

IMPACT OF PROFESSIONAL FORESTERS ON TIMBER HARVESTS ON WEST VIRGINIA NONINDUSTRIAL PRIVATE FORESTS

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Abstract.—Timber harvests conducted on 90 nonindustrial private forest properties in West Virginia were investigated to determine the effects that professional foresters have on harvest and residual stand attributes. Harvests were classified based on the type of forester involved: (1) consulting/state service foresters representing landowners, (2) industry foresters representing forest products firms, and (3) no involvement by a professional forester.

Consulting foresters removed less volume and value from the stand, caused a smaller decrease in average tree diameter, and displayed a lower preference for harvesting the more valuable species. Residual stands resulting from consultant harvests were more likely to be fully stocked, contain higher proportions of acceptable growing stock, and suffer less logging damage. There were few differences between harvests conducted by industry foresters and nonforesters.

Harvests were given overall evaluations based on residual stand attributes. Nearly one-fourth of the consultant harvests received a “good” evaluation, compared to less than 10 percent of industry forester harvests and no harvests when a forester was not involved. Less than one-fourth of the consultant harvests received a “poor” evaluation, compared to one-half to two-thirds for the other two groups.

INTRODUCTION

Approximately 60 percent (7.4 million acres) of West Virginia’s forest land is classified as nonindustrial private forest (NIPF) land, commonly referred to as “family forests” (Widmann et al. 2010). Timber production is not a primary ownership objective for many West Virginia timberland owners (Fraser and Magill 2000, Joshi 2007), a sentiment echoed in other eastern states (Hodge and Southard 1992, Olson 1979). In the most recent survey of West Virginia NIPF landowners, only 10 percent listed timber production as “very important” or “important” reasons for owning forest land (Widmann et al. 2010). However, these landowners owned nearly one-third of the state’s forests. In addition, a survey conducted in 1999-2000 indicated that 44 percent of the state’s NIPF landowners had harvested timber from their land at some time (Fraser and Magill 2000).

Because NIPF landowners control such a large portion of the resource, their management, or lack thereof, of their land is a factor critical to the future timber supply, the provision and enhancement of nontimber forest resources, and the protection of soil and water quality. Nearly half of the NIPF landowners in West Virginia who harvested timber during 2000-2001 did so without the assistance of a professional forester (McGill et al. 2006). Such results support the belief among the forestry community that poor forest practices are used on a great many acres in the state. Foresters have long argued that involvement by a professional forester in the timber sale process can benefit landowners. Foresters can use their knowledge of silviculture and other facets of the profession to best meet

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landowners' objectives for their forests and are more likely to leave a "better" residual stand after harvesting that will yield increased future benefits, financial and otherwise, for the landowner.

Despite the apparent validity of these widely held views, there is scant evidence to support these claims in the Appalachian region. Rather grim assessments of harvesting practices among NIPF landowners in New York, Pennsylvania, and West Virginia indicate that many landowners cut their largest, most valuable trees and leave the less valuable trees after harvest, regardless of whether a forester is involved with the harvest (Fajvan et al. 1998; Nyland 1992, 2001; Pell 1998). More recently, a survey of NIPF landowners who harvested timber in West Virginia found that 62 percent of the harvests were conducted by using a diameter-limit cut, even though professional foresters were involved with 60 percent of the harvests (McGill et al. 2006). This type of practice—harvesting without regard to silviculture—is exactly the type of practice that is supposedly avoided when professional foresters are consulted.

An important factor not addressed in previous studies of forester involvement in harvesting is whether or not the forester represents the landowner (i.e., a private consulting forester or state service forester) or represents the buyer (i.e., a procurement or management forester employed by a forest products firm). The relationship between the forester and landowner could significantly influence how the forester conducts the harvest. Because the interests of consulting/service foresters are more closely aligned with those of the landowner, it stands to reason that a consulting/service forester might conduct the sale and impact the residual stand in a much different manner from a forester working for the purchaser, whose interests may run contrary to the landowner's. However, there have been no studies in the Appalachian hardwood region to test this hypothesis.

STUDY AREA

This study was conducted on 90 forested sites throughout West Virginia. All sites were owned by NIPF landowners and had been subjected to partial timber harvesting between January 2005 and June 2007.

METHODS

This project was designed to compare partial timber harvests conducted by three groups: (1) consulting/state service foresters, (2) industry/procurement foresters, and (3) nonforesters. Post-harvest inventories of these properties (30 for each forester type) were conducted to measure attributes of the residual trees (species, size, value, quality, amount of logging damage); estimate the species, volume, and value of timber harvested; and assess the characteristics of the harvest (percentage of basal area, volume and value removed, change in quadratic mean diameter [QMD] and stocking level).

