

## **How the Woodland Stick Benefits Oregon Family Forestland Owners and Extension Volunteers**

### **Abstract**

We revised the Oregon State University (OSU) Woodland Stick to aid master woodland manager volunteers in advising their peers on land management decisions. The Woodland Stick has been used as an educational and measurement tool by OSU and other university Extension programs for many years, but little information is known about its impact. We surveyed users of the Woodland Stick and found that 48% use the tool at least once a year. Landowners who use the Woodland Stick find it simple to use and appreciate its low cost. Using the various features of the stick helps advance landowners toward successful woodland management.

**Keywords:** [forestry](#), [volunteer](#), [forest measurements](#), [field tools](#), [Woodland Stick](#)

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## **Introduction**

One of the important missions of land-grant university Extension programs is to disseminate unbiased research-based information to the public. The Oregon State University (OSU) Forestry and Natural Resources Extension Program (FNR) focuses much of its content on applied forestry landowners can use in the field. When forest landowners make management decisions, they need to know certain descriptive metrics of their forests. Professional foresters have access to a myriad of tools that measure tree size (height and diameter) and determine wood volume in individual or multiple trees. However, these tools can be expensive and complex for landowners who need only quick and rough estimates of their forest resources.

The Woodland Stick is a simple and cost-effective tool that forest landowners can easily use to obtain rough estimates of average tree size and wood volume on their properties. The Woodland Stick was originally developed in 1966 by the Soil Conservation Service to combine the Biltmore Stick, which can be used to measure tree height and diameter (Jackson, 1911), with soil and tree productivity information (U.S. Department of Agriculture Soil Conservation Service, 1966). The format of the Biltmore Stick makes it quick and easy to use in rough forest conditions, including the presence of brush, natural regeneration, understory

vegetation, and rough ground conditions. Measurements obtained using the Biltmore Stick are comparable to those obtained using other dendrometers; however, the Biltmore Stick can overestimate stem size in larger trees (Moran & Williams, 2002; Wilson, Murray, Ryding, & Mont, 2007).

Since the introduction of the Biltmore Stick, OSU FNR has adapted it to meet the needs of Oregon forestland owners. On the first OSU Woodland Stick, the Biltmore Stick tree measurement scales were included, but the soil and tree productivity information was replaced with tables for log volume estimates. In 2017, the OSU Woodland Stick went through its third revision and was reprinted to include graphics and tables comprising forest health, canopy class, tree spacing, tree performance rating, fixed plot dimension, cross drainage spacing, and thinning information. The tool itself is made of wood and is 1.75 in. wide, 3 ft long, and ¼ in. thick. The aforementioned information is printed directly on both sides of the stick.

The Woodland Stick is currently the focus of two OSU FNR programming efforts: (a) the Cruise, Fall, Buck, and Scale field class and (b) the timber harvesting module for the Master Woodland Manager (MWM) Program volunteer training program. In Oregon, landowners participate in the MWM training to increase their knowledge of forest management, improve the management practices administered on their properties, and volunteer with less active and less experienced woodland owners (Bowers, 2000). The Woodland Stick is a forestry field tool MWMs can use while on site visits to advise fellow landowners on how to make land management decisions and understand tree volume. Such work by MWMs is important—in Oregon, landowners contacted by MWMs felt better equipped to make management decisions about their land (Fletcher & Reed, 1996).

The Woodland Stick has been used as an educational and measurement tool in such programming for many years. Additionally, it has been adopted and used in the Washington State University Extension flagship program Coached Planning to support landowners in writing their forest management plans. Despite the active distribution of the tool in Oregon and Washington, little information is known about how it is used by program participants outside a course setting. To improve our understanding, we conducted a survey to learn more about the impact of the Woodland Stick and to identify how and how often Extension program participants are using the tool.

## Methods

The target population for our study was adults who received the Woodland Stick during an OSU FNR education program or MWM volunteer training. We emailed the survey to 157 individuals. Program participants had voluntarily provided us with email addresses during registration for programs. We sent two reminder emails with survey links to maximize response rates (Sheehan, 2001; Sheehan & Hoy, 1997).

The survey included 20 questions that explored how often landowners used the Woodland Stick, which features of the stick they found most useful, whether they used the stick for making management decisions, whether MWMs used the stick while volunteering with other forestland owners, and which features of the stick needed improving. Survey participants were asked to comment when they disagreed with positive value statements about the Woodland Stick (e.g., "I enjoy using my Woodland Stick."). The survey also solicited participant comments relating to how MWMs used the stick while volunteering, what features users liked, and what aspects of the stick needed improvement and other general comments about the Woodland Stick. The survey questions are shown in the appendix.

