

The Nature Conservancy's Don't Move Firewood Campaign: An Analysis of the 2005-2016 Survey Data

Project Report Submitted To



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Introduction

There is a long history of non-native forest pests being introduced to North America. Many non-native forest insects and diseases have made their way to North America through wood packaging material, live plant imports, and other means associated with international trade (Meurisse et al., 2019), while only some have become invasive species capable of widespread economic and ecological damage. The first record of the establishment of an introduced forest pest was the codling moth (*Cydia pomonella*) in 1635 which causes severe damage to agricultural crops (Aukema et al., 2010). Since then, the introduction of invasive forest pests increased exponentially. Among the worst early introduced invasive insects is the gypsy moth (*Lymantria dispar dispar*), introduced to the United States in 1869 (Elkinton & Liebhold, 1990) and later becoming one of the first pests widely known to spread by human movement of firewood for recreational and commercial purposes (Jacobi, Goodrich & Cleaver, 2011; Koch et al., 2012; Haack, Petrice & Wiedenhoft, 2010). The results of invasive forest pests and their spread throughout North America include detrimental biological impacts on natural and planted forests, their species composition, and ecosystem services, and the cost of these impacts can reach into the billions of dollars (Boyd et al., 2013; Pimentel et al., 2000).

Currently, there are some (species-specific) federal regulations on forest pests that are monitored and enforced by the federal government through USDA APHIS and US Customs and Border Protection (in partnership with international agencies to protect against their spread across international borders). There are also state driven regulations, usually through a state's Department of Agriculture, to prevent the intra- or interstate movement of invasive forest pests through the transport of firewood. Through these various mechanisms, both internal and external quarantines are in place across the country, representing a patchwork of preventative strategies. However, despite these regulations, the persistent spread of invasive insects and diseases across North America has increased the need for educational campaigns for citizens which are aimed at reducing the spread of invasive species. Regulatory reach has shown to be limited due to reasons including ineffective surveillance, lack of enforcement, and intentional and unintentional non-compliance (Lovett et al., 2016; Haack et al., 2014). The Nature Conservancy (TNC) implemented the Don't Move Firewood Campaign (DMF) in 2008 with the purpose of creating a consistent continent-wide campaign aimed at educating the general public on the spread of invasive forest insects and diseases through the movement of contaminated firewood. The goal of the DMF campaign was to effectively and efficiently prevent movement of firewood and associated pests by the public through research-informed outreach and coordination.

Over the past fifteen years, TNC conducted regional and national surveys in preparation for, and later part of, their educational program to gain a better understanding of the public's knowledge, perceptions of, and attitudes towards various environmental issues, including forest health and invasive species, as well as their behavior related to buying, transporting, and using firewood.

Methods

Survey Administrations

Between 2005 and 2016, TNC coordinated and conducted multiple studies addressing the use and movement of firewood relative to the spread of invasive forest insects and diseases (Table 1). TNC hired a research firm to develop the questionnaires and their respective sample frames for each survey administration and to implement data collection for each survey. The firm accessed state registered voter databases to develop the sample frames and the surveys were administered via phone. Four questionnaires were administered one time each at regional (320-300 and 320-338) or national levels (320-262 and 320-452), while one survey (320-705) was administered three times to different populations of interest: National, North Carolina, and Massachusetts. The total number of survey respondents across the five surveys was 4,840.

Table 1. List of surveys administered including survey number, administration date and location, the sample frame (N), and the number of respondents for each survey (n).

Survey Number	Admin Date	Location	Sample Frame (N)	Sample size (n) (Response rate)
320-262	Dec 2005	National	<ul style="list-style-type: none"> • 36,000 in continental U.S. 	817 (2.3%)
320-300	Mar 2007	Midwest	<ul style="list-style-type: none"> • 18,000 in IL • 18,000 in WI 	800 (2.2%)
320-338	Dec 2007	Regional (Northeast, Upper Midwest)	<ul style="list-style-type: none"> • 5,625 from ME, VT, NH, MA, CT, and RI • 4,500 from NY • 2,250 from NJ • 5,625 from PA • 18,000 from WI, IL, IN, MI, OH, and WV 	600 (1.7%)
320-452	Sept 2010	National (California, Northeast, South)	<ul style="list-style-type: none"> • 9,000 in Continental U.S • 9,000 in CA • 9,000 in Northeastern region (CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT) • 9,000 in Southern region (AL, AR, FL, GA, KY, MS, NC, SC, TN, VA, WV) 	1400 (3.9%)
320-705	Jul 2016	National, North Carolina, Massachusetts	<ul style="list-style-type: none"> • 5,000 in Continental U.S. • 4,000 in NC • 1,000 in MA 	1223 (12.23%) NC-100 (2.5%) MA-605 (60.5%)

The questions asked in the surveys can be divided into three themes related to the dispersal of forest insects and diseases through firewood movement: 1) Awareness of the issue, 2) Attitudes towards the issue, and 3) Behaviors related to the issue. Question type varied between multiple choice, Likert scale, open-ended, select all that apply, and binary (i.e., yes, no). Some (multiple choice and Likert scale) questions included a “split sample” methodology, wherein different terms for a similar item (e.g., “forest” and “wooded area”) or more or less information is given (e.g., “creating an official, but voluntary, state certification for firewood encouraging people to only purchase such certified firewood” and “creating an official, but voluntary, state certification for firewood encouraging people to only purchase such certified firewood, even though it might cost slightly more”) are used for randomly created sub-populations of the total population of participants to determine if there is a significant difference in response depending on the way the question is asked. Open-ended question responses were coded (based on similarity of the responses) by the research firm at the time of the initial analysis.

Although some of the questionnaires share common questions (e.g., birth, race, and education level; Table 2), none of the five questionnaires are identical. In addition, the sample size for every question varies throughout the surveys.

Data Entry and Analysis

Data from each survey were provided to us by TNC in Excel documents. We organized the data into a single Excel spreadsheet for the purpose of analyzing the aggregate data. We used the Statistical Package for Social Sciences (SPSS; 26.0.0, Chicago, Illinois) to calculate all descriptive statistics on the aggregate data.

