

## Educational Preferences of West Virginia's Female Woodland Owners

### Abstract

The growing cadre of women woodland owners within the general landowner population will increasingly direct decisions on how woodland properties are managed for timber, wildlife, recreation, and water. In the past, women woodland owners have been underserved with regard to their educational needs. Using a mail-based questionnaire and tax records, we surveyed woodland owners in four West Virginia counties to explore differences in educational preferences between female and male woodland owners. We found differences associated with several woodland-related topics of interest and seminar attributes.

**Keywords:** [forest management](#), [nonindustrial private forest](#), [women woodland owners](#), [woodland education](#)

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## Introduction

Women woodland owners in the United States are growing in number, with the primary reasons for this growth presumed to be that individual members of this group have inherited land from parents, outlived their spouses, or purchased forested property for their own purposes (Butler, Huff, Snyder, Butler, & Tyrell, 2018; Effland, Rogers, & Grim, 1993; Warren, 2003). The trend of increasing numbers of women woodland owners is also prominently identified in research from European countries (Lidestav, 2013; Lidestav & Ekström, 2000). This growing cadre of women woodland owners will increasingly direct decisions on how woodland properties are managed for timber, wildlife, recreation, and water and, consequently, will influence broader conservation efforts that aim to ensure healthy and productive landscapes.

Often, women landowners confront different challenges as resource managers/owners than their male counterparts encounter. Research has demonstrated that many women landowners have faced discrimination and other barriers in farm management roles (Barbercheck et al., 2009) and forestry roles (Redmore & Tynon, 2011). These barriers can cause women to seek alternative outlets for exchanging knowledge, often out of the spotlight of their male counterparts so as not to be criticized (Trauger et al., 2008). According to a study of forest owners' offspring nationwide, 83% of females interviewed said they would like to take over the family forest in the future,

but only 34% had been involved in the management of family forests, and 36% described lack of knowledge as a barrier to owning woodlands (Mater, 2005).

Karppinen and Berghäll (2015 [citing Ripatti, 1999]) suggested that women's timber stand improvement activities are more heavily influenced by subjective norms (social pressure to do something) than are those of their male counterparts. Also, according to their study, although women landowners were less likely to attend traditional education courses and field excursions, those women who did seek out education tended to be more likely to have timber harvests on their properties (Karppinen & Berghäll, 2015). With respect to land ownership, women generally express naturalist or environmental points of view or philosophies in contrast to consumptive or utilitarian philosophies (Davis, Asah, & Fly, 2015; Kuipers, G.C., & Potter-Witter, 2013). Some gendered viewpoints have been found to translate into preferred educational topics (Downing & Finley, 2005).

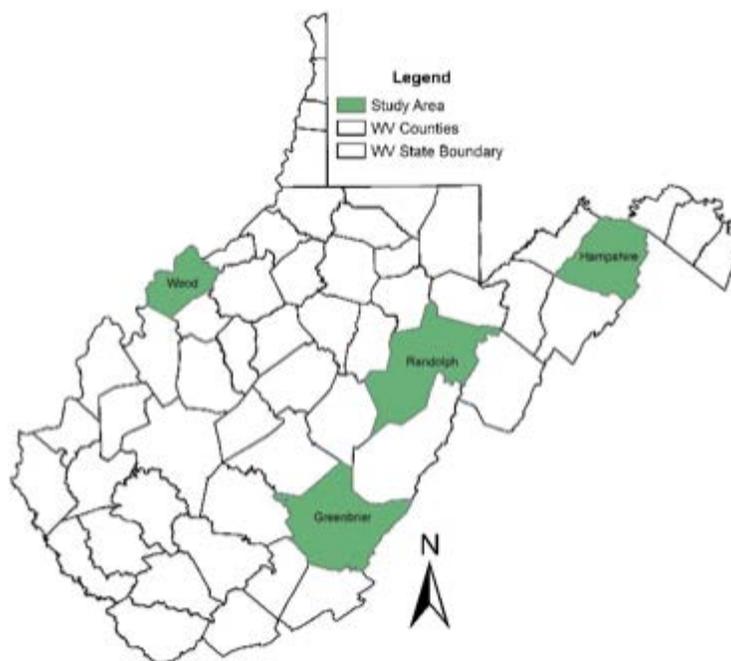
To seek new ways to engage with and support women in pursuing woodland stewardship, we explored the educational preferences of women woodland owners in West Virginia. We employed a comparative analysis of female and male landowners to examine our primary research question: Do educational preferences of women woodland owners differ from those of their male counterparts?

