Campers and Invasive Forest Pests in Northern New England

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KEY FINDINGS

While most campers did not move firewood, about 30 percent or the campers did report bringing firewood with to the campground. Those staying at public campgrounds were more likely to bring their own firewood than those staying at private campgrounds. Men were also more likely to bring firewood, as well as those with less than a bachelor's degree. Cost, convenience and quality contributed to campers' decision to bring firewood. Campers would be more likely not to bring firewood if they knew that inexpensive, good quality firewood was available for purchase at the campground.

Most campers have heard about forest pests, especially Asian longhorned beetle, and campers were concerned about the spread of invasive forest pests. Campers have heard messages about the effect of invasive forest pests on the natural world, and laws banning out of state firewood. Campers felt that their actions could make a difference in preventing the spread of the insects.

Campers reported that they learned about forest pests most frequently by state officials through the media. Effective outreach materials have more pictures than words and clear images of the insects, as well as signs of an infestation.

Continued outreach, addressing the effects of forest pests, existence of firewood bans, and availability of firewood for purchase can help prevent the spread of invasive forest pests in Northern New England.

BACKGROUND

Invasive forest pests are insects native to one part of the world, but spread to another area and disrupt the local ecosystem. Dutch elm disease, American chestnut blight, hemlock wood adelgid, emerald ash borer (EAB) and Asian longhorned beetle (ALB) are all examples of invasive forest pests that have threatened trees in North America. Emerald ash borer (*Argrilus planipennis*) and Asian longhorned beetle (*Anoplophora glabripennis*) are of current concern in Northern New England. Both insects are native to China, Russia, Japan and Korea and spread to North America most likely in shipping material. Though adults are physically able to fly up to several kilometers themselves, humans are responsible for most of the long-distance movement of the insects through the transport of logs, nursery stock or firewood. An infestation can decimate forested areas, but because the favored tree species of each insect are common urban trees, developed areas are also at risk (MacFarlane and Meyer 2005).

EAB first appeared in North America in southeast Michigan in 2002, and is thought to only eat ash trees (*Fraxinus* sp.), including green, white and black ash. Adults are bright metallic green and less than 2 cm long, while the larvae are creamy white and legless. Eggs are small and difficult to detect. While the adults eat foliage, the larvae eat the phloem and create galleries, causing canopy dieback and eventual tree death. The most obvious evidence of EAB infestation are D-shaped exit holes. Both green and white ash are popular trees in urban plantings. Ash is also a traditional resource for Native American basket makers. As of 2013, EAB has been found in Michigan, Ohio, Indiana, Illinois, Maryland, Pennsylvania, West Virginia, Wisconsin, Missouri, Virginia, Minnesota, New York, Kentucky, Iowa, Tennessee, Connecticut, Kansas, Massachusetts, New Hampshire, North Carolina, Colorado, Ontario, Quebec.

ALB was first found in North America in 1996 in New York, and has also been found in New Jersey, Massachusetts, Ohio, and Illinois. It has also spread to parts of Europe. ALB eats many hardwood trees, including maples, elms, birch, willows, and ash. Not only are these trees popular urban and suburban street trees, but maple trees are valued for syrup production.

Both of these insects have the potential to cause severe damage to North American forests. In 2003, the cost for EAB eradication in Lucas County Ohio exceeded $300,000 (Herms et al. 2004). Kovacs et al's (2010) model focused around Detroit predicted that between 2009 and 2019 EAB would encompass most of the 25 states included in the model. It would result in the treatment, removal and replacement of 17 million ash trees on developed land (of the 38 million estimated in the model area), and a mean discounted cost of $10.7 billion. It is feared that the ecological impact of EAB could be similar to that of Dutch elm disease or American chestnut blight (Herms et al. 2004).

GOALS

Since the movement of firewood is a major pathway for EAB and ALB, the goal of this survey was to learn about campers' firewood movement behavior, knowledge and attitudes toward invasive forest pests, and to evaluate the efficacy of different outreach materials and messages through an on-site campground survey.

STUDY AREA

This study focuses on three states in Northern New England: Maine, New Hampshire and Vermont. Though neither insect has been identified in Maine or Vermont (as of May 2014), EAB has been identified in New Hampshire, as well as nearby Massachusetts and Quebec. ALB has not been identified in Maine, New Hampshire or Vermont, but has been identified in

Massachusetts. Maine, New Hampshire and Vermont are all forested states and popular camping destinations, which puts them at risk from pests transported in campers' firewood.

METHODS

Campground surveys occurred during the summer of 2013. Two undergraduate research assistants visited 18 campgrounds in Maine, New Hampshire and Vermont on Thursdays, Fridays, Saturdays and Sundays between June 20 and September 1. A list of campgrounds is in Appendix 1. Half of the campgrounds were public, operated by state parks, while half were private campgrounds.

Table 1 Campground Locations

Campground State		Response	%
Maine		101	37%
New Hampshire		88	32%
Vermont		83	31%
Total		272	100%

The research assistants approached campers present in sites selected systematically, and 272 people agreed to participate: 101 in Maine, 88 in New Hampshire and 83 in Vermont (Table 1). Campers were required to be 18 or older to take part in the survey. The 35 question survey was conducted orally, and surveys generally took between 10 and 15 minutes to complete. Questions were a mixture of binary yes/no, open ended, multiple choice or five point Likert scales to rate agreement or disagreement to a statement.

More campers at the state parks agreed to take the survey than at the privately operated campgrounds, and this did not differ significantly across states (Tables 2-5).

OVERALL

Table 2 Campground Type—Overall

Campground Status		Response	%
Public		193	71%
Private		80	29%
Total		273	100%

MAINE

Table 3 Campground Type—Maine

Campground Status		Response	%
Public		68	67%
Private		33	33%
Total		101	100%

NEW HAMPSHIRE

Table 4 Campground Type—New Hampshire

Campground Status		Response	%
Public		63	72%
Private		25	28%
Total		88	100%

VERMONT

Table 5 Campground Type—Vermont

Campground Status		Response	%
Public		62	75%
Private		21	25%
Total		83	100%

Surveys generally occurred between 3pm and 7pm on Thursdays Fridays and Saturdays, though three were conducted during Sunday mornings at the request of campers (Table 6).

Table 6 Day of Survey

Survey Day		Response	%
Thursday		51	19%
Friday		108	40%
Saturday		111	41%
Sunday		3	1%
Total		273	100%

RESULTS

About the Participants

Most campers were return visitors to the state they were camping, but New Hampshire had significantly fewer first-time visitors (χ^2 test show significance at 0.05 level) than the other two states (Tables 7-10).