Results

In total, there were 4,840 respondents to all 5 surveys, with the largest portion of the total sample (1,400) from survey 452 (September 2010) and the smallest portion of the total sample (600) from survey 338 (December 2007). The total aggregate response rate was 4.46%. All but one survey (S705) had a sample frame of 36,000. Survey 705 had the highest response rate (12.23%), although it had the smallest sample frame (10,000), and survey 338 had the lowest response rate (1.7%).

Socio-demographic and Personal Background Questions

The mean age range of the participant samples at the time of their respective response was between 50 and 54 years old. Most identified themselves as White/Caucasian (85%), with another 8% identifying as Black/African American, and the other 7% as either Hispanic/Latino, Asian/Pacific Islander, or Native American. The most common educational level among participants was some college (27%), followed by high school (26%), college (21%), post-graduate

work (13%), and less than high school (12%). Of the participants asked if they had children under 19 living at home (S300, S338, and S452), 70% indicated there were only adults in the home. Political affiliation (S262 and S300) varied, with most identifying as Democrats (44%), followed by Republicans (29%), and Independents (25%). The average income level (S338) was \$60,001-\$90,000, and most owned their home (90%; S338). Most indicated they were not dependent economically to the condition of forests in their area (72%; S300), while an additional 20% indicated they were somewhat dependent (20%), and 8% indicating they were very dependent on the forests. Most (69%; S338) had never volunteered time or donated money to an environmental organization.

Table 2. List of socio-demographic questions, the survey (s) in which the question was asked, and the total number of respondents to each question (n).

Question	Survey Number	Sample Size
Date of birth	262, 300, 338, 452, 705	4,630
Race	262, 300, 338, 452, 705	4,649
Education level	262, 300, 338, 452, 705	4,793
Children <19	300, 338, 452	2,061
Political party	262, 300	1,483
Own/Rent home	338	594
Income level	338	450
Donate/Volunteer	338	1,356
Forest dependent	300	757

Participants were asked to indicate how often they participated in a variety of activities (Table 3). The most frequent outdoor recreational activity among the participants was visiting a state park. The activities participants engaged in the least frequently were driving a four-wheel ATV and hunting.

Table 3. Mean response to how often respondents participated in each recreational activity on a 4-point Likert scale, where 1=frequently and 4=never. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively.

	Mean Likert Scale Score	Survey(s)	Sample Size(s)
Visit state park	1.98	338	596
Garden	2.09	300, 452, 705	<u>1409</u> (307,551,551)
Buy nursery plants	2.25	300	796
Hike and/or bike	2.44	300, 338	<u>338</u> (166,172)
Wildlife/Bird watching	2.45	300, 338, 452, 705	<u>1142</u> (241,215,399,287)
Hike	2.73	452, 705	<u>488</u> (224,264)
Going to a cabin	2.88	338, 452, 705	<u>467</u> (134,177,156)
Fish	2.92	300, 338, 452, 705	<u>614</u> (138,138,190,148)
Camp	2.93	300, 338, 452	<u>398</u> (96,132,170)
Purchase fireplace tools	3.00	338	592
Buy wood stove	3.08	338	589
Practice winter sport	3.21	300, 338, 452	<u>289</u> (71,115,103)
Camping trailer	3.33	338, 452	<u>182</u> (71,111)
Bike	3.36	452	1393
Hunt	3.45	300, 338, 452, 705	<u>365</u> (100,102,92,71)
Driving a four-wheel	3.53	452	1389

Surveys 300 and 452 used split sample methodology to ask participants how close they lived to and how many times they visited: a) a wooded area, or b) a forest (Table 4). For participants asked how close they live to a wooded area, nearly two-thirds (65%) indicated that they live less than 5 miles of a wooded area; while of participants asked how close they live to a forest, only 39% indicated that they live less than 5 miles of a forest.

Table 4. Answer choices for participants who were asked how close they live to (split sample A: a wooded area) or (split sample B: a forest) and percentage of participants who selected each answer. This was a multiple-choice question.

Answer choices	Wooded area	Forest
Less than 5 miles	65%	39%
5 to 10 miles	16%	15%
11 to 25 miles	7%	14%
26 to 50 miles	5%	12%
51 to 100 miles	4%	10%
More than 100 miles	3%	10%

In the same way, participants were asked how many times they visited a) a wooded area or b) a forest over the past year (S300 and S452; Table 5). Of the participants who were asked how many times they visited a wooded area, 34% had visited 10 times or more; while of the participants who were asked how many times they visited a forest, only 22% said they visited 10 times or more. A similar difference can be seen for those who said they never visited a wooded area over the past year (18%) compared to those who said they never visited a forest over the past year (30%). These two surveys (S300 and S452) also asked all participants if they had trees in their yard or property, of which 39% indicated having a great deal of trees in their yard or property and 54% having a few trees in their yard or property.

Table 5. Answer choices for participants who were asked how many times they visited a (split sample A: a wooded area) or (split sample B: a forest) over the past year and percentage of participants who selected each answer. This was a multiple-choice question.

Answer choices	Wooded area	Forest
Never	18%	30%
Once or twice	17%	20%
3 to 5 times	16%	17%
6 to 10 times	15%	11%
More than 10 times	34%	22%

In all but one survey (S338), participants were asked to indicate how serious a host of social and environmental issues were in their area (Table 6). Results indicate that overall respondents felt the cost of health care was the most serious issue, while too much logging in forests was the problem of least concern in their area. In addition, on average, participants scored *bugs* that kill trees as a more serious problem than *insects* that kill trees, diseases that *kill* trees over diseases that *infest* trees, and *wildfires* over *forest fires* and *megafires*.