## Methods

Using a mail-based questionnaire, we explored differences in educational needs among female and male woodland owners in West Virginia. Greenbrier, Hampshire, Randolph, and Wood counties (Figure 1) were selected as the counties of interest in our survey as they provided a wide geographic representation of West Virginia woodland ownership (Fegel, 2014).

**Figure 1.**

Counties Selected to Receive Mail-Based Questionnaire



A women woodland owner (WWO) sample and a general woodland owner (GWO) sample were randomly selected from the state's tax database. Three hundred woodland properties—150 WWO properties and 150 GWO

properties—were selected from each of the four counties (1,200 total). Only individual private forest owners who had at least 10 ac of woodland and whose names were not suggestive of corporations or public entities were selected. WWO names were chosen only if female names existed in the ownership list, and gender-neutral names, such as Pat, Terry, Chris, and Lee, were not chosen (Van Fleet & Atwater, 1997). GWOs were selected without respect to gender.

Two nearly identical questionnaires were developed for the WWO and GWO target samples, differing only with regard to title, cover, and description of the research in the introductory statement (Figure 2). These differences were introduced to ensure that the target audience in the WWO group, women, were the entity completing the survey. The survey was granted an institutional review board research exemption (Protocol #1310115110).

**Figure 2.**

Covers of Questionnaires Targeting General Woodland Owner Sample (Left) and Women Woodland Owner Sample (Right)



Questionnaires were organized around the following categories: demographics, property and ownership, woodland activities, management roles, and interest in woodland topics.

We used two metrics to explore gender differences: (a) topics of interest to woodland owners and (b) woodland owners' preferences regarding seminar attributes. Participants were asked to choose whether they were not likely, somewhat likely, likely, or very likely to attend workshops on 17 topics. They also indicated whether they would be not interested, somewhat interested, interested, or very interested in attending workshops having 13 suggested seminar attributes. Likert items were combined into two groups, "not interested" and "more interested," on the basis of the median of the responses.

The mailing process followed the protocol recommended by Dillman (2000). A presurvey postcard, an initial questionnaire, a reminder postcard, and a second questionnaire were mailed between March 5 and May 1, 2014.

We used principal component analysis (PCA) to examine whether the 30 topics and seminar attributes could be reduced into fewer broad themes that would serve as response variables. PCA is a method through which many

correlated variables are reduced to a smaller set of composite variables. We tested variables loading on a given component for internal consistency (how similar they were) using Cronbach's alpha. We then used groups of variables (questionnaire items) with Cronbach's alpha values greater than or equal to 0.70 as summated scales by calculating the average values of the items.

The two principal components identified from the topics items were designated as (a) nature appreciation and (b) timber management. These two components accounted for 85% of the variation in this group of Likert items. Nature appreciation and timber management are summated scales made up of four and five items, respectively (Table 1). A third summated scale, conservation, was created from seven items that significantly cross-loaded on both nature appreciation and timber management.

**Table 1.**  
Principal Components Analysis with Summated Variables

<b>Summated variable name</b>	<b>Item: I would be likely to participate in a workshop regarding . . .</b>	<b><i>M<sup>a</sup></i> (<i>SD</i>)</b>	<b>PC 1<sup>b</sup></b>	<b>PC 2</b>	<b><i>α</i></b>
Nature (PC 1)	Identifying wildlife species	2.04 (1.13)	<b>0.875</b>	0.023	0.83
	Bird watching/identifying	1.97 (1.15)	<b>0.818</b>	-0.032	
	Medicinal herbs (ginseng, goldenseal)	2.30 (1.14)	<b>0.798</b>	0.265	
	Forest grown mushrooms (shiitake, chanterelle)	2.13 (1.15)	<b>0.711</b>	0.285	
	Using equipment (chainsaw, power tools, tractor)	1.61 (0.96)	<b>0.500</b>	0.154	
Timber (PC 2)	Timber harvest	1.89 (1.04)	0.142	<b>0.850</b>	0.89
	Marketing timber	1.70 (0.96)	0.074	<b>0.858</b>	
	Creating more productive timber lands	1.89 (1.03)	0.366	<b>0.746</b>	
	How to measure timber value	2.00 (1.05)	0.158	<b>0.812</b>	
Conservation	Managing for wildlife	2.13 (1.06)	0.690	0.452	0.85
	Non-timber forest products	1.65 (0.91)	0.575	0.462	
	Stewardship	1.84 (0.98)	0.476	0.479	