## Data Analysis

We calculated descriptive statistics (means and percentages) using Microsoft Excel 2016 (Microsoft, Redmond, VA). We employed an ordinal logistic regression analysis using R (Version 3.6.1) (R Core Team 2019) to identify whether any relationships existed between landowner demographics (such as acres owned or years of landownership) and (a) how often the stick was used or (b) how often a specific feature of the stick was used.

## Results

The survey response rate was 43%, and 88% of survey respondents were MWM volunteers.

Among all respondents, 48% stated that they used the Woodland Stick at least once per year (Table 1). As expected, the components for estimating diameter at breast height and tree height were the most used features on the stick (Table 2). More complex information such as log volume and management guidelines was not often used.

**Table 1.**

Woodland Stick Frequency of Use

Frequency of use	Responses (%)
Every 2-3 years	27
Every year	24
Multiple times a year	24
Never	25

**Table 2.**

Preferred Uses of Woodland Stick

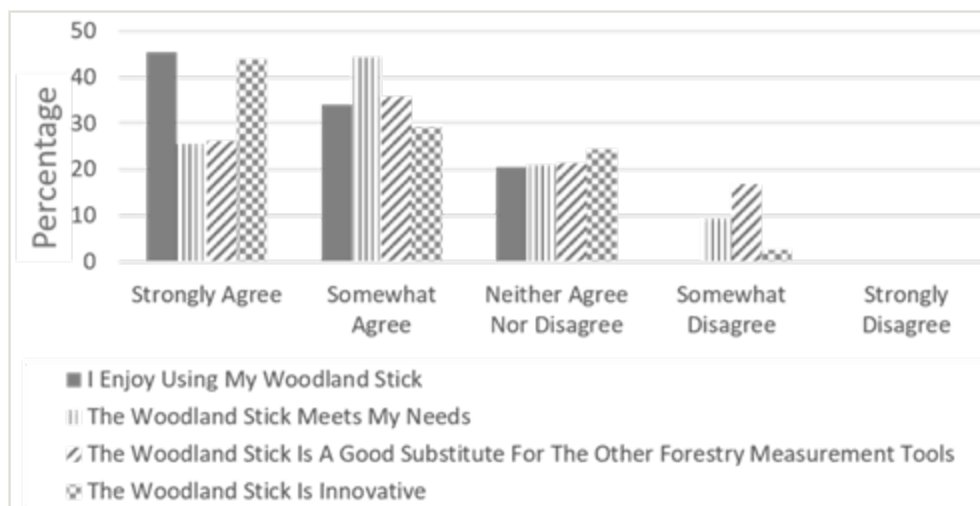
Measurement option	Responses (%)
DBH	72
Height	50
Log volume	19
Board feet	13

*Note.* Respondents were asked to choose up to three answers. DBH = diameter at breast height (tree diameter at 4.5 ft or 1.3 m).

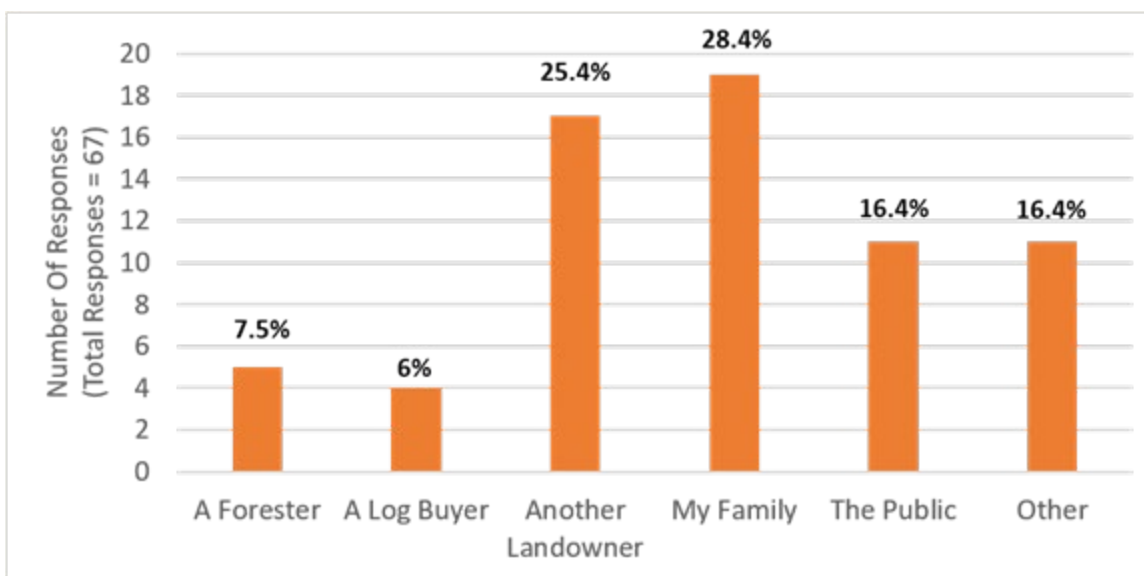
Over 60% of respondents strongly agreed or somewhat agreed that the Woodland Stick met their needs, has innovative features, and is enjoyable to use (Figure 1). The tool helped them communicate the volume of their trees to other landowners, their families, and the public (Figure 2). Most importantly, 28% of respondents reported using the tool when writing a forest management plan, and 54% reported using it when conducting a forest inventory (Table 3). Those who did not use the tool for these reasons felt that it did not deliver