Table 6. Mean response to how serious a problem each issue is in the respondent’s area on a 4-point Likert scale, where 1=extremely serious and 4= not serious. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Question	Mean Likert Scale Score	Survey (s)	Sample Size
Cost of health care	1.94	262, 300, 452, 705	<u>798</u> (181,153, 272,192)
Economy & unemployment	2.19	262, 300, 452, 705	<u>580</u> (66, 85, 316, 113)
Taxes	2.39	262, 300, 452, 705	<u>542</u> (116,125,191,110)
Quality of Pub. Ed.	2.46	262, 300, 452, 705	<u>471</u> (87,56,198,130)
Water pollution	2.71	262, 300, 452, 705	<u>289</u> (54, 56, 89, 90)
Lack of affordable housing	2.75	262, 300, 452, 705	<u>322</u> (69, 57,116, 80)
Traffic	2.79	262, 300, 452, 705	<u>313</u> (54, 60,130, 69)
Habitat loss for fish & wildlife	2.80	262, 300, 452, 705	<u>268</u> (50, 57, 95, 66)
Poorly planned development	2.84	262, 300, 452, 705	<u>250</u> (54, 37, 92, 67)
Bugs that kill trees*	2.85	262	357
Air pollution & smog	2.90	262, 300, 452, 705	<u>252</u> (66, 37, 89, 60)
Diseases that kill trees [§]	2.91	262, 300, 452, 705	<u>211</u> (45, 45, 66,55)
Insects that kill trees*	2.97	262, 300, 452, 705	<u>185</u> (29, 48, 54, 54)
Diseases that infest trees [§]	3.04	262	356
Wildfires [†]	3.12	262, 452, 705	<u>179</u> (38, 84, 57)
Forest fires [†]	3.14	705	611
Megafires [†]	3.23	705	596
Too much logging	3.24	262, 300, 452, 705	<u>140</u> (30, 37, 46, 27)

*Split question with Bugs that kill trees – Insects that kill trees – Combined average Likert score = 2.91

[§]Split question with Diseases that kill trees – Diseases that infest trees – Combined average Likert score = 2.97

[†]Split question with wildfires – Forest Fires – Megafires – Combined average Likert score = 3.13

Awareness about Insect and Disease Dispersal through Firewood Movement

Respondents were asked if they had ever seen, heard, or read any information urging the public not to move firewood from place to place (S338, S452, S705); 61% indicated they had not seen, heard or read any such information. Surveys 338 (2007) and 705 (2016) included an open-ended question asking participants what they had seen, heard, or read about this issue. Responses were recorded and coded by similarity. In 2007, the most common response (S338; 20%) was they had heard it was “not a good idea to transport firewood from one place to another” (Table 7), while in 2016 (S705; 45%) it was “spreads around insects” (Table 8). Participants were also asked if they were aware of any state laws or regulations in their area limiting the public’s ability to move firewood from one location to another (S338, S452, and S705); 81% indicated they had not aware of any such information.

Table 7. Open-ended responses, coded by similarity, on survey 338 (December 2007) from participants who had seen, heard, or ready any information urging the public not to move firewood from place to place.

<i>What did you see or hear about this issue? (338, 2007)</i>	Percentage of Respondents
Not a good idea to transport firewood from one place to another	20%
Illegal/not supposed to transport across state/county lines	19%
Insects being transported from one place to another	14%
Don't know	14%
Wood might be contaminated by insects and diseases	10%
Newspaper ad urged public not to move firewood	7%
There is a problem with EAB	5%
Billboard saying "don't move firewood"	5%
Other	6%

Table 8. Open-ended responses, coded by similarity, on survey 705 (July 2016) from participants who had seen, heard, or ready any information urging the public not to move firewood from place to place.

<i>What did you see or hear about this issue? (705, 2016)</i>	Percentage of Respondents
Spreads around insects	45%
I heard through TV/newspaper/radio/billboard	16%
Don't move from place to place	11%
Can't take wood across state lines with it	10%
Spreads diseases to the trees/kill trees	5%
Other	24%

In all but one survey (S338), respondents were asked to indicate whether they had heard anything about trees being infested or killed by a given insect or disease (Table 9). On average, respondents had heard most about gypsy moth and Dutch elm disease; respondents had heard least about laurel wilt and Sirex woodwasp. The majority of participants had not heard of the emerald ash borer (59%), chestnut blight (71%), sudden oak death (72%), Sirex woodwasp (78%), and laurel wilt (90%) infesting or killing trees (Table 9.1).

Table 9. Mean response to whether respondents had heard anything about trees being infested or killed by that insect or disease on a 4-point Likert scale, where 1=heard a lot and 4= not heard. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively.

Question	Mean Likert Scale score	Survey (s)	Sample Size
Gypsy moth	2.57	262, 300, 452, 705	<u>1076</u> (160, 250, 241, 425)
Dutch elm disease	2.59	262, 300, 452, 705	<u>1125</u> (171, 392, 255, 307)
Asian longhorned beetle	2.70	262, 300, 452, 705	<u>604</u> (18, 215, 78, 293)
Emerald ash borer	3.20	262, 300, 452, 705	<u>362</u> (18, 137, 64, 143)
Chestnut blight	3.50	262, 452, 705	<u>216</u> (54, 68, 94)
Sudden oak death	3.52	262, 300, 452, 705	<u>164</u> (15, 72, 44, 33)
Sirex woodwasp	3.65	300, 452	<u>32</u> (31, 1)
Laurel wilt	3.86	452, 705	<u>14</u> (7, 7)

Table 9.1. Breakdown of responses on the 4-point Likert scale for participants that were asked to indicate whether they had heard anything about trees being infested or killed by a given insect or disease

Question	Yes, a lot	Yes, a fair amount	Yes, a little	No
Gypsy moth	26%	22%	21%	31%
Dutch elm disease	27%	20%	19%	34%
Asian longhorned beetle	24%	17%	23%	36%
Emerald ash borer	14%	11%	16%	59%
Chestnut blight	7%	8%	14%	71%
Sudden oak death	6%	8%	14%	72%
Sirex woodwasp	4%	5%	13%	78%
Laurel wilt	0.9%	2%	7%	90%

Attitudes towards Insect and Disease Dispersal through Firewood Movement

Two questions assessed changes in attitude during the course of the survey. In the first, participants were asked to indicate how concerned they were about insects and diseases that are killing large numbers of trees across the U.S twice in three of the surveys (S262, S300, S452). To get a baseline response, the participants were asked the question early in the surveys, and then again later in the survey after they had answered questions regarding non-native insects and diseases that are infesting North American forests/trees. Approximately 90% expressed some level concern, with 41% indicating some concern, 31% indicating they were very concerned, and

another 17% being extremely concerned in the baseline measurement. In the follow up, 33% indicated they were somewhat concerned, 40% indicated they were very concerned, and another 22% indicated to be extremely concerned. Similarly, Participants were asked if they would support a proposal in Congress to increase funding for efforts to eradicate and stop the spread of non-native insects and diseases (S262). Over three-quarters of respondents indicated support, with 43% responding with strong support and another 34% indicating they would somewhat support the proposal. In the follow up question, 47% indicated strong support, while slightly fewer than the baseline (31%) indicated some support.