	State incentive programs	2.16 (1.08)	0.538	0.554	
	Forestry terms (diameter breast height, merchantable height)	1.60 (0.89)	0.391	0.591	
	Creating deer habitat	2.04 (1.12)	0.614	0.382	
	Trapping and hunting wildlife	1.67 (1.02)	0.271	0.462	
Land transfer <sup>c</sup>	Land transfer	1.44 (0.83)	0.058	0.473	—

*Note.* PC = principal component.  
<sup>a</sup>Means are based on ordinal scale from 1 = *not likely* to 4 = *very likely*. <sup>b</sup>Values for PC 1 and PC 2 are component scores. Component scores in bold were deemed to be significantly loaded on respective components. Scores range from 0 to 1, and in a general sense, the higher the score, the more an individual variable is associated with the summated variable. <sup>c</sup>Land transfer was not a summated variable but one that did not have any consistent pattern of loading in the principal component analysis.

Seminar attributes had only one statistically important component, with nine items used as a summated scale (Cronbach's  $\alpha = 0.94$ ). This summated scale, designated as interactive, included the variables weekend workshop, meeting hosted in the woods of a woodland owner, indoor meeting with natural resources professionals, discussion with other forest owners, event with instructors who are my same gender, discussion with natural resources professionals, demonstration in the forest, network of other forest owners, and question-and-answer session. The variables PowerPoint presentation, online webinar, event for families (including children's activities), and weekday evening workshop were left as solitary response variables as they did not reach the minimum Cronbach's alpha to justify combining them.

Each response variable was modeled as a function of gender and the remaining set of explanatory variables. Female respondents from both WWO and GWO surveys were combined for data analysis. We used an open stepwise logistic regression to derive the optimal number of variables for the model with the minimum Akaike information criterion. Using a best subsets regression variable selection routine that forced gender into the model, we selected the optimal model based on the score chi-square statistic (Table 2); then we ran logistic regression, including gender in all models, and examined goodness-of-fit statistics.

**Table 2.**  
 Description of Significant Explanatory Variables in Logistic Regressions

Variable name	Description
Gender	Binary variable (male = 0, female = 1). Female respondents from both WWO and GWO surveys were combined for data analysis.
Tenure	Continuous variable. Number of years respondent has owned the property

(log transformed).

Resident	Binary variable (nonresident = 0, resident = 1). Resident landowners live on the property, nonresidents do not.
Purchased	Binary variable (not purchased = 0, purchased = 1). Respondents who purchased their property (purchase = 1) compared with those who either inherited it, were gifted the property, or acquired it in some other way.
Unique owner	Binary variable (joint ownership = 0, unique ownership = 1). Unique owners are the sole owner of the property.
Forester	Binary variable (no forester = 0, forester = 1). Respondent has contacted a forester about his or her woodland property.
Sell timber	Binary variable, likelihood of selling timber in the next 10 years (not likely = 0, somewhat to very likely = 1).
Woodland acreage	Continuous variable, number of acres of woodland (log transformed).
Age	Ordinal variable with seven age categories.
Education	Ordinal variable with nine education categories ranging from 1 = some high school to 9 = Ph.D.
Plan to sell	Binary variable based on the possibility of selling property in the next 10 years (no = 0, yes = 1).
Sold timber	Binary variable (have never sold timber = 0, have sold timber = 1).
Contacted	Binary variable (have never contacted professional forester = 0, have contacted forester = 1).

