multinomial model. For this variable selection procedure we used an $\alpha=0.05$ cutoff to select significant variables.

Results

The 1297 questionnaires returned by landowners represent 41% of the initial number ($n=3166$) of mailing addresses. The overall survey response rate, however, is 46% (not including bad addresses, deceased, and refused at post office).

Property and management objectives

The majority (79%) of private forest owners selling timber over the period of our study did not have written management plans for their forested properties. Despite the scarcity of written plans, forestland owners had a wide array of objectives for their properties. Most landowners had multiple objectives. Timber management ranked highest with 416 (50%) of the total 831 responses for this question followed closely by the desire to improve habitat for wildlife species (45%). Forest recreation and investment were objectives for nearly one out of six forestland owners. Only 6% of our respondents indicated they did not have management objectives.

The mailing list we used for the survey contained a wide variety of property owners. This is reflected in the ownership size reported by the respondents. The 247 ha average property size is skewed by a few large properties; woodland size of respondents ranged from 0.4 to 60,705 ha. Median woodland size was 32 ha with 75% of all properties being less than 81 ha.

Timber harvest attributes

From many angles, the nature of timber transactions is diverse. The process of harvesting timber on private property begins with a decision to sell a particular quantity of timber, followed by the development of relationships among various participants in the timber transaction, and finally ends with the physical removal of timber and completion of the transaction. This section of questions was aimed at identifying personal motivations or objectives for harvesting timber, and physical aspects of the timber transaction process.

With respect to the timber harvests conducted on respondents' property, income was the most frequently cited reason for harvesting timber. Of the 386 returned questionnaires listing a single reason, 143 (37%) indicated they had harvested their timber to generate income. The second most frequently occurring reason for harvesting timber for those listing a single reason was that someone had asked (19%).

Others answered that they had sold timber because someone had advised them that it was either "mature" or needed to be thinned, or it was recommended in their management plan. Few sales resulted from insect, storm, or fire damage. These results will likely vary from sales conducted in 2003 and later due to the catastrophic ice storm that struck West Virginia in February 2003, severely damaging 124,243 ha.

Harvesting was mostly done on a diameter limit basis with 554 respondents (62%) indicating this harvesting strategy was used during the transaction period. The second most frequently cited method used to harvest timber was the “selection” method. In the questionnaire, the descriptive phrase we included for the selection harvesting method was “cut to leave good quality trees of all sizes”. Most respondents indicated only one type of harvest, however 192 checked two or more types and 64 checked three or more.

Timber sales without marked trees were more frequent than sales with marked trees. This difference, however, was not exceptionally large, with unmarked sales exceeding marked sales by ten percentage points or a total of 88 sales.

A majority (53%) of the timber sales carried out on respondents’ properties during our survey period either did not eliminate cull trees or the owners were not sure if these trees were eliminated. Nearly three fourths of the respondents in our survey stated that skid roads were seeded with grass or clover species after timber harvesting to help minimize soil erosion. Despite the fact that our survey was designed to target individual transactions that had occurred for two years, beginning with notification forms three years old, six percent of the transactions were still in progress. Most respondents with completed sales were satisfied with the on-the-ground outcomes of their transactions; however, one out of four were either very dissatisfied or somewhat dissatisfied with their respective outcomes.

Timber sale contracts were used in 82 percent of the timber transactions in this survey. Despite this large majority of timber sale contracts present, nearly one in five sales were carried out without a contract. Most timber transactions involved lump sum type sales (Table 1). Moreover, most respondents (91%) listed only one type of marketing method. For these listing a single method, however, lump sum sales and sales on percentages were nearly equal. A small percentage (<5%) indicated that they were unaware of the way their timber was sold.

Table 1. Types of marketing methods used to sell timber. Total reflects the number of responses excluding missing values (434 missing).