Participants were given some brief information on the issue of insect and disease dispersal through firewood movement and were subsequently asked how willing they would be to only use local firewood and not move it from place to place (S338, S705). Eighty-one percent of respondents indicated they were very willing, and another 11% were somewhat willing. Survey 338 asked participants the same question near the end of the questionnaire, 77% indicated they were very willing and 17% were somewhat willing. Respondents were also asked to indicate why they would not use firewood from a local area (S338; Table 10). The most popular response category for this question after responses were coded was “I live in the woods and use my own / lots of trees around,” followed by “I don’t know” (17%).

Table 10. Percentages for coded responses from open-ended answers from participants of survey 338 regarding why they were not willing to use only local firewood and not move it from place to place.

Coded responses	Percentage of Respondents
I live in the woods and use my own / lots of trees around	34%
Don’t know	17%
Not available	14%
I should be able to carry firewood wherever I want	8%
Easier and safer	8%
Don’t know what they are selling	7%
Different varieties	6%
Cost factor	6%
Out of my way	4%
Don’t like all the cutting and lugging	4%

Respondents were given a series of terms referring to invasive forest insect pests and diseases (S262) and were asked to indicate whether the term sounded positive or negative to them. All terms scored below the neutral rating (Table 11), however, the term “pathogens” had, on average, the lowest score (i.e., most negative connotation), followed by the term “invasive insects”. The terms with the least negative ratings were “exotic insects” and “non-native species.” In addition, *pathogens*, *invasive insects*, *non-native insect*, *introduced insect*, and *foreign insect*

sounded more negative to participants than *tree diseases*, *exotic insects*, *non-native species*, and *introduced insect*, respectively.

Table 11. Mean response to whether each term has a positive or negative ring or feeling on a 7-point Likert scale where 1= very negative, 4= neither, and 7= very positive. This was a split sample question; left columns represent sample A and right columns represent sample B.

Term	Mean Likert Scale score	Sample Size	Term	Mean Likert Scale score	Sample Size
Pathogens	2.65	318	Tree diseases	2.97	400
Invasive insects	2.66	363	Exotic insects	3.39	375
Non-native insect	2.88	374	Non-native species	3.24	386
Introduced insect	3.15	357	Foreign insects	2.98	394

Participants were given three statements related to different approaches to protecting forests from insects and diseases and asked to indicate which one they felt was most effective (S300; Table 12). Two of the three statements were preferred by participants. “Toughening and improving regulations designed to prevent invasive insects and diseases from being brought to America” was chosen by 42% of respondents; “preventing the importation of invasive species by giving consumers more information and encouraging them to buy only plants certified to be free of insects and diseases” was chosen by 32% of participants. In contrast, only 11% of respondents selected “devoting more money to existing government efforts to prevent invasive species from entering the country.”

Table 12. Frequencies of responses to what option would be best for preventing forests from invasive insects and diseases. This was a multiple-choice question.

<i>Which approach you think will be most effective?</i>	Percentage of Respondents	Sample Size
Toughening and improving regulations designed to prevent invasive insects and diseases from being brought to America	42%	327
Preventing the importation of invasive species by giving consumers more information and encouraging them to buy only plants certified to be free of insects and diseases	32%	248
Devoting more money to existing government efforts to prevent invasive species from entering the country	11%	85
All are good statements	13%	103
None are good statements	2%	16

Participants were asked to indicate which one of the statements about insects and diseases that are killing large numbers of trees across the U.S. caused the most concern (S262; Table 13). Responses varied, as 38% of respondents indicated the most concerning statement was “insects and diseases threaten our clean air, clean water, and public health.” Similarly, in another survey (S300), participants were given three statements and asked to indicate which one offers the best reason to support efforts to fight tree-killing non-native insects and diseases (Table 14). The preferred statement by participants (39%) was “forests are critical to our public health, providing natural filters that keep our air and drinking water clean.”

Table 13. Frequency of participants responses to related to what causes the most concern about insects and diseases that are killing large numbers of trees across the U.S. This was a multiple-choice question.

<i>Which statement causes you the <u>most</u> concern about insects and diseases that are killing large numbers of trees across the U.S?</i>	Percentage of Respondents	Sample Size
Insects and diseases threaten our clean air, clean water and public health	38%	299
Insects and diseases are spreading rapidly across the country, and trees have no defenses	15%	115
Insects and diseases will cost thousands of jobs and hurt our economy	15%	115
Insects and diseases threaten trees that are an important part of neighborhood and community quality of life	11%	90
Insects and diseases are placing our enjoyment of forests at risk	5%	42
All concern me	11%	90
None concern me	5%	36

Table 14. Frequency of participants responses to the best reason to support additional efforts to fight non-native insects and diseases that kill trees. This was a multiple-choice question.

<i>Which statement offers the <u>best</u> reason to support additional efforts to fight non-native insects and diseases that kill trees?</i>	Percentage of Respondents	Sample Size
Forests are critical to our public health, providing natural filters that keep our air and drinking water clean	39%	302
Trees are essential to our quality of life, providing beauty, peace and shade to our homes and communities	23%	178
Forests are important to our economy, supporting tens of thousands of good-paying jobs across the U.S.	17%	129
All are good reasons	20%	159
None are good reasons	1%	13

In another survey (S452), participants were given a series of problems that may be caused by the spread of laurel wilt (Table 15) and sudden oak death (Table 16) in their area and were asked to rate how serious of a problem each was. Respondents indicated that the loss of hunting opportunities caused by laurel wilt and loss of food for wildlife caused by sudden oak death were the problems of most concern.

Table 15. Mean response to how serious a problem the participants think each of the following situations are on a 4-point Likert scale, where 1= extremely serious and 4=not serious.

Problems related to laurel wilt	Mean Likert Scale Score	Sample Size
Loss of hunting opportunities	3.16	31
Loss of avocado crops	3.07	27
Loss of certain hardwood trees	3.06	32

Table 16. Mean response to how serious of a problem the participants think each of the following situations are on a 4-point Likert scale, where 1= extremely serious and 4=not serious.