This project was restricted to evaluating the impact professional foresters have on partial timber harvests. Because virtually all merchantable timber is removed during a clearcut harvest, it is unlikely foresters would exert much influence on either the trees that are harvested or the residual stand composition. In addition, our analysis of timber harvest notifications provided by the West Virginia Division of Forestry (WVDOP) indicates that more than 90 percent of timber harvests in the state are some form of partial harvest, so foresters' impact on these types of harvests is most relevant.

Sample Selection

Excel® spreadsheets (Microsoft, Redmond, WA) containing information on all timber harvests in West Virginia which began during 2005 and 2006 were provided by the WVDOT. This list was pared to include only partial harvests of at least 20 acres in size on properties owned by NIPF landowners. The NIPF classification excludes forest land owned by government entities, forest products manufacturing firms, and other industrial owners. In addition, we excluded properties owned by real estate investment trusts and timberland investment management organizations. Every landowner on the timber harvest list was contacted by mail to: (1) verify that a timber harvest occurred on the land, (2) determine what type of forester, if any, was involved in the sale, and (3) request his or her willingness to participate in the study by allowing us to inspect and collect inventory data from the property. Within 3 months, 273 landowners (11 percent) had agreed to participate in the study.

To ensure that samples were well-distributed throughout the state, properties were divided into six groups according to the former WVDOT management districts in which the properties lie. Within each district, we randomly selected: (1) five properties for which the landowner indicated he or she had used a consulting/state service forester to assist with the sale, (2) five properties for which the landowner indicated that only an industry/procurement forester was involved in the sale, and (3) five properties for which the landowner indicated that no professional forester was involved. After initial selection of the properties, both information provided by the landowner and information provided on the timbering operation notification forms were scrutinized to ensure that the forester classification provided by the landowner was correct. The following criteria were used to classify each sale according to the type of professional involved:

- 1) Consulting forester – an individual or firm that provides forest management consulting services to the public, for a fee. Such individuals must be registered professional foresters (or forest technicians) in West Virginia and must not be employed by forest products companies or engage in the buying and selling of timber or timberland for themselves or on behalf of their employer. Foresters employed by forest products companies that also provide consulting services and foresters involved with industrial landowner assistance programs were specifically excluded from this classification.
- 2) State service forester – an individual employed by the WVDOT who is also a registered professional forester (or forest technician) in West Virginia.
- 3) Industry/procurement forester – any registered professional forester (or forest technician) not classified as a “consulting forester” or “state service forester.”
- 4) Nonforester – an individual who does not meet any of the above criteria.

“Registered professional forester” and “registered forest technician” status was verified using membership rosters provided by the West Virginia State Board of Registration for Foresters.

Field Measurements

Circular 0.1-acre inventory plots were established throughout each selected property on a systematic grid. Sampling intensity was one plot per harvested acre, with a minimum of 20 plots and a maximum of 30 plots on each property. Sampling was confined to recently harvested areas. Tree

species, stem diameter at 4.5 feet from the ground (diameter at breast height, d.b.h.), and canopy position (dominant/codominant, intermediate, or suppressed) were measured for all living residual trees ≥ 4.6 inches d.b.h. On every third plot, stump diameter was measured for every residual tree. These data were collected to develop regression equations to predict d.b.h. from stump diameter.

Each tree was evaluated for future sawtimber potential, following guidelines for the U.S. Department of Agriculture, Forest Service tree grades, based on the number and severity of defects within the butt log (Miller et al. 1986). Trees with potential to make Forest Service tree grades of F1 or F2 were considered “acceptable growing stock.” Various types of logging damage (damage to bole, damage to crown, broken or leaning stem) were noted for each residual tree.

Species, stump height, and stump diameter (average of two measurements) were recorded for every recently harvested stump ≥ 6 inches in average diameter located within the 0.1-acre sample plots. On 39 properties, trees to be harvested had been designated as such with tree-marking paint (29 of 30 consulting forester sales, 8 of 30 industry forester sales, and 2 of 30 nonforester sales). On these sites, marked trees that were left unharvested by the logger were considered to be “harvested” and their d.b.h. was measured directly, rather than being estimated from stump diameter. This step was taken to ensure that the project evaluated forester performance (how the forester intended to harvest the site) rather than logger performance (how the site was actually harvested). The incidence of unharvested marked trees was extremely low (65 trees out of 5,934 stumps + marked residuals, or just over 1 percent).

In all, 2,346 plots were placed on 90 properties in 21 counties. A total of 21,648 residual trees and 5,934 stumps (including marked residual trees) were measured. Based on our field measurements, all properties examined in this study appeared to have been well-stocked with merchantable sawtimber prior to harvesting. No evidence was found of harvest activity before the most recent harvest on any subject property.