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## Results and Discussion

Of the total 1,200 surveys, 305 completed surveys were returned, yielding a 25% response rate (American Association for Public Opinion Research, 2015, p. 5). One hundred thirty-seven surveys were returned blank, 66 surveys were returned due to bad addresses, and 10 were deemed ineligible due to the respondent's not owning land or the landowner's having died.

Fifty-one percent of respondents were female. Notably, for respondents whose highest level of education attained was a bachelor's degree, the proportion of females holding that degree was 11 percentage points higher than the proportion of males holding that degree. Female respondents tended to be slightly younger, having a modal age class of 50–60 years versus that of males, which was 60–70. Income between females and males was generally even, except females were 10 percentage points higher in the <\$15,000 category and 11 percentage points lower in the \$30,001–\$45,000 category. Table 3 shows comparisons of demographic characteristics.

**Table 3.**

Differences in Woodland Owner Characteristics by Gender

Characteristic	Female (%)	Male (%)	Difference (F–M) (pct pts)
Gender	51	49	2
Age <sup>a</sup> , b			
18–30	1	1	0
30–40	4	2	2
40–50	9	10	1
50–60	37	23	14
60–70	28	35	–7
70+	21	30	–9
Education <sup>b</sup>			
Some high school	3	4	–1
High school graduate	12	22	–10
GED	1	1	0
Trade school	7	7	0
Some college	16	19	–3
Associate's degree	9	4	5
Bachelor's degree	30	19	11
Master's degree	18	19	–1
Ph.D.	5	4	1
Income			
<\$15,000	13	3	10
\$15,001–\$30,000	14	12	2
\$30,001–\$45,000	10	21	–11
\$45,001–\$60,000	18	11	7
\$60,001–\$75,000	10	14	–4
\$75,001–\$90,000	9	10	–1
\$90,000+	26	29	–3

<sup>a</sup>The 1-year overlap in the age category was an oversight in the questionnaire.

<sup>b</sup>Percentages that do not sum 100% are due to rounding error.

Gender was significantly associated with all three topic themes (Table 4). Female respondents tended to be more likely than male respondents to attend a seminar with a nature theme ( $OR = 1.69$ ,  $p = .082$ ) and less likely to attend seminars with timber ( $OR = 0.44$ ,  $p = .006$ ) or conservation ( $OR = 0.45$ ,  $p = .014$ ) themes. These

findings corroborate and substantiate the suggestion by Downing and Finley (2005) that women prefer discussions of environmental issues. Previous researchers have reached similar conclusions that women are more likely to manage their woodlands for elements such as wildlife and nontimber forest products (Crim, Dubois, Bailey, & Schelhas, 2003) and may be less likely to participate in timber management (Lidestav & Ekström, 2000; Redmore, 2009).

Tenure (number of years property has been owned) and forester (whether respondent had ever contacted a forester) were also found to be associated with all three topic themes (Table 4). The longer the tenure on the land, the less likely respondents would be to attend seminars on any of the suggested topics, possibly because they felt adequately knowledgeable. Conversely, those who had had contact with a professional forester were much more likely to attend seminars on any of the three topic themes. This finding is important in an Extension context as educational outreach involves connecting people with professionals. This "connecting" takes place both from outreach efforts and from office-based referrals that link Extension clientele to forestry professionals (McGill, Campbell, & Pierskalla, 2007).

**Table 4.**

Gender and Other Variables from Best Logistic Regression Models Related to Educational Topics of Interest

<b>Response variable</b>	<b>Explanatory variable</b>	<b>Odds ratio</b>	<b>Lower 90% confidence limit</b>	<b>Upper 90% confidence limit</b>	<b>p-value</b>
Nature	Gender	1.69	0.937	3.044	.082
	Tenure	0.60	0.427	0.823	.008
	Resident	1.95	1.066	3.578	.104
	Purchased	2.08	0.995	4.353	.037
	Forester	2.23	1.152	4.318	.032
	Sell timber	0.55	0.286	1.058	.014
Timber	Gender	0.44	0.270	0.720	.006
	Tenure	0.74	0.578	0.953	.050
	Forester	3.57	2.049	6.230	<.001
	Woodland acreage	1.33	1.034	1.710	.063
Conservation	Gender	0.45	0.237	0.845	.013
	Tenure	0.65	0.460	0.921	.015
	Purchased	3.15	1.432	6.952	.004
	Forester	3.90	1.895	8.014	<.001
	Woodland acreage	1.43	1.025	1.981	.035