OVERALL

Table 7 First Time Visitors

Is this your first time in this state?		Response	%
Yes		24	9%
No		248	91%
Total		272	100%

MAINE

Table 8 First Time Visitors—Maine

Is this your first time in this state?		Response	%
Yes		12	12%
No		89	88%
Total		101	100%

NEW HAMPSHIRE

Table 9 First Time Visitors—New Hampshire

Is this your first time in this state?		Response	%
Yes		2	2%
No		85	98%
Total		87	100%

VERMONT

Table 10 First Time Visitors—Vermont

Is this your first time in this state?		Response	%
Yes		9	11%
No		74	89%
Total		83	100%

Most campers had spent more than two nights camping in the state the previous year (Table 11). A χ^2 test showed that those who camp at private campgrounds are more likely to camp for more than 10 nights a year (significant at .001 level). More than 50% of campers at private campgrounds spent more than 10 nights last year in a campground in the given state. There was no significant difference between states.

Table 11 Camping Frequencey

How many nights did you spend at a campground in this state last year?		Response	%
Zero nights		44	16%
One night		29	11%
2-5 nights		69	25%
6-10 nights		44	16%
More than 10 nights		88	32%
Total		274	100%

Eighteen states were represented and three countries (US, Canada, Germany). Overall, more campers listed New Hampshire as their home state, followed by Massachusetts, Maine and Vermont (Table 12).

OVERALL

Table 12 Home State—Overall

Home State		Response	%
New Hampshire		63	25%
Massachusetts		52	20%
Maine		46	18%
Vermont		39	15%
New York		14	5%
I do not reside in the United States		8	3%
Connecticut		8	3%
Florida		7	3%
New Jersey		4	2%
Illinois		2	1%
Ohio		2	1%
Rhode Island		2	1%
Pennsylvania		2	1%
Virginia		2	1%
Total		256	100%

At campgrounds in Maine, nearly half of the campers were from Maine. Massachusetts was the next most common, followed by New Hampshire and New York. All together, these states amounted to 80% of the participating campers' home states. Four percent did not live in US (Table 13).

MAINE

Table 13 Home State—Maine

Home State		Response	%
Maine		45	48%
Massachusetts		13	14%
New Hampshire		9	10%
New York		7	8%
I do not reside in the United States		4	4%
New Jersey		3	3%
Florida		2	2%
Ohio		1	1%
Illinois		1	1%
Vermont		1	1%
Michigan		1	1%
Rhode Island		1	1%
Virginia		1	1%
Arkansas		1	1%
Delaware		1	1%
Georgia		1	1%
Connecticut		1	1%
Total		93	100%

Fewer states were represented at New Hampshire campgrounds, and no international campers. At New Hampshire Campgrounds, most of the campers were from New Hampshire (57%) or Massachusetts (35%) (Table 14).

NEW HAMPSHIRE

Table 14 Home State—New Hampshire

Home State		Response	%
New Hampshire		50	57%
Massachusetts		31	35%
Florida		3	3%
Maine		1	1%
Virginia		1	1%
New York		1	1%
Rhode Island		1	1%
Total		88	100%

At Vermont campgrounds most campers were from Vermont, with Massachusetts Connecticut and New York being the next three most popular home states. Five percent did not live in the US (Table 15).

VERMONT

Table 15 Home State—Vermont

Home State		Response	%
Vermont		38	52%
Massachusetts		8	11%
Connecticut		7	10%
New York		6	8%
I do not reside in the United States		4	5%
New Hampshire		3	4%
Pennsylvania		2	3%
Ohio		1	1%
Illinois		1	1%
New Jersey		1	1%
Montana		1	1%
Florida		1	1%
Total		73	100%

Overall, slightly more men than women participated in the survey. This did not vary significantly by state (Table 16).

Table 16 Gender

Gender		Response	%
Male		150	55%
Female		123	45%
Total		273	100%

Education level also did not vary significantly across states. A plurality of participants held a bachelor's degree (Table 17).

Table 17 Education Level

Education Level		Response	%
High School/GED		85	31%
Technical/Community College Degree		33	12%
Bachelor's Degree		119	44%
Above Bachelor's Degree		35	13%
Total		272	100%

Overall, most participating campers were between the ages of 30 and 69 (Table 18). However, the age of the participants did vary across states (χ^2 test significant at the 0.05 level). Figures 1-4 show the age compositions of the participating campers overall and in the three states. Campers in Maine were older than those in New Hampshire and Vermont.

Table 18 Age Overall

Age		Response	%
18-29 years of age		24	9%
30-39 years of age		57	21%
40-49 years of age		68	25%
50-59 years of age		52	19%
60-69 years of age		58	21%
70+ years of age		13	5%
Total		272	100%