Data Analysis

Stump diameters and d.b.h. measurements from the residual trees were used to develop species-specific linear regression equations to predict d.b.h. from stump diameter. Coefficients of determination (R^2) for the regression equations were above 0.92 for all species. These equations were used to predict the d.b.h. of harvested trees on the sample plots by using the measured stump diameters from the harvested trees.

Merchantable stem volumes for residual and harvested trees were predicted from d.b.h. (for residual trees) or predicted d.b.h. (for harvested trees) by using equations from Wiant (1989). Cubic-foot volumes were calculated for all trees with an actual or predicted d.b.h. ≥ 4.6 inches. International 0.25-inch scale board-foot volumes were calculated for all trees with an actual or predicted d.b.h. ≥ 11.6 inches. Percentage of stocking was calculated for each property by using stocking charts for upland Central Hardwoods (Gingrich 1967).

Stumpage value was calculated for all trees with an actual or predicted d.b.h. ≥ 11.6 inches by using stumpage prices in dollars per thousand board feet (MBF) (International 0.25-inch scale) reported by the West Virginia University Appalachian Hardwood Center (AHC) for 2007 (statewide average of

the four quarterly reporting periods). For stumpage value calculations, species were grouped into the following AHC pricing categories:

- 1) northern red oak (*Quercus rubra* L.)
- 2) white oak (*Q. alba* L.)
- 3) mixed oak: all oaks except northern red and white oak
- 4) black cherry (*Prunus serotina* Ehrh.)
- 5) yellow-poplar (*Liriodendron tulipifera* L.) and cucumbertree (*Magnolia acuminata*)
- 6) hard maple: sugar maple (*Acer saccharum* Marsh.) and black maple (*A. nigrum*)
- 7) soft maple: red maple (*A. rubrum* L.) and silver maple (*A. saccharinum*)
- 8) ash: all (*Fraxinus* spp.)
- 9) hickory: all (*Carya* spp.)
- 10) black walnut (*Juglans nigra*)
- 11) other species: all species not otherwise categorized

Analysis of variance was performed to determine the effect of forester type (consultant, industry, or none) on various harvest and residual stand attributes ($\alpha = 0.10$). The Tukey-Kramer multiple-comparison test was performed on treatment means to determine significant treatment differences ($\alpha = 0.10$).

Properties were grouped into classes based on various harvest removal and residual stand attributes. For example, each property was assigned to the appropriate residual damage class based on the percentage of the residual basal area damaged, either: (1) ≤ 10 percent damaged, (2) 11 to 15 percent damaged, or (3) ≥ 16 percent damaged. The number of properties falling into each class was summed for each forester type. Pearson's chi-square goodness-of-fit test was performed to determine if differences in observed frequencies between the forester types were significant.

Finally, an overall harvest evaluation was performed for each property based on three residual stand attributes: (1) stocking classification, (2) percentage of residual basal area classified as acceptable growing stock, and (3) percentage of residual basal area damaged. These criteria were judged by professional foresters to be the three most useful silvicultural attributes for assessing harvesting impacts on a site (Egan and Jones 1997). Together, these three factors significantly affect the quality of the residual stand and the likelihood that the stand will produce high-quality timber in the next 10 to 20 years.

Properties were evaluated for each of the above attributes based on criteria outlined in Table 1. Each attribute was rated as "good," "fair," or "poor" based on these criteria and points were assigned to each property based on these evaluations. These three scores were summed and properties with a total score of 5 or 6 points received an overall evaluation of "good." Properties with a total score of 3 or 4 points received an overall evaluation of "fair." Those with 2 or fewer total points received an overall evaluation of "poor." No residual stands were overstocked, so no evaluation criterion was necessary for overstocked conditions.

Table 1.—Criteria used to perform an overall harvest evaluation on 90 NIPF properties in West Virginia

Stand attribute	Good (2 points)	Fair (1 point)	Poor (0 points)
Gingrich stocking classification	Fully stocked	Understocked	Severely understocked
Basal area in acceptable growing stock	61% or greater	41 to 60%	40% or less
Basal area damaged	10% or less	11 to 15%	16% or greater
Overall evaluation	5 – 6 points	3 – 4 points	0 – 2 points

Table 2.—Mean values, by forester type, for harvest removal attributes on 90 NIPF properties in West Virginia

Harvest attribute	Forester type		
	Consultant	Industry	None
Sawtimber basal area harvested	57.7% a [†]	67.8% b	68.8% b
Sawtimber volume harvested	60.1% a	70.5% b	71.2% b
Sawtimber value harvested	58.9% a	70.2% b	71.2% b
Species preference ratio	0.98 a	1.00 b	1.01 b

[†] Means within a row followed by the same letter are not significantly different ($\alpha = 0.10$).