Problems related to sudden oak death	Mean Likert Scale Score	Sample Size
Loss of food for wildlife	2.70	205
Loss of visual beauty associated with forests and trees	2.58	214
Increased risk of fire among dead trees	2.28	212

Respondents were asked to indicate their agreement/disagreement with a series of statements related to invasive insects and diseases (S262, S300, S452; Table 17). Respondents strongest agreement was with the statement, “Protecting trees and forests is important for maintaining air and water quality,” while they most strongly disagreed with “if and area loses a large number of trees, they almost always grow back on their own.”

Table 17. Mean response to whether participants agree or disagree with the statements below on a 4-point Likert scale, where 1= strongly agree and 4= strongly disagree. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question with no comparable questions.

Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
Protecting trees and forests is important for maintaining air and water quality	1.34	262	393
Trees are an important part of the character and quality of life in my neighborhood	1.39	262, 300, 452	<u>1000</u> (273,301,426)
Being surrounded by trees gives me a sense of peace	1.44	300	394
Non-native plants, insects, and animals can do great damage when they are introduced to a new area	1.59	262, 300, 452	<u>774</u> (203,231,340)
The death of large amounts of trees can cause significant economic damage and job loses	1.78	262	377
Native insects and diseases are just a big threat to American trees as non-native ones	2.12	452	603

Table 17 CONTINUED. Mean response to whether participants agree or disagree with the statements below on a 4-point Likert scale, where 1= strongly agree and 4= strongly disagree. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question but with no comparable questions.

Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
The federal government is actively working to keep invasive insects and diseases affecting trees from entering the country	2.26	452	157
It's sad when bugs or diseases kill trees, but it's just a natural process at work	2.39	262, 300, 452	<u>318</u> (77,57,184)
I know of areas where trees have died from disease or insects	2.41	262, 300, 452	<u>400</u> (108,120,172)
Forests and trees are disappearing quickly in my area	2.43	262, 300, 452	<u>395</u> (121,108,166)
The federal government has done a good job of keeping invasive insects and diseases affecting trees from entering the country	2.55	452	113
We have lots of things to worry about in the U.S right now, and tree diseases should be a low priority	2.80	262, 300, 452	<u>223</u> (66,43,114)
If and area loses a large number of trees, they almost always grow back on their own	3.01	300, 452	<u>124</u> (28,96)

In 3 of the 5 surveys (S300, S338, S452), respondents were asked to indicate how convincing a set of statements related to forest insect pests and diseases were to them (Table 18). On average, the statement, “Trees are essential to our quality of life. We must do what it takes to protect them” was the most convincing, while the least convincing statement was “The danger to America’s forests is so severe and so imminent that it has brought together groups that do not usually agree, who are leading efforts to fight these threats to American’s trees.”

Table 18. Mean response to how convincing the statements given are on a 4-point Likert scale, where 1=very convincing and 4= don’t believe. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
Trees are essential to our quality of life. We must do what it takes to protect them	1.42	300, 452	1,093
Forests play a critical role in providing natural filters that give us clean air, and are also sources of clean drinking water [†]	1.54	300, 452	<u>821</u> (453,368)
Insects & diseases that threaten these trees can change the character of a neighborhood for decades	1.59	300, 452	<u>593</u> (202, 391)
The only safe strategy is to keep these insects & diseases from ever being brought here [§]	1.68	300, 452	<u>538</u> (211,327)
Foreign insects that have been carried to the U.S accidentally are infecting trees that have no natural defense against them	1.67	300, 452	<u>1019</u> (390,629)
We just cannot know what impact a new foreign insect or disease will have when brought to our forests	1.65	300	395
Taking action now to prevent introduction of deadly insects & diseases is the most efficient way to protect our trees [§]	1.60	300, 452	<u>756</u> (390,366)
One type of tree-killing insect alone could cause more than 600 billion dollars in economic damage	1.68	300	390
When people buy firewood and bring it to the forest, it can spread insects & diseases that kill trees	1.69	338	592
Trees & forests clean the air & water, and anything that hurts trees & forests eventually affects people [†]	1.71	300, 452	<u>686</u> (371,315)
It may cost some money to stop tree-killing insects & diseases, but doing nothing would cause even more damage to our economy	1.72	300	389
Moving firewood can spread the insects & diseases that destroy forests & threaten our clean air, water & health*	1.75	338	596

Table 18 CONTINUED. Mean response to how convincing the statements given are on a 4-point Likert scale, where 1=very convincing and 4= don't believe. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
Moving firewood can spread insects and diseases that kill trees*	1.76	338	593
In states where it is illegal to move firewood, the spread of insects & diseases is slowed	1.81	338	582
Non-native insects & diseases have already cost cities & towns around the country millions of dollars, driving up local taxes	1.81	338	295
Insects & diseases that kill trees could cost us thousands of jobs & do serious damage to our economy	1.83	338, 452	<u>689</u> (106,583)
Stopping the spread of tree-killing insects & diseases is important to help deal with the climate crisis	1.83	338, 452	<u>582</u> (254,398)
Not moving firewood helps keep our forests safe from fire	1.87	338, 452	<u>794</u> (235,559)
Many species of trees have already been nearly wiped out by deadly non-native insects & diseases	1.91	452	666
The danger to America's forests is so severe & imminent that it has brought together groups that don't usually agree	2.12	300, 452	<u>601</u> (254,347)

*Split question with moving firewood can spread the insects & diseases that destroy forests & threaten our clean air, water & health - Moving firewood can spread insects and diseases that kill trees – average Likert score= 1.75

§Split question with taking action now to prevent introduction of deadly insects & diseases is the most efficient way to protect our trees - The only safe strategy is to keep these insects & diseases from ever being brought here – average Likert score= 1.64

†Split question with forests play a critical role in providing natural filters that give us clean air, and are also sources of clean drinking water - Trees & forests clean the air & water, and anything that hurts trees & forests eventually affects people – average Likert score= 1.62

Respondents were asked to indicate their level of support for a variety of strategies for reducing the movement of firewood (S300, S338, and S452; Table 19). The statement respondents showed the most support for was “Improving enforcement of existing laws that prevent non-native insects and diseases from being brought to the country.” The strategies that respondents were least supportive of were “Placing a state tax on firewood sales to raise money to fight the spread of insects and diseases” and “making it illegal to transport firewood across county lines.” It is important to note that the means scores for all the strategies are below 3 and thus do not reach the somewhat oppose or strongly oppose.