OVERALL

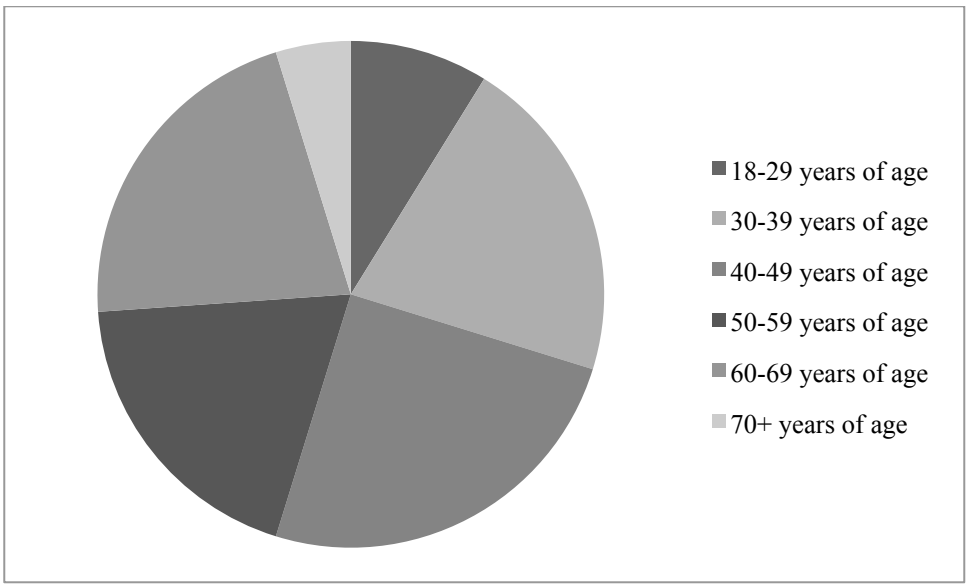

Figure 1 Age Overall

MAINE

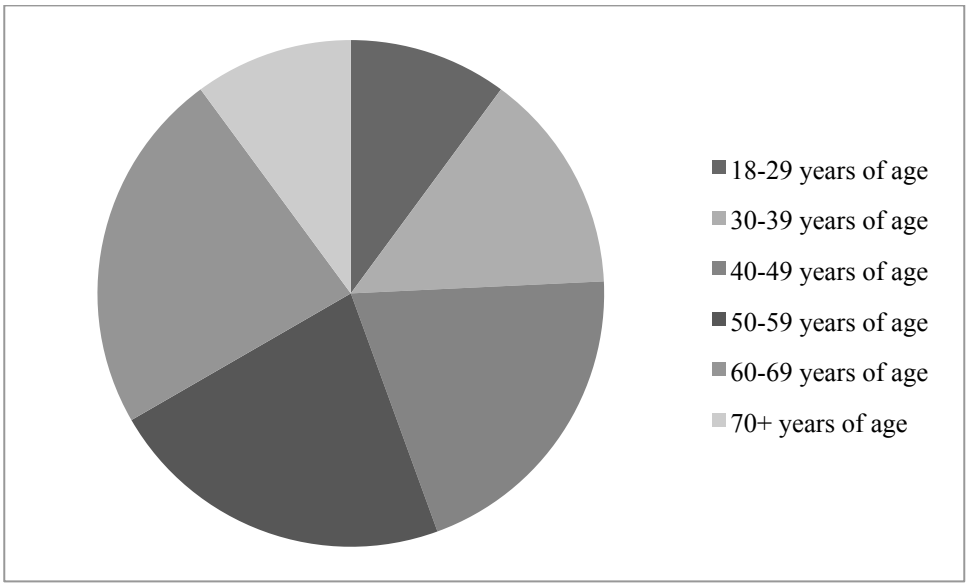

Figure 2 Age—Maine

NEW HAMPSHIRE

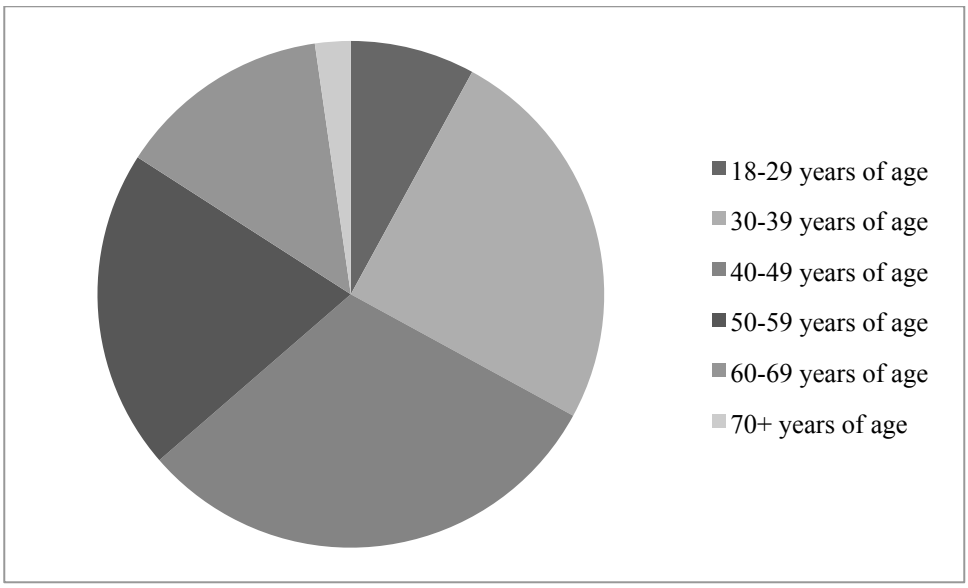

Figure 3 Age—New Hampshire

VERMONT

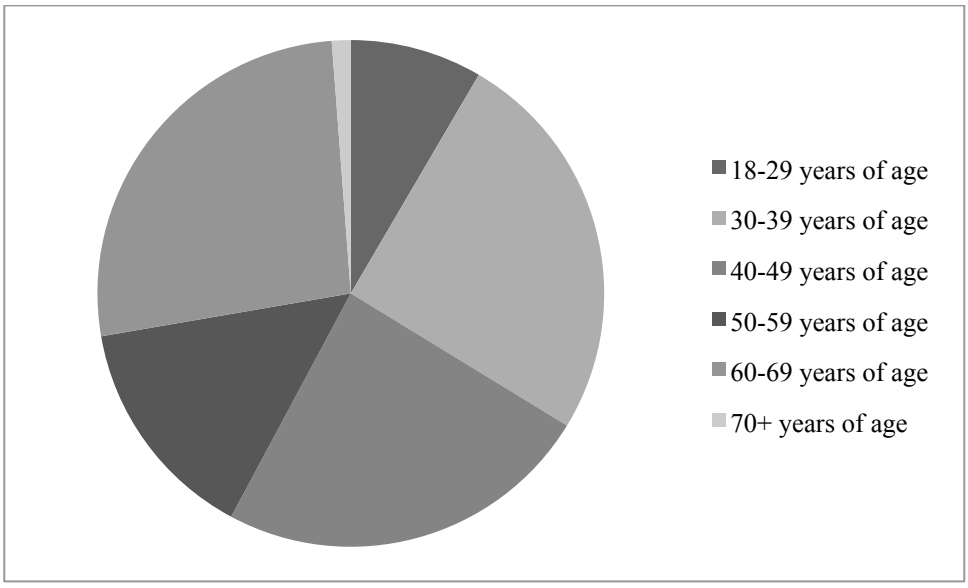

Figure 4 Age—Vermont

Firewood Practices

Tables 19-22 summarize reported firewood practices overall, as well as for each state. Sixteen percent of all campers "always" bring firewood with them. Another seven percent often do. Only 59% never bring firewood when camping in Northern New England. Fewer people always brought firewood at the Maine campgrounds than at the Vermont and New Hampshire campgrounds (χ^2 test, significant at 0.1 level).

OVERALL

Table 19 Firewood Movement Frequencey—Overall

How often do you bring firewood?		Response	%
Never		161	59%
Rarely		26	10%
Sometimes		24	9%
Often		18	7%
Always		44	16%
Don't know		0	0%
Total		273	100%

MAINE

Table 20 Firewood Movement Frequency—Maine

How often do you bring firewood?		Response	%
Never		65	64%
Rarely		12	12%
Sometimes		9	9%
Often		6	6%
Always		9	9%
Don't know		0	0%
Total		101	100%

NEW HAMPSHIRE

Table 21 Firewood Movement Frequency—New Hampshire

How often do you bring firewood?		Response	%
Never		42	48%
Rarely		10	11%
Sometimes		8	9%
Often		9	10%
Always		19	22%
Don't know		0	0%
Total		88	100%

VERMONT

Table 22 Firewood Movement Frequency—Vermont

How often do you bring firewood?		Response	%
Never		53	65%
Rarely		4	5%
Sometimes		7	9%
Often		3	4%
Always		15	18%
Don't know		0	0%
Total		82	100%

Most people did not bring wood on the camping trip where they were surveyed (Tables 23-26). The χ^2 test of significance did not show that there was any significant difference across states as to whether the campers chose to bring wood with them on this particular trip. In comparing campers at public and private campgrounds, of those who brought wood with them, more stayed at public campgrounds than private campgrounds (χ^2 test, significant at the 0.1 level) (Tables 27 and 28).