For example, a property that was fully stocked with 52 percent of the residual basal area classified as acceptable growing stock and 20 percent of the residual basal area damaged would receive a stocking classification rating of “good” (2 points), an acceptable growing-stock rating of “fair” (1 point), and a damage rating of “poor” (0 points). A total of 3 points would be assigned to this property and its overall evaluation would be “fair.”

The number of properties falling into each overall evaluation class was summed for each forester type. Pearson’s chi-square goodness-of-fit test was performed to determine if differences in observed frequencies between the forester types were significant.

RESULTS

Consulting foresters removed smaller proportions of trees, basal area, sawtimber volume, and sawtimber value than either industry foresters or loggers working without direction from a professional forester (Table 2). There were no significant differences between industry foresters and nonforesters for any of the harvest removal attributes examined in this study.

The species preference ratio (harvest value per MBF divided by initial value per MBF) indicates whether the harvested species were, on average, more valuable (ratio >1), less valuable (ratio <1), or of equal value (ratio = 1) compared to the initial species composition. The species preference ratio for sales handled by consulting foresters is 0.98, indicating that harvested species were slightly less valuable than the overall species composition. The species preference ratios for sales handled by industry foresters and nonforesters were 1.00 and 1.01, respectively, indicating that harvested species were as valuable as or slightly more valuable than the average species in the stand.

Residual stands resulting from harvests conducted by consulting foresters contained higher proportions of dominant and codominant trees and acceptable growing stock than properties harvested under the direction of industry foresters or nonforesters (Table 3). Consultant-directed harvests resulted in less damage to the residual stand and reduced QMD by a smaller percentage.

Table 3.—Mean values, by forester type, for residual stand attributes on 90 NIPF properties in West Virginia

Residual stand attribute	Forester type		
	Consultant	Industry	None
Basal area dominant or codominant	61.7% a [†]	51.9% b	52.2% b
Basal area in acceptable growing stock	63.0% a	57.0% b	53.2% c
Basal area damaged	14.9% a	20.7% c	17.7% b
Change in quadratic mean diameter	- 16.5% a	- 20.2% b	- 20.2% b

[†] Means within a row followed by the same letter are not significantly different ($\alpha = 0.10$).

Table 4.—Mean values, by forester type, for stocking parameters on 90 NIPF properties in West Virginia

Stocking parameter	Forester type		
	Consultant	Industry	None
Initial stocking	85.7% a [†]	81.8% a	82.2% a
Residual stocking	50.3% a	43.7% a	44.0% a
Change in stocking level	- 41.6% a	- 47.5% b	- 46.5% ab

[†] Means within a row followed by the same letter are not significantly different ($\alpha = 0.10$).

Table 5.—Percentage of basal area harvested from 90 NIPF properties in West Virginia by species and diameter class, for each type of forester involved with the harvest

Forester type	High-value species				Low-value species			
	N. red oak		White oak		American beech		Sweet birch	
	12-15 inches	≥16 inches	12-15 inches	≥16 inches	12-15 inches	≥16 inches	12-15 inches	≥16 inches
Consultant	12%	76%	14%	66%	66%	64%	44%	88%
Industry	29%	89%	22%	89%	14%	29%	0%	NA [†]
None	22%	87%	10%	82%	13%	32%	10%	0%

[†] No sweet birch ≥16 inches was tallied on any tracts harvested by industry foresters.

Properties harvested under the direction of industry foresters contained larger proportions of damaged trees compared to properties harvested without a forester's involvement. However, properties harvested under the direction of industry foresters also contained a higher proportion of acceptable growing stock compared to properties harvested by nonforesters.

Initial and residual stocking levels were not significantly different between the different forester types (Table 4). However, consulting foresters caused a smaller percentage reduction in average stocking level compared to industry foresters.

In general, consultants removed a lower proportion of high-value species (e.g., northern red oak and white oak) ≥16 inches in d.b.h, compared to the other two groups (Table 5). Industry foresters and nonforesters removed more than 80 percent of the basal area of high-value species ≥16 inches in d.b.h. Consulting foresters tended to remove considerably less basal area from the smaller diameter classes of high-value species. Consulting foresters also removed much higher proportions of low-value species (e.g., American beech [*Fagus grandifolia* Ehrh.] and sweet birch [*Betula lenta* L.]) across all merchantable diameter classes. Industry foresters and nonforesters generally avoided harvesting low-value species.