information that was accurate enough when compared to the more advanced tools available, especially when completing measurements needed for timber sales or legal purposes.

**Figure 1.**  
Woodland Stick Value Characterization



**Figure 2.**  
Use of Woodland Stick as Tool for Communicating with Landowners and Professionals



Note: Participants were able to choose all answers that applied. Percentages were rounded to the nearest tenth.

**Table 3.**  
Use of Woodland Stick for Management Planning

Response option	Management plan (%)	Forest inventory (%)
Yes	28	54

No	58	34
Maybe	14	12

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Of the respondents who identified as MWMs, 55% used the Woodland Stick while volunteering to assist other landowners like themselves, and 47% said they had recommended using the stick to someone else.

More than 60% of the woodland owners who responded to the questionnaire had been managing their forestland between 25 and 50 years. Acres owned ranged from 0 to 1,000 ac and averaged 181 ac. Of all the respondents, 80% were White, 74% were male, and 70% were retired. All participants were over the age of 45. Participants in the survey who had owned their properties for less than 5 years were more likely to agree that the Woodland Stick met their needs as compared to landowners who had owned their land for 6 or more years,  $\beta = 18.3$ ,  $t(33) = 1.25e+07$ ,  $p < .001$ .

When asked to comment on their favorite things about the stick, participants mentioned that it is simple to use, that it is a great tool for teaching youths and neighbors about forestry, and that they appreciated its low cost compared to other forestry tools. When asked to assess how the stick could be improved, survey respondents recommended that it be constructed in a way that would allow it to double as a walking stick. Respondents also recommended that a publication or user's manual addressing how to use the stick should be included with every stick purchased or acquired.

## Discussion and Conclusions

More than half of the woodland owners (60%) who responded to the survey enjoyed using the Woodland Stick and stated that it met their needs. Of the 35 participants who had a management plan, less than 30% stated that they had used the tool to help them write their management plans. The 55% who stated that they had not used the Woodland Stick to help them write their management plans may have included landowners who hired a consulting forester. We draw this conclusion because 54% affirmed that they had used the Woodland Stick for establishing a forest inventory, which is important foundational information included in a forest management plan. Further, only 6%–7% of respondents used the stick to communicate information to forestry professionals, such as foresters and log buyers. This finding may be an indicator that landowners use the tool early in the forest management planning cycle and then come to rely on more accurate methods at the time of harvest.

From the survey comments, we learned that respondents found the tool useful for introducing tree measurements and forestry concepts to new learners. Additionally, newer landowners were more likely to find that the tool met their needs. With this in mind, we expect that introducing the Woodland Stick in beginner classes will encourage people to incorporate tree measurements into their forest management decision processes. As landowners advance into the MWM volunteer training program, they can be introduced to more accurate (and complex) tools. Woodland Stick instruction in the MWM program should focus on how MWMs can use the tool on site visits as part of their peer-to-peer work with novice landowners.