	Age	0.70	0.503	0.968	.031
Land transfer	Gender	1.058	0.590	1.897	.850
	Woodland acreage	1.447	1.097	1.910	.009

Five seminar attributes were also associated with explanatory variables (Table 5). Among the five seminar attributes, gender was related to family event ( $OR = 0.40$ ,  $p = .005$ ) and weekday evening ( $OR = 0.54$ ,  $p = .038$ ). Female respondents were only half as likely as their male counterparts to show interest in these two seminar attributes. Why females were not interested in having woodland family events is a topic needing further research. The composite interactive attribute was four times as likely to be preferred by those who had purchased their properties ( $OR = 4.00$ ,  $p < .001$ ) and over three times as likely to be preferred by those who had been in contact with a professional forester ( $OR = 3.21$ ,  $p < .001$ ). Respondents who had been in contact with a forester were more than twice as likely to be receptive to the interactive, PowerPoint, family event, and weekday evening seminar attributes.

**Table 5.**

Gender and Other Explanatory Variables from Best Logistic Regression Models Related to Preferred Seminar Attributes

<b>Response variable</b>	<b>Explanatory variable</b>	<b>Odds ratio</b>	<b>Lower 90% confidence limit</b>	<b>Upper 90% confidence limit</b>	<b>p-value</b>
Interactive	Gender	0.80	0.495	1.285	.435
	Purchased	4.00	2.194	7.302	<.001
	Forester	3.21	1.924	5.367	<.001
	Age	0.37	0.225	0.601	<.001
PowerPoint	Gender	0.86	0.536	1.375	.594
	Tenure	0.66	0.516	0.842	.005
	Forester	2.77	1.660	4.606	.001
Webinar	Gender	0.87	0.544	1.379	.612
	Age	0.35	0.222	0.561	<.001
	Education	1.86	1.158	2.978	.031
Family event	Gender	0.40	0.234	0.680	.005
	Tenure	0.68	0.519	0.878	.014
	Unique owner	0.43	0.239	0.781	.020
	Forester	2.40	1.377	4.171	.010
	Education	0.52	0.308	0.894	.047

	Plan to sell	0.27	0.138	0.547	.002
Weekday evening	Gender	0.54	0.305	0.966	.038
	Resident	2.76	1.551	4.918	<.001
	Forester	2.41	1.233	4.722	.010
	Sold timber	2.38	1.180	4.787	.015
	Contacted	0.47	0.233	0.925	.029

## Conclusions

We found significant differences in preferences for educational workshop topics and seminar attributes between male and female questionnaire respondents. Our analysis led to the following findings:

1. Women were more likely to select nature-themed topics and less likely to express interest in timber or general conservation topics than their male counterparts.
2. Family events was the only seminar attribute that had a significant gender effect, with women being less likely than men to indicate interest.
3. Previous contact with a forester resulted in consistently higher levels of interest in all woodland educational topics and all types of seminar attributes.
4. Newer landowners expressed more interest in more topics and a wider variety of seminar attributes.

Because women expressed less interest in attending workshops in general, more creative offerings may be crucial for reaching this underserved population. We believe that peer learning networks would be a beneficial way to empower women through education. Over half (51%) of the women respondents said they would be interested in participating in a peer-to-peer network.

Also, getting women landowners in contact with a professional forester may be extremely beneficial in their overall likelihood of participating in educational opportunities. This circumstance could be the result of their feeling more empowered and confident after having spoken with a professional in the field or the result of the forester's having addressed and/or suggested participation in these activities.

Previous studies have demonstrated that empowerment is the first step to breaking down the barriers that exist for women in forestry (Redmore, 2009) and that education can be the first step to empowerment (Allred & Sagor, 2011; Page & Czuba, 1999). By offering diverse seminar topics—some with nature-based themes—in appealing educational settings, Extension can help ensure that the doors of opportunities for women woodland owners will continue to open.

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