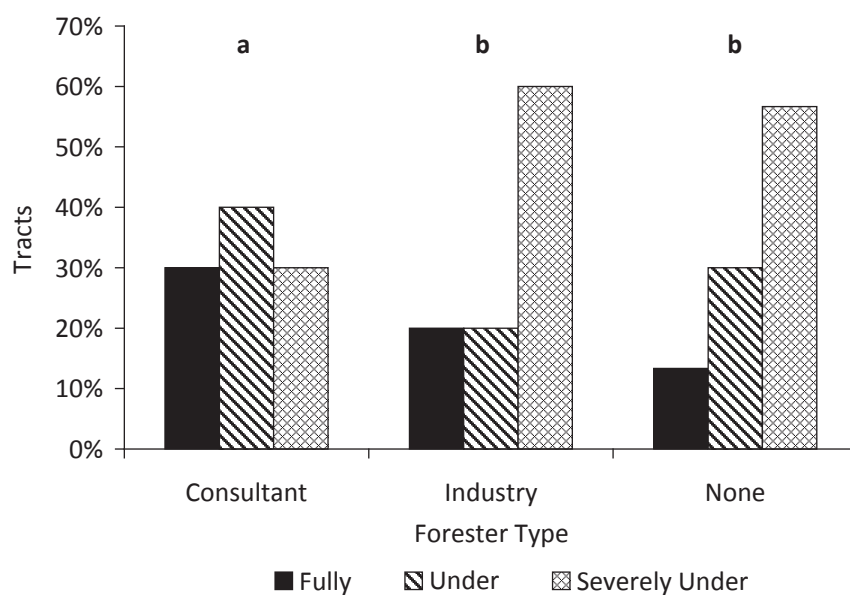


Figure 1.—Harvested NIPF properties in West Virginia classified into residual stocking classes by type of forester involved with the harvest. Forester type distributions with the same letter are not significantly different based on Pearson's chi-square goodness-of-fit test ($\alpha = 0.10$).

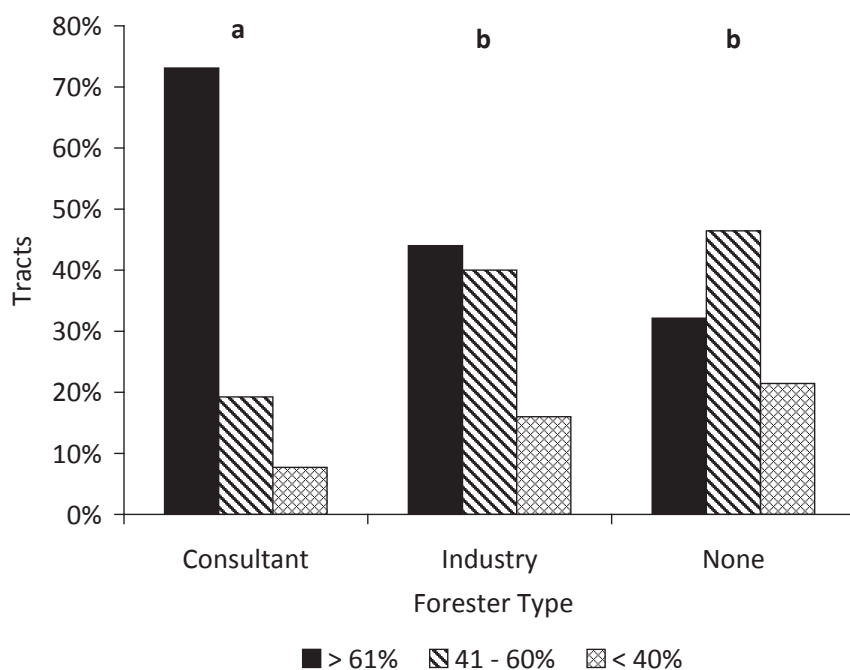


Figure 2.—Harvested NIPF properties in West Virginia classified into acceptable growing-stock classes by type of forester involved with the harvest. Forester type distributions with the same letter are not significantly different based on Pearson's chi-square goodness-of-fit test ($\alpha = 0.10$).

Thirty percent of the harvests handled by consultants resulted in residual stands that were fully stocked, compared to 20 percent or fewer of the harvests handled by industry foresters or nonforesters (Fig. 1). More than half of the harvests handled by industry foresters or nonforesters resulted in severely under-stocked residual stands, compared to only 30 percent of harvests conducted by consulting foresters.

Nearly three-fourths of the harvests conducted by consulting foresters resulted in residual stands with more than 60 percent of the residual basal area in acceptable growing stock (Fig. 2). In contrast, fewer than half of the sales handled by industry foresters or nonforesters had more than 60 percent of the residual stand in acceptable growing stock.