OVERALL

Table 23 Current Firewood Transport—Overall

Did you bring firewood today?		Response	%
Yes		77	28%
No		197	72%
Total		274	100%

MAINE

Table 24Current Firewood Transport—Maine

Did you bring firewood today?		Response	%
Yes		25	25%
No		76	75%
Total		101	100%

NEW HAMPSHIRE

Table 25 Current Firwood Transport—New Hampshire

Did you bring firewood today?		Response	%
Yes		29	33%
No		59	67%
Total		88	100%

VERMONT

Table 26 Current Firewood Transport—Vermont

Did you bring firewood today?		Response	%
Yes		22	27%
No		61	73%
Total		83	100%

PUBLIC

Table 27 Current Firewood Transport—Public Campgrounds

Did you bring firewood today?		Response	%
Yes		64	33%
No		129	67%
Total		193	100%

PRIVATE

Table 28 Current Firewood Transport—Private Campgrounds

Did you bring firewood today?		Response	%
Yes		12	15%
No		68	85%
Total		80	100%

Men were significantly more likely to bring firewood with them than women (χi^2 test significant at 0.05 level). The decision to bring firewood was not associated with the age of the participant, but was significantly associated with the education level of the respondent. More than half of those who brought firewood had less than a bachelor's degree, compared to 60 percent with at least a bachelor's degree who did not bring firewood (χi^2 test significant at 0.05 level).

The overwhelming reason campers chose to bring their own wood was cost. Other reasons include quality and convenience. Some said that, "they had it at home already." Others said that, "they knew their wood was safe," because they were local. The reasons did not seem to vary from state to state. Those who did not bring wood with them that they "knew we weren't allowed," forest pests, space concerns, and convenience.

When asked what would make them more likely to buy wood at the campground, respondents said that they would buy wood if they did not have wood at home or if campground wood was cheaper.

Most campers chose to purchase wood nearby, most often at the campground itself (Tables 29-36). There was no significant difference across the states. People generally paid between $2.00 and $7.00 for a “bundle” of wood.

OVERALL

Table 29 Firewood Purchase--Overall

Did you purchase wood at the campground or nearby?		Response	%
Yes		149	76%
No		48	24%
Total		197	100%

MAINE

Table 30 Firewood Purchase--Maine

Did you purchase wood at the campground or nearby?		Response	%
Yes		63	83%
No		13	17%
Total		76	100%

NEW HAMPSHIRE

Table 31Firewood Purchase—New Hampshire

Did you purchase wood at the campground or nearby?		Response	%
Yes		44	75%
No		15	25%
Total		59	100%

VERMONT

Table 32 Firewood Purchase—Vermont

Did you purchase wood at the campground or nearby?		Response	%
Yes		41	67%
No		20	33%
Total		61	100%

OVERALL

Table 33 Firewood Purchase Location—Overall

Where was the firewood purchased?		Response	%
Campground		118	79%
Store		6	4%
Private Individual		24	16%
Other		1	1%
Total		149	100%

MAINE

Table 34 Firewood Purchase Lcoation—Maine

Where was the firewood purchased?		Response	%
Campground		48	76%
Store		2	3%
Private Individual		12	19%
Other		1	2%
Total		63	100%

NEW HAMPSHIRE

Table 35 Firewood Purchase Lcoation—New Hampshire

Where was the firewood purchased?		Response	%
Campground		33	75%
Store		4	9%
Private Individual		7	16%
Other		0	0%
Total		44	100%

VERMONT

Table 36 Firewood Purchase Locations--Maine

Where was the firewood purchased?		Response	%
Campground		37	90%
Store		0	0%
Private Individual		4	10%
Other		0	0%
Total		41	100%

Forest Pest Knowledge

Most campers have heard of invasive forest pests (Tables 37-40). Significantly more campers at campgrounds in Maine had heard of forest pests (χi^2 test significant at 0.05 level).

OVERALL

Table 37 Forest Pest Familiarity--Overall

Have you heard of forest pests?		Response	%
Yes		251	92%
No		23	8%
Total		274	100%

MAINE

Table 38 Forest Pest Familiarity—Maine

Have you heard of forest pests?		Response	%
Yes		98	97%
No		3	3%
Total		101	100%

NEW HAMPSHIRE

Table 39 Forest Pest Familiarity—New Hampshire

Have you heard of forest pests?		Response	%
Yes		76	86%
No		12	14%
Total		88	100%

VERMONT

Table 40 Forest Pest Familiarity—Vermont

Have you heard of forest pests?		Response	%
Yes		75	90%
No		8	10%
Total		83	100%

The surveyors asked participating campers which forest pests they had heard of, without prompting with any specific names. Overall, most were not able to list the insects by name, but people were equally familiar with EAB and ALB when prompted (Tables 41-44). People in New Hampshire were less likely to be able to name EAB unprompted, than those in Maine and Vermont (χ^2 test significant at the 0.05 level).

OVERALL

Table 41 Unprompted Identification—Overall

Which forest pests have you heard of?		Response	%
Emerald Ash Borer		55	22%
Asian Longhorn Beetle		54	22%
Other		38	15%
Yes, but can't name specifically		143	57%

MAINE

Table 42 Unprompted Identification—Maine

Which forest pests have you heard of?		Response	%
Emerald Ash Borer		18	19%
Asian Longhorn Beetle		15	15%
Other		19	20%
Yes, but can't name specifically		57	59%

NEW HAMPSHIRE

Table 43 Unprompted Identification—New Hampshire

Which forest pests have you heard of?		Response	%
Emerald Ash Borer		11	14%
Asian Longhorn Beetle		21	28%
Other		8	11%
Yes, but can't name specifically		45	59%

VERMONT

Table 44 Unprompted Identification—Vermont

Which forest pests have you heard of?		Response	%
Emerald Ash Borer		25	33%
Asian Longhorn Beetle		17	23%
Other		11	15%
Yes, but can't name specifically		40	53%

Overall, when prompted, more than half of the respondents had heard of EAB (Tables 45-48). There was no significant difference across states.

OVERALL

Table 45 Prompted Familiarity with EAB--Overall

Have you heard of EAB?		Response	%
Yes		142	52%
No		132	48%
Total		274	100%

MAINE

Table 46 Prompted Familiarity with EAB—Maine

Have you heard of EAB?		Response	%
Yes		52	51%
No		49	49%
Total		101	100%

NEW HAMPSHIRE

Table 47 Prompted Familiarity with EAB—New Hampshire

Have you heard of EAB?		Response	%
Yes		40	45%
No		48	55%
Total		88	100%

VERMONT

Table 48 Prompted Familarity with EAB--Vermont

Have you heard of EAB?		Response	%
Yes		49	59%
No		34	41%
Total		83	100%

When prompted, more people were familiar with ALB than EAB (Tables 49-52). More than 70% of all respondents in all the states were familiar with ALB. This did not vary across states, but more people had heard of ALB than EAB (χ^2 test significant at 0.001 level).