Number of methods used	Number of responses	-----Marketing Method-----					Shares or percentages	Total
		Not sure	Lump Sum	Negotiated	Closed bid			
0	434	0	0	0	0	0		
1	787	36	252	125	114	260	787	
2	69	2	56	30	30	20	138	
3	7	0	5	5	6	5	21	
Total	863	38	313	160	150	285		

Mean area harvested by the respondents was 41 ha. A few large sales, or perhaps annual totals from large holdings, disproportionately inflate the mean. Only 15 percent of the timber transactions were greater than 130 ha. The median area harvested was 16 has. Three out of four of the timber transactions in our survey were less than 36 ha.

Technical assistance

Technical assistance is one of three main categories of forestland owner assistance activities, the others being financial assistance and educational programs. Recently in West Virginia, research has shown that this is the mechanism most preferred by landowners for receiving assistance. Technical assistance usually comes in the form of a visit, one-on-one, to the landowner’s property by a natural resources professional. This section contains responses to questions that aim at identifying the type of professionals providing these services relative to timber transactions.

Almost three out of five timber sales in West Virginia during the sampling period of 2000-2001 were conducted under the guidance of a professional forester. These foresters were split nearly equally between industry foresters (41%) and private consultants (38%), with WVDOF service foresters providing 21 percent of the technical assistance.

Despite the fact that respondents reported that 60 percent of the timber sales were conducted using a professional forester (above), only 39 percent of the people who indicated a single agent estimated their wood volume selected a forester as the one who estimated the amount of timber that was being sold. In 52% of the transactions, wood volume was estimated by either the timber purchaser (28%), the logger (12%), or not inventoried at all (12%). Foresters selected trees to cut on 38% of 642 transactions. On greater than one in four sales, landowners themselves were the agents that designated which trees would be cut.

In regard to timber contract advice and assistance, foresters and timber purchasers were nearly equal with respondents listing a single agent as their source for this technical service with timber contracts. Attorneys assisted with only 3 percent of the contracts written.

Information conveyed to landowners during the timber transaction period

To quantify silviculture information that has been conveyed to private forest owners during a timber transaction period, we asked questions about respondents' level of satisfaction or their assessment rating of the information they received during this significant process. In most of the questions, there were majorities of the respondents that did not receive information on a particular topic (Table 2). West Virginia Best Management Practices, however, were provided in the majority of timber transactions (57%; not listed in Table 2). Particularly elevated are the number of respondents who claim that they received no information on unwanted plant species and deer impact topics. Among respondents who did indicate they did not receive information on one or more of the forest management topics listed in Table 2, the rating and satisfaction levels were skewed upward into the very satisfied and excellent categories; that is, there few respondents who were either dissatisfied or somewhat dissatisfied with information they did receive.

Table 2. Number (n) and percentages of respondents answering questions regarding information transfer of various topics during the timber transaction process.

Topics	n	Did not	Very	Somewhat	Somewhat	Very
		receive	dissatisfied	dissatisfied	satisfied	satisfied
-----Percent-----						
Timber harvest methods	896	43	4	9	28	15
Unwanted plant species	886	70	2	2	9	16
Post-harvest regeneration	890	57	3	7	24	10
Future timber values	893	48	2	4	19	27
Effects on wildlife	892	55	3	10	17	15
Post-harvest deer impact	893	71	3	7	10	8
<i>Mean</i>	892	57	3	7	18	15

Variables related to post-harvest satisfaction

Four of the 23 variables describing the respondents' ownership objectives, timber harvest attributes, technical assistance, and satisfaction with information conveyed to them in their recent timber transactions were statistically related to their level of post-harvest satisfaction with the condition of their woodlands. These included 1) whether the skid roads were seeded following harvest, 2) whether timber was a specified management objective, 3) satisfaction level with information provided on harvesting methods, and 4) satisfaction level with information provided on future timber values (Table 3).

Respondents who had timber transactions in which roads had been reseeded or claimed to have timber as a management objective were 2.49 and 1.62 times more likely, respectively, to have indicated satisfaction with the on-the-ground results of their timber harvest (Table 3). Those respondents who were satisfied with information on different timber harvesting methods were 2.5 times more likely to be satisfied with the outcome of timber harvesting than those not provided with similar information. Similarly, respondents satisfied with information provided on future timber values were 2.6 times more likely to be satisfied with timbering outcomes. The regression model indicates that respondents who were dissatisfied with information on future timber values were less likely to be satisfied with timbering outcomes than those who received no information on the topic (OR=0.38; p<0.001).