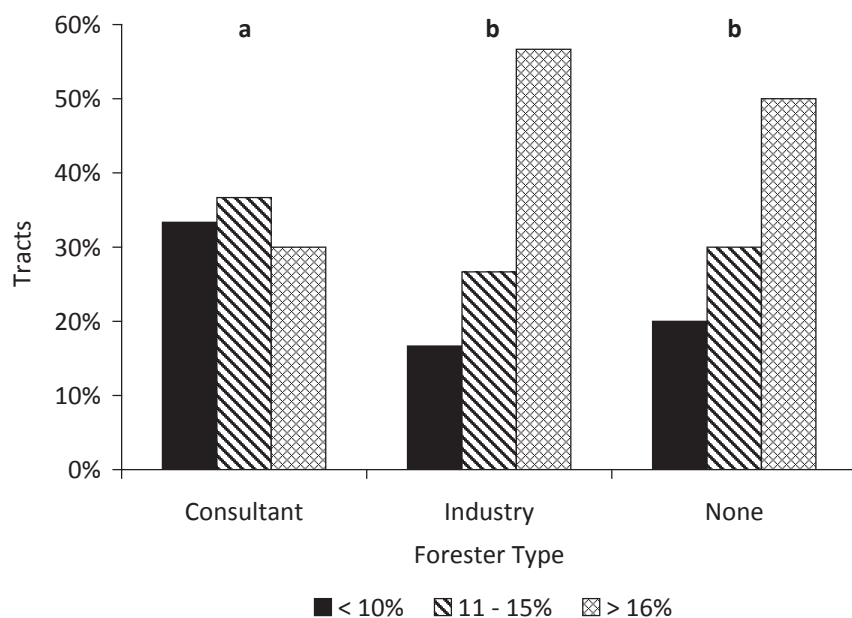


Figure 3.—Harvested NIPF properties in West Virginia classified into residual logging damage classes by type of forester involved with the harvest. Forester type distributions with the same letter are not significantly different based on Pearson's chi-square goodness-of-fit test ($\alpha = 0.10$).

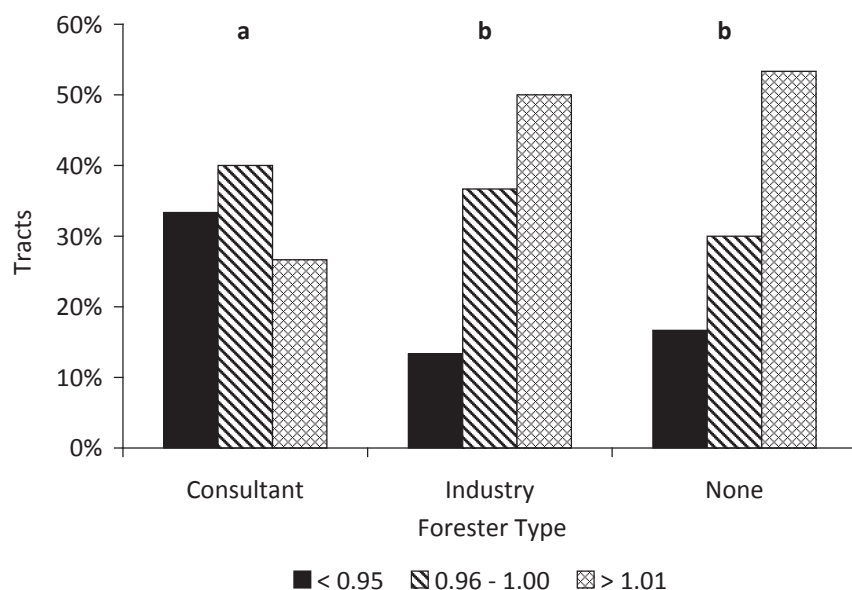


Figure 4.—Harvested NIPF properties in West Virginia classified into species preference ratio classes by type of forester involved with the harvest. Forester type distributions with the same letter are not significantly different based on Pearson's chi-square goodness-of-fit test ($\alpha = 0.10$).

One-third of the harvests handled by consultants had no more than 10 percent of the residual basal area damaged by logging, whereas fewer than 20 percent of the harvests handled by industry foresters and nonforesters had such low levels of residual damage (Fig. 3). Only 30 percent of the consultants' harvests resulted in heavily damaged residual stands (at least 16 percent of the residual basal area damaged), compared to more than half of the industry forester and nonforester harvests.

Only about one-fourth of the consulting foresters displayed a preference for removing the more valuable species during harvest, as indicated by a species preference ratio greater than 1.0 (Fig. 4). In contrast, more than half of the industry foresters and nonforesters indicated a bias towards removing the more valuable species during harvesting. In addition, one-third of the consulting foresters attempted to remove at least some of the less valuable species from the stand (species preference ratio ≤ 0.95), compared to fewer than 20 percent of the industry foresters and nonforesters.