OVERALL

Table 49 Prompted Familarity with ALB--Overall

Have you heard of ALB?		Response	%
Yes		210	77%
No		64	23%
Total		274	100%

MAINE

Table 50 Prompted Familiary with ALB--Maine

Have you heard of ALB?		Response	%
Yes		74	73%
No		27	27%
Total		101	100%

NEW HAMPSHIRE

Table 51 Prompted Familiarity with ALB—New Hampshire

Have you heard of ALB?		Response	%
Yes		70	80%
No		18	20%
Total		88	100%

VERMONT

Table 52 Prompted Familiarity with ALB--Vermont

Have you heard of ALB?		Response	%
Yes		65	78%
No		18	22%
Total		83	100%

How did you hear about EAB?

Tables 53-60 summarize the manner, both source and format, that information about EAB has been distributed. Chi^2 tests showed some variation across states both in source and format. More people at campgrounds in Vermont and New Hampshire listed state agencies as a source of information about EAB compared to those staying at campgrounds in Maine (significant at the 0.1 level). More people staying at campgrounds in New Hampshire and Vermont than in Maine mentioned that they had heard about EAB on the television news (significant at 0.05 level). Other sources included learning about EAB through the purple EAB traps, especially in Maine or Vermont.

Chi^2 tests showed some variation across states both in source and format. More people at campgrounds in Vermont and New Hampshire listed State Agencies as a source of information about EAB compared to those staying at campgrounds in Maine (significant at the 0.1 level). More people staying at campgrounds in New Hampshire and Vermont than in Maine mentioned that they had heard about EAB on the television news (significant at 0.05 level). Other sources included learning about EAB through the purple EAB traps, especially in Maine or Vermont.

How did you hear about ALB?

Tables 61-68 summarize the manner, both source and format, that information about ALB is spread. Again, χ^2 tests showed some variation across states both in source and format. More people at campgrounds in New Hampshire listed family members as a source of information about ALB compared to those staying at campgrounds in Maine (significant at the 0.1 level). More people at New Hampshire campgrounds identified state agencies as a source of information about ALB (significant at the 0.05 level). More people staying at campgrounds in Maine and Vermont identified “other” as a source of information about ALB (significant at the

0.05) level. More people staying at campgrounds in New Hampshire mentioned that they had heard about ALB on the television news (significant at 0.05 level). Other sources included witnessing ALB first hand in Worcester.

OVERALL

Source

Table 53 Source of Information about EAB--Overall

How did you hear about EAB: Source?		Response	%
Family		7	5%
Friends		4	3%
Campground Host / Attendant		24	17%
State Agency		80	58%
Other Campers		0	0%
Other		31	22%

Format

Table 54 Format of Information about EAB--Overall

How did you hear about EAB: Format?		Response	%
Television		6	4%
Radio		4	3%
Newspaper		19	14%
Radio News		4	3%
Television News		41	31%
Email		0	0%
Internet		2	1%
Bumper Sticker		0	0%
Campground Website		2	1%
Onsite Campground		29	22%
Other		55	41%

MAINE

Source

Table 55 Source of Information about EAB--Maine

How did you hear about EAB: Source?		Response	%
Family		4	8%
Friends		1	2%
Campground Host / Attendant		13	25%
State Agency		23	43%
Other Campers		0	0%
Other		14	26%

Format

Table 56 Format of Information about EAB--Maine

How did you hear about EAB: Format?		Response	%
Television		1	2%
Radio		1	2%
Newspaper		6	12%
Radio News		2	4%
Television News		9	18%
Email		0	0%
Internet		1	2%
Bumper Sticker		0	0%
Campground Website		0	0%
Onsite Campground		15	29%
Other		23	45%

NEW HAMPSHIRE

Source

Table 57 Source of Information about EAB—New Hampshire

How did you hear about EAB: Source?		Response	%
Family		2	5%
Friends		1	3%
Campground Host / Attendant		6	15%
State Agency		27	69%
Other Campers		0	0%
Other		5	13%

Format

Table 58 Format of Information about EAB—New Hampshire

How did you hear about EAB: Format?		Response	%
Television		2	5%
Radio		1	3%
Newspaper		5	14%
Radio News		0	0%
Television News		17	46%
Email		0	0%
Internet		0	0%
Bumper Sticker		0	0%
Campground Website		0	0%
Onsite Campground		6	16%
Other		11	30%

VERMONT

Source

Table 59 Source of Information about EAB--Vermont

How did you hear about EAB: Source?		Response	%
Family		1	2%
Friends		2	4%
Campground Host / Attendant		5	11%
State Agency		29	63%
Other Campers		0	0%
Other		12	26%

Format

Table 60 Format of Information about EAB--Vermont

How did you hear about EAB: Format?		Response	%
Television		3	7%
Radio		2	4%
Newspaper		7	16%
Radio News		2	4%
Television News		15	33%
Email		0	0%
Internet		0	0%
Bumper Sticker		0	0%
Campground Website		2	4%
Onsite Campground		8	18%
Other		21	47%

OVERALL

Source

Table 61 Source of Information about ALB--Overall

How did you hear about ALB: Source?		Response	%
Family		9	4%
Friends		5	2%
Campground Host / Attendant		28	14%
State Agency		112	55%
Other Campers		3	1%
Other		56	28%

Format

Table 62 Format of Information about ALB--Overall

How did you hear about ALB: Format?		Response	%
Television		11	6%
Radio		6	3%
Newspaper		32	17%
Radio News		1	1%
Television News		75	40%
Email		0	0%
Internet		2	1%
Bumper Sticker		0	0%
Campground Website		6	3%
Onsite Campground		35	19%
Other		62	33%

MAINE

Source

Table 63 Source of Information aobut ALB--Maine

How did you hear about ALB: Source?		Response	%
Family		1	2%
Friends		0	0%
Campground Host / Attendant		10	16%
State Agency		32	51%
Other Campers		1	2%
Other		21	33%

Format

Table 64 Format of Information about ALB--Maine

How did you hear about ALB: Format?		Response	%
Television		5	8%
Radio		3	5%
Newspaper		13	20%
Radio News		0	0%
Television News		19	30%
Email		0	0%
Internet		1	2%
Bumper Sticker		0	0%
Campground Website		1	2%
Onsite Campground		13	20%
Other		23	36%

NEW HAMPSHIRE

Source

Table 65 Source of information about ALB—New Hampshire

How did you hear about ALB: Source?		Response	%
Family		6	9%
Friends		2	3%
Campground Host / Attendant		9	13%
State Agency		46	69%
Other Campers		2	3%
Other		10	15%