When asked how the Woodland Stick could be improved, survey respondents recommended that it be constructed in a way that would allow it to double as a walking stick. Previous versions of the stick have been designed to accommodate that purpose; however, the most recent version favored information display qualities over the tool's ability to serve as a walking stick. Respondents also recommended that a publication

or user's manual covering how to use the Woodland Stick be developed and provided with each stick. Since the Woodland Stick upgrade in 2017, every person who purchases a Woodland Stick receives a laminated instruction card highlighting how to use each tool feature.

Our goals for increasing the impact of the Woodland Stick include developing a more suitable and robust user guide, videos covering how to use the stick, a smartphone application, and continuing education classes on how to use the Woodland Stick for those needing a refresher. Additionally, multiple survey respondents mentioned their concern for accuracy of the Woodland Stick. With this in mind, we plan to develop a research project to test the accuracy of the Woodland Stick against that of more advanced tools and include that information in the Woodland Stick outreach materials. These outreach materials will also emphasize how the Woodland Stick can be used as a communication tool with various natural resources professionals and for management planning.

The Woodland Stick concept is easily transferrable to other university Extension programs. The Biltmore Stick's physical design and measurement information are applicable to any tree species and forest community. Interested Extension professionals can easily and effectively use the stick to introduce concepts of measurements and inventory to new landowners. Additionally, the tool is extremely cost effective. With a \$5 purchase, landowners can obtain a fairly accurate picture of what forest resources are present on their properties. The design of the Woodland Stick lends itself to being easily adapted for use in other regions as well. The Scribner volume tables can be replaced with the Doyle rule, for example, and species-specific information can be adjusted to relevant species for a region.

There is interest from small forest property owners in having a general understanding of the sizes of the trees on their properties. The Woodland Stick provides a unique opportunity for Extension instructors to empower landowners to gather practical information about their properties at low cost and thereby support their management planning endeavors and applied forestry management actions, such as harvesting. The Woodland Stick is also a resource MWMs can use during site visits and other peer-to-peer learning activities. We encourage other Extension program personnel to adopt and use the Woodland Stick to promote a basic understanding of forest measurements, a first approach to writing a forest management plan, an ability to communicate with forestry professionals, and an opportunity for continuous forest monitoring.

### **Acknowledgments**

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## **Appendix**

### **Survey Questions**

Q1. How often do you use your Woodland Stick?

- Multiple times a year
- Every year
- Every 2-3 years
- I've never used it

Q2. When did you receive your Woodland Stick?

- 2016 or earlier—your woodland stick is square
- 2017 or later—your woodland stick is flat

Q3. Which features of the Woodland Stick have you used? (Check all that apply)

- Diameter at breast height (DBH)
- Height
- Log Volume
- Board Feet

- Ruler

Q4. Which features of the Woodland Stick do you use most often? (Check up to 3 features)

- Diameter at breast height (DBH)
- Height
- Log Volume
- Board Feet
- Ruler

Q5. Which features of the Woodland Stick do you use least often? (Check up to 3 features)

- Diameter at breast height (DBH)
- Height
- Log Volume
- Board Feet
- Ruler

Q6. [Participants could select one of the following for each statement—*strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree*]

Statements:

- I enjoy using my Woodland Stick
- The Woodland Stick meets my needs
- The Woodland Stick is innovative
- The Woodland Stick is a good substitute for the other forestry measurement tools

Q6a. Please share why you disagreed with one or more of the above statements.

Q7. The Woodland Stick helped me communicate the volume of my trees better to: [check all that apply]

- A forester
- A log buyer



- Another landowner
- My family
- The public
- Other
- None of the above

Q8. Do you have a written forest management plan?

Q8a. Did you use the Woodland Stick to help you write your forest management plan (e.g., use the Woodland Stick to get tree volume information that you included in your plan)?

Q9. Did you use the Woodland Stick to assist you in conducting a forest inventory (i.e., use it to take heights, diameters, or calculate volume of your trees)?

Q10. Are you a Master Woodland Manager?

Q10a. If yes, have you used the Woodland Stick while volunteering?

Q10b. Please describe how you used the Woodland Stick while volunteering as a Master Woodland Manager.

Q11. Have you recommended the Woodland Stick to someone else?

Q11a. How many people have you recommended using this stick to?

Q12. What is your favorite thing about the Woodland Stick?

Q13. In what ways can the Woodland Stick be improved?

Q14. Do you have anything else to share about the Woodland Stick?

Q15. How many acres do you own or manage?

Q16. How long have you owned or managed your property?

Q17. What is your age?

Q18. What is your ethnicity?

Q19. What is your gender?

Q20. What is your employment?

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