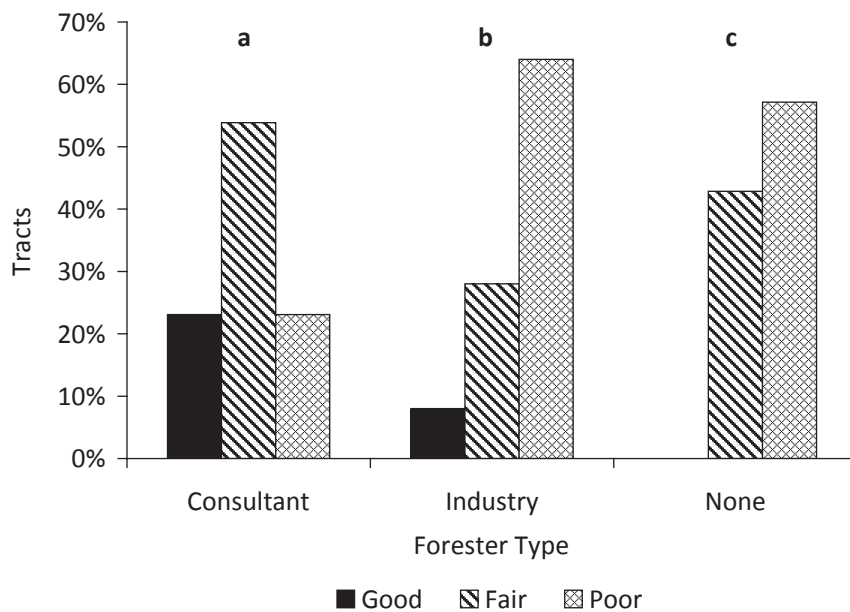


Figure 5.—Harvested NIPF properties in West Virginia classified into overall harvest evaluation classes by type of forester involved with the harvest. Forester type distributions with the same letter are not significantly different based on Pearson's chi-square goodness-of-fit test ($\alpha = 0.10$).

Nearly one-fourth of the harvests conducted by consulting foresters were evaluated as “good” based on evaluations of residual stocking level, acceptable growing stock, and damage to residual trees, as described in Table 1 (Fig. 5). Fewer than 10 percent of the harvests conducted by industry foresters received a “good” evaluation and none of the harvests conducted by nonforesters were rated as “good.” About one-fourth of the harvests conducted by consulting foresters were evaluated as “poor,” compared to more than 50 percent of nonforester harvests and more than 60 percent of the harvests conducted by industry foresters.

DISCUSSION

Results from this study suggest that there are significant differences between timber harvests conducted by consulting foresters (including state service foresters) and timber harvests either handled by industry foresters or conducted without involvement by any professional forester. By contrast, there were very few differences in the attributes we measured between harvests conducted by industry foresters and harvests carried out by nonforesters.

Consulting foresters removed less volume and value from the stand during harvesting compared to the other two groups and tended to remove trees that were somewhat smaller in diameter, as evidenced by the smaller reduction in QMD after harvesting. In addition, consultants were less inclined to remove the more valuable species from a stand, particularly in the 12- to 15-inch diameter classes, which represent future sawtimber growing stock. Industry foresters and nonforesters removed a very high proportion of high-value species ≥ 16 inches in diameter, which is consistent with trends observed for timber harvesting in general in West Virginia and eastern Kentucky (Fajvan et al. 1998, Luppold and Bumgardner 2009). Industry foresters and nonforesters strongly avoided harvesting low-value species (e.g., beech and sweet birch), yet consultants tended to harvest these species heavily. In all but one instance, consulting foresters marked the timber to be harvested, compared to only one-quarter of the harvests conducted by industry foresters and less than 10 percent of the harvests conducted by nonforesters. Collectively, these tendencies provide strong evidence that many consulting foresters conducted harvests with the intent to practice silviculture, to at least some extent. In general, such intentions appear to be lacking from most harvests conducted by industry foresters and nonforesters.

Residual stands resulting from harvests managed by consulting foresters were generally in better condition than residual stands resulting from harvests conducted by the other two groups. When consulting foresters conducted the harvest, stands were more likely to be left in a fully stocked condition and have higher proportions of acceptable growing stock and trees in dominant or codominant canopy positions. In addition, consultant-managed harvests resulted in fewer damaged residual trees and fewer trees of the lowest quality (culls and non-sawtimber quality).

It is impossible to determine the initial quality of the timber examined in this study prior to harvest. Therefore, it is impossible to know for certain if differences in residual timber quality are the result of differences in initial stand conditions or differences in the manner in which the harvests were conducted. However, given the size of this study and the randomness with which properties were selected, there is little reason to believe that significant differences in initial timber quality existed between the various forester types. Regardless of whether such differences existed, several factors (damage to residual trees, stocking level, percentage of residual trees in dominant or codominant canopy positions, reduction in QMD) are not influenced by initial timber quality. Ample evidence based solely on these factors supports the claim that consulting foresters conducted harvests with the intent to practice silviculture, to the extent possible given landowner objectives and market constraints.