Format

Table 66 Format of Information about ALB—New Hampshire

How did you hear about ALB: Format?		Response	%
Television		2	3%
Radio		1	2%
Newspaper		9	14%
Radio News		0	0%
Television News		34	53%
Email		0	0%
Internet		0	0%
Bumper Sticker		0	0%
Campground Website		1	2%
Onsite Campground		8	13%
Other		19	30%

VERMONT

Source

Table 67 Source of Information about ALB--Vermont

How did you hear about ALB: Source?		Response	%
Family		1	2%
Friends		0	0%
Campground Host / Attendant		10	16%
State Agency		32	51%
Other Campers		1	2%
Other		21	33%

Format

Table 68 Format of Information about ALB--Vermont

How did you hear about ALB: Format?		Response	%
Television		4	7%
Radio		2	3%
Newspaper		9	16%
Radio News		1	2%
Television News		21	36%
Email		0	0%
Internet		1	2%
Bumper Sticker		0	0%
Campground Website		4	7%
Onsite Campground		14	24%
Other		20	34%

Attitudes toward Forest Pests

The research assistants asked participants a series of questions to determine their level of concern about forest pests. Participating campers were asked, “Invasive forest pests include insects that are native to another region and, when brought to another area, spread widely and cause harm to trees. On a scale of one to five, would you way that invasive forest pests are of concern to me (1) or of not concern to me (5), matters to me (1) or does not matter to me (5),

impacts community where the campground is located (1) or does not impact the community where the campground is located (5), impacts my community (1) or does not impact my community (5), impacts my family (1) or does not impact my family (5)." Responses are summarized in Tables 69-72. Overall respondents were concerned about forest pests and think that they matter, but did not think that the pests have an impact on them or their families. ANOVA revealed some variation across states. The results from the Tukey HSD test shows the variation across states (Tables 73).Campers in Vermont showed significantly lower mean ratings than New Hampshire for three of the questions (concern, impacts my community, impacts me or my family). Vermont and Maine differed in the average rating for "matters to me" with Vermont giving a lower average rating. There was no difference across state for "impacts the community where the campground is located."

OVERALL

Table 69 Beliefs about Forest Pests--Overall

	1	2	3	4	5		Total Responses	Mean
Of concern to me	66%	12%	14%	2%	6%	Of no concern to me	274	1.70
Matters to me	71%	12%	12%	2%	2%	Does not matter to me	273	1.51
Impacts community where campground is located	30%	15%	32%	11%	12%	Does not impact community where campground is located	274	2.59
Impacts my community	38%	12%	12%	9%	28%	Does not impact my community	274	2.78
Impacts me or my family	18%	11%	8%	8%	55%	Does not impact me or my family	274	3.72

MAINE

Table 70 Beliefs about Forest Pests--Maine

	1	2	3	4	5		Total Responses	Mean
Of concern to me	67%	15%	10%	2%	6%	Of no concern to me	101	1.64
Matters to me	66%	15%	13%	2%	4%	Does not matter to me	101	1.62
Impacts community where campground is located	33%	14%	34%	7%	13%	Does not impact community where campground is located	101	2.53
Impacts my community	41%	12%	12%	7%	29%	Does not impact my community	101	2.71
Impacts me or my family	16%	12%	11%	9%	52%	Does not impact me or my family	101	3.70

NEW HAMPSHIRE

Table 71 Beliefs about Forest Pests—New Hampshire

	1	2	3	4	5		Total Responses	Mean
Of concern to me	58%	9%	22%	3.41%	7.95%	Of no concern to me	88	1.94
Matters to me	68%	13%	14%	3.41%	2.27%	Does not matter to me	88	1.59
Impacts community where campground is located	27%	16%	26%	17%	14%	Does not impact community where campground is located	88	2.74
Impacts my community	30%	9%	9%	17%	35%	Does not impact my community	88	3.19
Impacts me or my family	15%	3%	6%	6%	70%	Does not impact me or my family	88	4.14

VERMONT

Table 72 Beliefs about Forest Pests--Vermont

	1	2	3	4	5		Total Responses	Mean
Of concern to me	73%	11%	10%	1%	5%	Of no concern to me	83	1.53
Matters to me	82%	9%	9%	1%	0%	Does not matter to me	82	1.29
Impacts community where campground is located	30%	17%	35%	8%	10%	Does not impact community where campground is located	83	2.51
Impacts my community	43%	16%	16%	5%	20%	Does not impact my community	83	2.43
Impacts me or my family	24%	17%	6%	10%	43%	Does not impact me or my family	83	3.31

Table 73 Mean Ratings by State

	Maine	New Hampshire	Vermont
Of concern to me	1.64	1.94[a]	1.53[a]
Matters to me	1.62[b]	1.59	1.29[b]
Impacts community where campground is located	2.53	2.74	2.51
Impacts my community	2.71	3.19[a]	2.43[a]
Impacts me or my family	3.70	4.14[a]	3.31[a]

[a] = Tukey HSD Test shows that the means differ between VT and NH at the 0.05 level of significance
[b] = Tukey HSD Test shows that the means differ between VT and ME at the 0.05 level of significance

Agency and Risk Perception

The participating campers were asked to rate on a scale of one-five how strongly they agree or disagree with a series of statements. A higher score indicates a higher level of agreement (Tables 74-77). Overall, participants believed that invasive forest pests are a problem and that their efforts can make a difference in addressing the problem.

The mean scores, excluding the "don't know" category, did not vary across states with the exception of two statements: "There is not much one individual can do about invasive forests pests" and, "As long as other people bring firewood, my efforts to prevent invasive forest pests are useless" (Table 78). The mean responses for "There is not much one individual can do about invasive forests pests" from participating campers at New Hampshire campgrounds was higher than those in Maine campgrounds, while the mean responses for, "As long as other people bring firewood, my efforts to prevent invasive forest pests are useless" from participating campers at New Hampshire campgrounds was higher than those in Vermont campgrounds.