Discussion

The timber transaction process is played out in crucial period that impacts heavily on the future productivity of forest stands associated with the transaction. Landowner decisions made during this period will affect the economic and biological productivity of the forest stands for decades into the future. As shown from this survey of landowners conducting timber transactions between 2000 and 2001, an average of 57 percent of the respondents who had recently completed a timber transaction did not receive information on sustainable forestry topics. An additional 10 percent felt dissatisfied with information provided to them during the transaction period.

While we do not substantiate whether satisfaction with information provided on forest management will lead to sustained forest productivity, we have found that this is related to post-harvest satisfaction with the appearance and condition of harvested properties. In a study conducted in Pennsylvania, a state that borders West Virginia to the north, landowner knowledge of forest management topics was shown to be related to on-the-ground impacts of timber harvesting (Egan and Jones 1993). Hence, we feel that the provision of information on forest management during the transaction period will lead to better timber harvesting outcomes.

Table 3. Results of stepwise regression of independent variables on the binary response—satisfaction with condition of woodland after the harvest (satisfied, dissatisfied). Intercept statistics for the model were present in the analysis but are not shown. Levels column describes the independent variables; the last listed level for a particular variable effect is the “reference” category. Odds ratios (OR) are shown with their respective 95% confidence intervals (CI). Prob>Chisq is the probability level for the overall type III analysis of effects for the slope (beta) term in the univariate model based on the Wald Chi-square test statistic.

^a Y=roads reseeded or presence of timber objective, N=roads not seeded or absence of timber objective, S= satisfied, NI=no information provided on topic, D=dissatisfied.

Variable effect	Levels	<u>OR</u>	95% CI	p>Chisq	
Reseeded roads	Y/N ^a	2.49	(1.7-3.6)	<0.001	The relationship between forest management information, post-harvest condition of roads, and timber objectives and post-harvest
Timber objective	Y/N	1.62	(1.1-2.3)	0.011	
Satisfaction level with info on timber harvest methods	S v. NI	2.53	(1.6-4.1)	<0.001	
	D v. NI	0.73	(0.4-1.2)	0.001	
Satisfaction level with info on future timber values	S v. NI	2.59	(1.6-4.1)	<0.001	
	D v. NI	0.38	(0.2-0.8)	<0.001	

property satisfaction level, however, may be confounded with financial aspects of the transaction. As McGill et al. (2004) have shown, West Virginia forest owners were 38 times more likely to express satisfaction with the post-harvest condition of their properties if they had been satisfied with the revenue generated from their timber sales. Hence, some satisfaction—and dissatisfaction—expressed in this survey may be—at least in part—a function of the financial portion of the transaction, an area that we did not take into account in this study.

The biggest challenge in supporting sustainable forestry by promoting efforts of private forestland owners may be found within the timber transaction process. Currently, loggers in West Virginia must file a timbering notification form. One of the questions on the form is “Was the landowner provided with information on best management practices?” This question, however, is answered by the logger—the purchaser of the timber—and irrespective of the quality of best management practice information provided to the landowner, the logging contract at the notification form stage in the timbering process is already in place.

It seems a certainty that timing of information transfer during the timber transaction period is important in promoting future forest productivity. For example, if information regarding methods to assure ample natural regeneration (the primary regeneration mode in Appalachian hardwood forests) and conditions that support the development of that regeneration are provided following the signing of a timbering contract, the landowner may have few options in changing how the logger goes about removing timber. However, information conveyed to

the landowner prior to signing the contract would allow the landowner and associated participants in the timber transaction to consider certain harvesting specifications that promote regeneration.

As forestry extension and outreach organizations continue to develop communication strategies to convey sustainable forest management information to forestland owners, it is important to understand the variation in these transactions to avoid program development pitfalls (Jones et al. 1995). Clearly, all timber transactions are not created equally. It is the obligation of forestry extension and outreach organizations to move forward to assure that forestland owners are prepared to engage in the timber transaction process before it begins.

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