Residual tree damage was positively correlated with harvest intensity, as measured by the proportion of basal area harvested (Moss 2011). The effect was nevertheless quite small, suggesting that other factors such as terrain, logger skill, logger diligence, and the effectiveness of logging supervision are more important in determining damage to the residual stand. Consulting foresters removed less basal area during harvesting than the other forester groups. However, even accounting for this effect on logging damage, harvests conducted by consulting foresters had less residual tree damage than harvests conducted by either industry foresters or nonforesters.

The overall harvest evaluation was based on three attributes of the residual stand: (1) residual stocking level, (2) percentage of residual basal area in acceptable growing stock, and (3) percentage of residual basal area damaged during logging. These three attributes were chosen because they significantly affect the probability that the stand will be productive and yield high-quality sawtimber in the near future (10 - 20 years). Based on this evaluation method, nearly one-fourth of the harvests managed by consulting foresters were rated as “good.” Although somewhat disappointing, this performance is much better than that achieved by industry foresters (less than 10 percent rated as “good”) or nonforesters (none rated as “good”). Conversely, more than half of the harvests conducted by industry foresters or nonforesters were rated as “poor” (failing to provide for short-term sustainability). Fewer than 25 percent of consultant-managed harvests were rated as “poor.”

A cursory examination of the WVDOP timbering notification forms for 2005 indicated that consulting/service foresters were involved in roughly 20 percent of the timber harvests in West Virginia; industry/procurement foresters were involved in about 30 percent. Approximately half of the timber harvests in 2005 did not appear to include involvement by any professional forester. Assuming that the findings of this study can be applied statewide and forester involvement in harvesting typically follows the pattern shown in 2005, only 7 percent of the timber harvests in the state would receive a “good” evaluation based on the criteria listed in Table 1. Forty-one percent of

the harvests would be considered “fair” and more than half (52 percent) would be considered “poor.” This outcome is consistent with the findings of other researchers, who have concluded that most timber harvesting in the Appalachian region consists of high-grading and diameter-limit harvests.

Many factors may explain the relatively poor ability of professional foresters to carry out silvicultural harvests. First and foremost are landowner objectives. No attempt was made in this study to ascertain the landowners’ objectives for their properties or reasons for harvesting timber. It is likely that some landowners were not interested in silviculture, sustainable timber production, or any of the other aspects of forest management that professional foresters can provide. Given landowners’ preferences, there are likely to be instances where non-sustainable harvests are carried out by professional foresters, regardless of their personal preferences towards the harvest.

Additionally, economics dictates how timber harvests are conducted to a considerable extent. Inadequate markets for small-diameter trees, poor quality trees, and certain low-value species seriously hinder foresters’ ability to remove such trees from a stand during a commercial harvest, for fear of making the sale economically unattractive. “Textbook” silviculture, including practices such as cleaning and thinning from below, are extremely challenging to perform in the context of a commercial harvest, and few landowners appear inclined to subsidize such activities. Thus, foresters are limited to practicing silviculture within the bounds provided by a commercial (i.e., economically attractive) harvest.

In spite of these constraints, harvest removal attributes and residual stand characteristics suggest that consulting foresters were more apt to integrate silvicultural concepts into their harvests than were either industry foresters or nonforesters (landowners and loggers). This study provided scant evidence that industry foresters were any more likely to practice silviculture as part of a timber harvest than nonforesters.

Part of the reason for the greater likelihood of consulting foresters to conduct silvicultural harvests could lie with the landowners. Landowners who are interested in forest management or concerned about their forest might be more likely to seek out assistance from consulting foresters and state service foresters compared to those landowners with little or no interest in forest management or sustainability. In other words, industry foresters might be just as motivated to practice silvicultural and sustainable harvesting as consulting foresters, but might be more likely to be working with landowners who are not concerned with such matters. Conversely, consulting foresters might be no more likely to practice sustainable forestry than industry foresters when working with unconcerned landowners or landowners whose objectives for their property do not involve forest management. The reader should be aware of the limitations of this study to address such issues and care should be taken in how these results are interpreted.

Nevertheless, one important conclusion from this study is that only a small fraction (probably less than 10 percent) of the timber harvests conducted in the state can be defined as silviculturally oriented. The overwhelming majority of these harvests were carried out by consulting foresters. Landowners should be made aware of the benefits of engaging consulting foresters and state service foresters to assist with their timber sales, particularly if their ownership objectives involve some aspect of forest management.

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