OVERALL

Table 74 Beliefs about Forest Pest Risk--Overall

	Strongly disagree	Somewhat disagree	Neither disagree or agree	Somewhat agree	Strongly agree	Don't know	Total Responses
There is not much one individual can do about invasive forest pests	76%	8%	1%	5%	7%	3%	274
I don't think invasive forest pests brought in by firewood are very important	82%	11%	1%	1%	5%	0%	272
The threat of invasive forest pests brought in by firewood is serious	3%	3%	3%	15%	70%	7%	274
As long as other people bring firewood, my efforts to prevent invasive forest pests are useless	50%	18%	4%	11%	14%	2%	274
The invasive forest pest risk from firewood is exaggerated	53%	15%	3%	4%	4%	20%	273
In the long run, things will balance out with invasive forest pests	42%	11%	7%	9%	9%	21%	274

MAINE

Table 75 Beliefs about Forest Pest Risk--Maine

	Strongly disagree	Somewhat disagree	Neither disagree or agree	Somewhat agree	Strongly agree	Don't know	Total Responses
There is not much one individual can do about invasive forest pests	85%	2%	2%	6%	4%	1%	101
I don't think invasive forest pests brought in by firewood are very important	85%	7%	1%	1%	6%	0%	101
The threat of invasive forest pests brought in by firewood is serious	1%	3%	0%	21%	69%	6%	101
As long as other people bring firewood, my efforts to prevent invasive forest pests are useless	51%	20%	4%	14%	11%	1%	101
The invasive forest pest risk from firewood is exaggerated	56%	11%	2%	5%	4%	22%	101
In the long run, things will balance out with invasive forest pests	44%	11%	4%	10%	10%	22%	101

NEW HAMPSHIRE

Table 76 Beliefs about Forest Pest Risk—New Hampshire

	Strongly disagree	Somewhat disagree	Neither disagree or agree	Somewhat agree	Strongly agree	Don't know	Total Responses
There is not much one individual can do about invasive forest pests	65%	13%	0%	5%	14%	5%	88
I don't think invasive forest pests brought in by firewood are very important	74%	17%	1%	3%	5%	0%	87
The threat of invasive forest pests brought in by firewood is serious	3%	5%	8%	10%	68%	6%	88
As long as other people bring firewood, my efforts to prevent invasive forest pests are useless	41%	18%	6%	10%	22%	3%	88
The invasive forest pest risk from firewood is exaggerated	47%	18%	5%	1%	6%	24%	88
In the long run, things will balance out with invasive forest pests	44%	5%	10%	5%	15%	22%	88

VERMONT

Table 77 Beliefs about Forest Pest Risk--Vermont

	Strongly disagree	Somewhat disagree	Neither disagree or agree	Somewhat agree	Strongly agree	Don't know	Total Responses
There is not much one individual can do about invasive forest pests	77%	8%	2%	2%	5%	5%	83
I don't think invasive forest pests brought in by firewood are very important	87%	9%	0%	0%	4%	1%	82
The threat of invasive forest pests brought in by firewood is serious	5%	0%	0%	13%	73%	8%	83
As long as other people bring firewood, my efforts to prevent invasive forest pests are useless	60%	16%	4%	8%	10%	2%	83
The invasive forest pest risk from firewood is exaggerated	56%	18%	4%	5%	4%	13%	82
In the long run, things will balance out with invasive forest pests	37%	18%	9%	14%	2%	19%	83

Table 78

	Maine	New Hampshire	Vermont
There is not much one individual can do about invasive forest pests	1.4[a]	1.85[a]	1.42
I don't think invasive forest pests brought in by firewood are very important	1.36	1.48	1.23
The threat of invasive forest pests brought in by firewood is serious	4.64	4.43	4.64
As long as other people bring firewood, my efforts to prevent invasive forest pests are useless	2.14	2.52[b]	1.89[b]
The invasive forest pest risk from firewood is exaggerated	1.58	1.7	1.63
In the long run, things will balance out with invasive forest pests	2.13	2.25	2.09

[a] = Tukey HSD Test shows that the means differ between ME and NH at the 0.05 level of significance

[b] = Tukey HSD Test shows that the means differ between VT and NH at the 0.05 level of significance

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Forest Pest Messages and Actions

When asked what messages respondents had heard regarding forest pests, more than 40% mentioned that they had heard about the laws banning out-of-state wood and/or the effect on the natural world for losing tree species. This did not vary across states, except that more people camping at campgrounds in Maine were unsure about the messages they have heard (χ^2 test show significance at 0.05 level) compared to those in NH and VT. Responses are summarized below (Tables 79-82).

OVERALL

Table 79 Forest Pest Messages--Overall

What messages have you heard about forest pests?		Response	%
The effect on the natural world from losing tree species		103	46%
The government law banning out-of-state firewood		93	42%
Other		58	26%
I haven't heard any		26	12%
I'm not sure		24	11%
Threat to towns and street trees		10	5%
Threat to forest products industry		7	3%
The expense of having to buy firewood instead of bringing it from home		7	3%
Threat to Native American basket makers		1	0%

MAINE

Table 80 Forest Pest Messages--Maine

What messages have you heard about forest pests?		Response	%
The government law banning out-of-state firewood		36	45%
The effect on the natural world from losing tree species		34	43%
Other		20	25%
I'm not sure		14	18%
I haven't heard any		12	15%
The expense of having to buy firewood instead of bringing it from home		5	6%
Threat to towns and street trees		3	4%
Threat to forest products industry		1	1%
Threat to Native American basket makers		0	0%

NEW HAMPSHIRE

Table 81 Forest Pest Messages—New Hampshire

What messages have you heard about forest pests?		Response	%
The effect on the natural world from losing tree species		36	47%
Other		24	32%
The government law banning out-of-state firewood		23	30%
I'm not sure		7	9%
I haven't heard any		7	9%
Threat to towns and street trees		5	7%
Threat to forest products industry		2	3%
The expense of having to buy firewood instead of bringing it from home		2	3%
Threat to Native American basket makers		0	0%

VERMONT

Table 82 Forest Pest Messages--Vermont

What messages have you heard about forest pests?		Response	%
The government law banning out-of-state firewood		33	52%
The effect on the natural world from losing tree species		33	52%
Other		13	20%
I haven't heard any		7	11%
Threat to forest products industry		4	6%
Threat to towns and street trees		2	3%
I'm not sure		2	3%
Threat to Native American basket makers		1	2%
The expense of having to buy firewood instead of bringing it from home		0	0%

More than 40 percent the respondents said that learning about invasive forest pests changed their desire to bring firewood with them (Tables 83-86). This did not vary significantly across states.

OVERALL

Table 83 Changed Desire to Bring Firewood--Overall

Has learning about forest pests changed your desire to bring firewood with you?		Response	%
Yes		92	41%
No		133	59%
Total		225	100%

MAINE

Table 84 Changed Desire to Bring Firewood --Maine

Has learning about forest pests changed your desire to bring firewood with you?		Response	%
Yes		37	44%
No		47	56%
Total		84	100%

NEW HAMPSHIRE

Table 85 Changed Desire to Bring Firewood —New Hampshire

Has learning about forest pests changed your desire to bring firewood with you?		Response	%
Yes		22	31%
No		48	69%
Total		70	100%

VERMONT

Table 86 Changed Desire to Bring Firewood --Vermont

Has learning about forest pests changed your desire to bring firewood with you?		Response	%
Yes		33	47%
No		37	53%
Total		70	100%

Similarly, close to half of the respondents said that they changed their firewood behavior as a result of EAB or ALB concerns, and the responses did not vary significantly across states (Tables 87-90).