Table 19. Mean responses to possible solutions to firewood movement and invasive insects spread on a 4-point Likert scale, where 1=strongly support and 4= strongly oppose. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Likert Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
Improving enforcement of existing laws to prevent non-native insects and diseases from being brought to the country in the first place	1.41	300	792
Applying the same stiff standards used for import of fruits and vegetables to other ways that pests reach the country, such as imports of trees, shrubs, or houseplants	1.49	300	390
Urging garden and nursery industry to adopt an official certification to notify consumers that the products they buy and plant will not harm local trees*	1.50	300	390
Urging garden and nursery industry to adopt their version of the Dolphin Safe Tuna Seal, so consumers will know that the products they buy and plant will not harm local trees*	1.52	300	377
Encouraging voluntary shifts to successful industry practices that have been successful in preventing the introduction of insects and diseases	1.54	300	370
Requiring companies to contribute to the cost of addressing insects or diseases they help bring to the U. S, even if it makes some products more expensive	1.64	300	386
Publicizing the availability of free firewood on-site with your reservation at any private, state park, and state land campgrounds	1.67	452	645
Creating government incentives for nurseries to follow practices minimizing the spread of insects/diseases	1.69	452	685
Limit number or types of plant imports that can be imported to America, even if it means that certain imported plants will no longer be available in the country	1.74	300	383
Limit trade with other countries to keep non-native insects and diseases out	1.74	452	1,358
Prohibiting the transport of firewood into state parks or state lands, and only allowing the use of firewood gathered on site or sold by state land managers	1.77	338	577
Increasing federal funding by \$500mill/year to eradicate the most dangerous insects/diseases [§]	1.85	300, 452	<u>446</u> (102, 344)
Creating an official, but voluntary, state certification for firewood encouraging people to only purchase such certified firewood	1.93	338, 452	<u>407</u> (110, 297)
Creating an official, but voluntary, state certification for firewood encouraging people to only purchase such certified firewood, even though it might cost slightly more	2.06	338	289

The Nature Conservancy's Don't Move Firewood Campaign: An Analysis of the 2005-2016 Survey Data
<https://www.dontmovefirewood.org/resources/Survey-Data-Analysis-2005-2016>

Table 19 continued. Mean responses to possible solutions to firewood movement and invasive insects spread on a 4-point Likert scale, where 1=strongly support and 4= strongly oppose. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Likert Statement	Mean Likert Scale score	Survey(s)	Sample Size(s)
Increasing park visitor fees to raise money to fight the spread of insects/diseases	2.11	452	672
Requiring all firewood distributors to be licensed by the state with an agreement to follow procedures to keep insects and diseases from surviving in firewood [†]	2.14	338	288
Requiring all firewood distributors to be licensed by the state, and agree to follow procedures to keep insects and diseases from surviving in firewood, though they would make firewood cost slightly more [†]	2.15	338	288
Increasing federal funding by \$500mill/year to eradicate the most dangerous insects/diseases funded by a small increase in taxes [§]	2.18	300	378
Making it illegal to transport firewood across state lines [‡]	2.24	338	289
Introduce new insects that will be natural predators for dangerous, tree-killing insects	2.25	300	371
Spraying pesticides to kill dangerous invasive insects	2.28	300	381
Having occasional checkpoints on state highways to ensure that people are not moving firewood	2.47	338	571
Making it illegal to transport firewood across county lines [‡]	2.53	338	287
Placing a state tax on firewood sales to raise money to fight the spread of insects/diseases	2.54	338, 452	<u>309</u> (133,176)

*Split question with Urging garden and nursery industry to adopt their version of the Dolphin Safe Tuna Seal, so consumers will know that the products they buy and plant will not harm local trees - Urging garden and nursery industry to adopt an official certification to notify consumers that the products they buy and plant will not harm local trees – average Likert score= 1.51

§Split question with Increasing federal funding by \$500mill/year to eradicate the most dangerous insects/diseases - Increasing federal funding by \$500mill/year to eradicate the most dangerous insects/diseases funded by a small increase in taxes – average Likert score= 2.02

†Split question with Requiring all firewood distributors to be licensed by the state with an agreement to follow procedures to keep insects and diseases from surviving in firewood - Requiring all firewood distributors to be licensed by the state, and agree to follow procedures to keep insects and diseases from surviving in firewood, though they would make firewood cost slightly more – average Likert score= 2.14

‡Split question with Making it illegal to transport firewood across state lines - Making it illegal to transport firewood across county lines – average Likert score= 2.39

According to the respondents, the most believable sources that might speak out about information regarding issues relating to forest health (Table 20) are the state-level forestry departments, followed by park rangers. The least believable sources of information were congress, and outdoor equipment suppliers.

Table 20. Mean response to how believable are these sources of information speaking about issues relating to forest health on a 4-point Likert scale, where 1= very believable and 4= not at all believable. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively.

Question	Mean Likert Scale Score	Survey(s)	Sample Size(s)
State Dept. Forestry	2.36	300	516
WI Dept. Forestry	2.38	300	356 (<i>WI only</i>)
Rangers	2.39	300, 452, 705	<u>69</u> (24,15,30)
USFS	2.46	300, 452	<u>71</u> (22,13,36)
State Dept. Agriculture	2.52	300	533
IL Dept. Forestry Resources	2.54	300	341 (<i>IL only</i>)
TNC	2.56	300, 452, 705	<u>395</u> (56,169,170)
Scientists	2.58	300, 452, 705	<u>65</u> (21,13,31)
Homeowners	2.58	300, 452, 705	<u>137</u> (10,29,98)
Forester	2.59	300, 452, 705	<u>146</u> (23,39,84)
Conservation organizations	2.62	300, 452, 705	<u>117</u> (25,23,69)
Gardeners	2.71	452	1320
Recreation associations	2.88	452	1192
Timber companies	3.21	300, 452, 705	<u>163</u> (21,33,109)
Local owners	3.34	300, 452, 705	<u>122</u> (28,51,43)
Equipment suppliers	3.43	452	1212
Congress	3.61	452	1245

Participants were presented various sources that could present information about not moving firewood to the public (S338, S705). Respondents scored each source depending on whether they would be more or least likely to pay attention to them. Our results indicate that respondents would be most likely to pay attention to are a flyer distributed when entering a state park (Table 21), followed by information from a camp site reservation email. Sources that people would be least likely to pay attention to are a celebrity followed by a Facebook post.

Table 21. Mean response on ways to present information to the public about not moving firewood that they would pay most attention to, using a 3-point Likert scale, where 1=definitely pay attention and 3=definitely not pay attention. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question on S705; comparable questions are at the bottom of the table.

Question	Mean Likert Scale score	Survey(s)	Sample Size(s)
State park flyer	1.46	338	597
Campsite email	1.57	705	573
Friend	1.58	338, 705	<u>600</u> (306,294)
Poster	1.59	338, 705	<u>652</u> (310,342)
Brochure	1.66	338, 705	<u>601</u> (201,400)
Newspaper article [§]	1.72	338, 705	<u>571</u> (315,256)
Broadcast TV ad	1.72	338, 705	<u>548</u> (300,248)
Billboard	1.74	338, 705	<u>533</u> (263,270)
Label on firewood	1.75	338, 705	<u>596</u> (262,334)
Radio ad*	1.80	338, 705	<u>452</u> (234,218)
Cable TV ad*	1.85	338	587
Booth	1.86	338, 705	<u>442</u> (205,237)
Politician	1.95	338, 705	<u>390</u> (166,224)
Newspaper ad [§]	1.96	338, 705	<u>418</u> (250,168)
Mail newsletter	1.98	338	595
Catalog	1.98	338, 705	<u>412</u> (225,187)
E-Newsletter	2.00	705	602
Website	2.11	338, 705	<u>329</u> (169,160)
Facebook	2.22	705	585
Celebrity	2.33	338	593

*Split question with radio ad – tv ad – average Likert score = 1.76

[§]Split question with newspaper article – newspaper ad – average Likert score = 1.84

Participants were given two different phrases related to firewood movement and asked them which one they thought would serve best as a slogan for an educational poster or billboard (S705; Table 22). For sample A, “buy it where you burn it” was the preferred phrase for 72% of the participants; for sample B, “buy local, burn local” was preferred by 68%. The phrase “don’t move firewood” was not preferred by either sample (23%, 26%).

Table 22. Respondent’s choice of phrase to use as a slogan for an educational poster or billboard. This was a split sample question; left columns represent sample A and right columns represent sample B.

Phrase	Percentage of Respondents	Sample size	Phrase	Percentage of Respondents	Sample Size
Buy it where you burn it	73%	437	Buy local, burn local	68%	403
Don’t move firewood	23%	139	Don’t move firewood	26%	154
Neither	3%	16	Both	4%	21
Both	1%	8	Neither	2%	13

Participants were presented with phrases that might be used to describe a program and were asked whether those phrases had a positive or negative sound, in their opinion (Table 23; S300). The phrase rated as having the most positive connotation was “Clean & Green: Certified free of Invasive Species” followed by “Certified Green, Clean, & Safe.” The phrase that had the least positive connotation was “Plant Right.” It is important to note that all phrases scored, on average, above the neutral score.

Table 23. Mean response to split question phrases used to describe programs using a 7-point Likert scale, where 1=very negative, 4=neither, and 7=very positive: left columns represent sample A and right columns represent sample B.

Phrase A	Mean Likert Scale score	Sample Size	Phrase B	Mean Likert Scale Score	Sample Size
Green thumb certified	5.20	287	The good landscaping seal	5.18	378
Plant healthy	5.40	391	Plant right	4.52	274
Tree safe	5.44	381	Plant safe	5.16	382
CleanLeaf: Won’t harm local plants and animals	5.46	385	CleanLeaf: Safe for local plants and animals	5.54	390
A home safe plant: Certified free of invasive species	5.55	386	Clean & green: Certified free of invasive species	5.71	391
Certified green, clean & safe	5.61	385	Greenleaf: Certified clean	5.36	386

Behaviors regarding Insect and Disease Dispersal through Firewood Movement

Participants were asked how many times they burn firewood in a fireplace or wood stove compared to how often they burn firewood outdoors (S338, S452, S705). Fifty-five percent of respondents indicated they had never burned firewood indoors and 53% never burn firewood outdoors; 14% burned firewood indoors 30 times or more, and 11% burns firewood outdoors 10 times or more (Table 24). Participants who stated that they burn firewood indoors and/or outdoors were also asked if and how far they move firewood (S338, S452, S705); 68% never brings firewood from one location to use in another location and 67% of those who do typically move it less than 50 miles (Table 25).

Table 24. Percentage of respondents who burn firewood outdoors (left table) and who burn firewood indoors (right table).

<i>How often do you burn firewood indoors?</i>	Percentage of Respondents	Sample size	<i>How often do you burn firewood outdoors?</i>	Percentage of Respondents	Sample Size
More than 30 times	14%	437	10 or more times	11%	342
11 to 30 times	10%	336	5 to 9 times	12%	389
6 to 10 times	7%	232	1 to 4 times	24%	767
1 to 5 times	14%	441	Never	53%	1,697
Never	55%	1,765			

Table 25. Percentage of respondents who and bring firewood from one location to use in another location (left table) and mile range of firewood transported from those who move firewood (right table) from those who stated they burn firewood indoors and/or outdoors.

<i>How often do you bring firewood from one location to use in another location?</i>	Percentage of Respondents	Sample size	<i>How far have you typically transported it?</i>	Percentage of Respondents	Sample Size
5 times or more	7%	147	< 50 miles	67%	417
1 to 4 times	15%	293	51 to 100 miles	22%	139
Once every few years	10%	201	101 to 200 miles	6%	38
Never	68%	1,374	> 200 miles	5%	29

One survey (S338) addressed several specific questions about participant’s firewood behavior. When asked where they typically get their firewood (Table 26), responses indicated that 45% cut their own firewood, 28% purchased it, and 25% picked it up in the woods. Of those that purchase firewood, 39% indicated they buy their firewood once a year, with another 33% making firewood purchases 2 to 4 times a year. Responses to where participants get their firewood were

varied (Table 27). The most popular response was having a firewood seller bring it to their home (25%) and the least popular was buying it at a gas station (4%). Some participants provided information on how they had heard about their firewood seller (Table 28). The most common way was from word of mouth (20%), while the least common ways were from a logger (2%) or a seller at a campground (2%).

Table 26. Participant’s responses when asked the method for acquiring their firewood. Multiple responses were accepted for this question.

<i>Where do you get your firewood?</i>	Percentage of Respondents	Sample size
Cut your own firewood	45%	266
Purchase it	28%	167
Pick it up in the woods	25%	148

Table 27. Responses about location from participants who purchase their firewood. Multiple responses were accepted for this question.

<i>Where do you typically purchase your firewood?</i>	Percentage of Respondents	Sample Size
A firewood seller who brings it to your house	25%	55
A big-box retail store like Walmart or Lowe’s	15%	33
A roadside stand	15%	32
A seller at a campsite	14%	31
A grocery store or supermarket	12%	27
A landscaper or contractor	11%	25
A gas station	4%	10

Table 28. Responses about the sources of information for finding the firewood seller of their choice. This was an open-ended question and responses were coded for quantitative analysis.

<i>In a few words of your own, how did you first find that firewood seller?</i>	Percentage of Respondents	Sample Size
Word of mouth	20%	15
News ad	16%	12
Friend	13%	10
Driving down the highway	9%	7
Shopping	9%	7
Neighbor	6%	5
Family	5%	4
Billboard	4%	3
They work with me	4%	3
From a logger	2%	2
Seller at campground	2%	2

When asked about actions that individuals might take to stop the spread of insects and diseases that kill trees (S262, S300, S452; Table 29), participants indicated the most willingness to buy certified trees and plants and cleaning their boots after hiking in a forest. Respondents were least willing to volunteer in a tree safety day or to donate to an organization.

Table 29. Mean response to actions individuals can take to help stop the spread of invasive insects on a 3-point Likert scale, where 1=very willing and 3=not willing. For questions included in multiple surveys, the total sample size is underlined and the sample size per survey is given in parenthesis, respectively. This was a split sample question; comparable questions are at the bottom of the table.

Question	Mean Likert Scale score	Survey(s)	Sample Size(s)
Buy plants & trees from certified nurseries only [†]	1.40	262, 300, 452	<u>1669</u> (521,265,883)
Clean boots post hike	1.46	262, 300, 452	<u>1792</u> (450,497,845)
Buy only local firewood	1.51	262, 300, 452	<u>1623</u> (414,426,783)
Clean bike after riding on trails [§]	1.51	452	601
Buy plants & trees from certified nurseries only even if cost more [†]	1.56	300	388
Not taking plants home from another location*	1.61	452	668
Clean vehicle after driving on trails [§]	1.63	452	634
Not taking plants back home from a friend*	1.80	452	656
Signing a petition	1.83	262	<u>773</u>
Writing a letter to elected officials	2.03	262, 300	<u>457</u> (210,247)
Emailing an elected official	2.09	262	<u>220</u>
Donating to an organization	2.22	262, 300	<u>280</u> (113,167)
Volunteering on a tree safety day	2.24	262, 300	<u>309</u> (134,175)

*Split question with not taking plants home from another location – not taking plants back home from a friend – average Likert score = 1.71

§Split question with clean bike after riding on trails – clean vehicle after driving on trails – average Likert score = 1.57

†Split question with buy plants & trees from certified nurseries only - buy plants & trees from certified nurseries only even if cost more – average Likert score = 1.48

Participants were asked if the information they heard throughout the survey made them less likely to move firewood from one place to another (S705); 53% said it made them much less likely to move firewood, followed by 31% who said it made no difference. In an earlier survey (S338), participants were asked early on how willing they were to not move firewood from place to place. About 76% of participants said they were very willing to not move firewood from place to place. The same question was asked near the end of the survey, where the percentage went down to 73%.

Conclusions

It appears that awareness surrounding forest health, forest insect and disease dispersal, and the movement of firewood is relatively low among the samples related to the 16-year period in which the surveys were implemented. The good news is that there is indication that when they are aware, there is concern and willingness to take or support measures related to improving forest health and stopping forest pest dispersal through firewood movement. Therefore, these results suggest that if relevant information can be more effectively transmitted, firewood movement might be reduced.

Research by Peterson & Diss-Torrance (2012) found that calculated motivations (i.e., when people can calculate the advantages and disadvantages of compliance - especially price and convenience), had the greatest influence on compliance with environmental regulations. Likewise, convenience and cost were the strongest motivations of participant's behavior related to moving firewood. As such, one strategy that could have a substantial effect in changing firewood movement behavior could be selling firewood at a lower cost in national and state parks. Providing information about the availability of this low-cost firewood in parks, and why locally sold firewood a better choice than moving firewood, via flyers and park reservation emails could increase the impact.

Further, our results suggest that participants are more likely to support additional efforts to prevent the movement of nonnative insects and diseases via firewood transport when they are told that this issue threatens clean air, clean water, public health, and overall quality of life. Support for preventing forest pests from entering the USA may be garnered with the information that prevention is less expensive than mitigation and damage control. Presenting the information about forest health, forest insect and disease dispersal, and the movement of firewood in collaboration with a state Department of Forestry may increase the credibility of such messaging.

When asked about where participants would prefer to get the information about not moving firewood, social media outlets (i.e., Facebook, Website, Celebrity) were the least preferred sources. This finding could be influenced by respondent's mean age (50-54), as this effect can be seen in the crosstabulations. For the same reason and likely because participants would prefer receiving the information without having to look for it, respondents preferred flyers at state parks and receiving an email when making a campsite reservation. Over time, these preferences may change as Generation Z ages.

Overall, willingness to prevent the spread of forest pests appears to be highest when it does not require major effort on the part of the participants. When the suggested alternatives create a discomfort, such as increase in taxes, volunteering, or donating, there may be less compliance and/or support. Our survey data shows that convenience is the key to changing the behavior of firewood users.

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