OVERALL

Table 87 Behavior Change—Overall

Have you changed your firewood behavior as a result of EAB or ALB concerns?		Response	%
Yes		121	45%
No		147	55%
Total		268	100%

MAINE

Table 88 Behavior Change—Maine

Have you changed your firewood behavior as a result of EAB or ALB concerns?		Response	%
Yes		44	44%
No		56	56%
Total		100	100%

NEW HAMPSHIRE

Table 89 Behavior Change—New Hampshire

Have you changed your firewood behavior as a result of EAB or ALB concerns?		Response	%
Yes		34	40%
No		51	60%
Total		85	100%

VERMONT

Table 90 Behavior Change—Vermont

Have you changed your firewood behavior as a result of EAB or ALB concerns?		Response	%
Yes		42	52%
No		39	48%
Total		81	100%

Participating campers were asked why or why not based on their response to the question "Have you changed your firewood behavior as a result of EAB or ALB concerns. Many said that they were not going to bring firewood anyway (about 30 percent) or always bought or brought local wood with them anyway (about 30 percent). Some said that they did not know about the insects or weren't aware of the problem (about 10 percent). Others mentioned that they knew their wood was safe or that they always get safe wood (about 15 percent) . Conversely, about 33 percent mentioned that they knew of the risk of insects and 30 percent were away of the laws.

When asked what messages would convince the participants not to move firewood to prevent EAB and ALB from moving, the most frequent response, apart from "other" was the effect on the natural world from losing tree species (Table 91). Other response included pictures of before and after effects or examples of devastation, and that wood was available and affordable. These responses did not vary across states except that fewer campers at Vermont campgrounds were unsure as to what messages would convince them to not move firewood in (χ^2 test significant at 0.05 level).

OVERALL

Table 91 Convincing Messages—Overall

What messages would convince you not to move firewood to prevent EAB and ALB from moving?		Response	%
Other		94	41%
The effect on the natural world from losing tree species		79	34%
I'm not sure		32	14%
The government law banning out-of-state firewood		26	11%
The expense of having to buy firewood instead of bringing it from home		6	3%
I haven't heard any		5	2%
Threat to towns and street trees		1	0%
Threat to forest products industry		0	0%
Threat to Native American basket makers		1	0%

Forest Pest Outreach

As part of the survey, the research assistants showed two state-specific outreach materials to participating campers, and the participants were asked a series of questions about the effectiveness of the material. The outreach materials are in Appendix 3.

Maine campers were show a poster called (Un)Wanted and an ALB brochure. The (Un)Wanted poster shows three insects: ALB, EAB and hemlock wooly adelgid (HWA). It shows where the insects are located and signs of an infestation. The ALB brochure has information on both the front and back. It focuses only on ALB and includes information about signs and potential impact of ALB along with how to report possible sightings. Responses to the two Maine outreach materials were similar (Tables 92 and 93). Overall the materials were rated highly. Paired t-tests showed that there were significant differences (at the 0.1 level) in the mean ratings for only two questions. Respondents rated Maine's ALB Brochure higher than the (Un)wanted Poster with respect to "This material would make you want to check the trees near your home for invasive forest pests," and "This material would influence you not to bring your own firewood from where you live."

A plurality of respondents were unsure as to whether the materials would get most people to not bring firewood from where they live.

Table 92 Maine Outreach Material 1: (Un)Wanted

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	1%	2%	1%	36%	60.40%	0%	101
Would make you want to share this information with others	3%	10%	2%	34%	51.49%	0%	101
Would make you want to check the trees near your home for invasive forest pests	9%	18%	7%	21%	45.00%	0%	100
Would make you want to report a potential forest pest finding to officials	2%	10%	2%	24%	62.38%	0%	101
Would influence you to not bring your own firewood from where you live	12%	4%	7%	18%	59.41%	0.%	101
Would get most people to not bring firewood from where they live	13%	9%	10%	22%	18.81%	28%	101

Table 93 Maine Outreach Material 2: Maine ALB Brochure

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	5%	2%	0%	29%	64%	0%	101
Would make you want to share this information with others	4%	8%	0%	37%	51%	0%	101
Would make you want to check the trees near your home for invasive forest pests	9%	13%	5%	24%	49%	1%	101
Would make you want to report a potential forest pest finding to officials	2%	8%	2%	22%	66%	0%	101
Would influence you to not bring your own firewood from where you live	10%	1%	6%	13%	70%	0%	101
Would get most people to not bring firewood from where they live	8%	13%	5%	22%	21%	30%	101

The outreach materials shown to campers in New Hampshire were both double-sided brochure size cards. “Use Local Firewood” stressed using local firewood and included a large picture of an ALB, along with smaller pictures of signs of EAB and ALB. “Regulation” focused on regulations, with language explaining the firewood quarantine. Both materials included information about what can be done and where to report suspicious insects. Respondents rated the two New Hampshire materials differently (Tables 94 and 95). Paired t-tests show significant differences at least the 0.5 level for five of the six questions. There was no significant difference in the rating of the materials with respect to “This material would make you want to share this information with others.” However the “Use Local Firewood” was rated significantly higher in all other areas compared to “Regulation”. It featured less text and prominent pictures of the insects.

A plurality of respondents were unsure as to whether the materials would get most people to not bring firewood from where they live.

Table 94 New Hampshire Outreach Material 1: Use Local Firewood

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	7%	2%	5%	23%	64%	0%	88
Would make you want to share this information with others	7%	11%	2%	19%	60%	0%	88
Would make you want to check the trees near your home for invasive forest pests	15%	10%	14%	18%	43%	0%	88
Would make you want to report a potential forest pest finding to officials	6%	9%	0%	18%	65%	2%	88
Would influence you to not bring your own firewood from where you live	7%	3%	8%	14%	68%	0%	88
Would get most people to not bring firewood from where they live	22%	2%	3%	16%	20%	36%	88

Table 95 New Hampshire Outreach Material 2: Regulation

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	13%	10%	2%	25%	50%	0%	88
Would make you want to share this information with others	14%	10%	1%	18%	56%	1%	88
Would make you want to check the trees near your home for invasive forest pests	23%	18%	7%	14%	39%	0%	88
Would make you want to report a potential forest pest finding to officials	19%	11%	1%	13%	53%	2%	88
Would influence you to not bring your own firewood from where you live	16%	2%	7%	19%	56%	0%	88
Would get most people to not bring firewood from where they live	30%	3%	2%	16%	15%	34%	88

Campers at Campgrounds in Vermont were shown a poster called “Stop Invasive Pests” and a poster called “Look Up.” “Stop Invasive Pests” shows information about ALB, EAB and HWA, including signs of damage, what trees are affected, what can done, and where to find more information or to report insects. The “Look Up” poster stressed the connection between ALB, maple trees and maple syrup. Respondents generally rated the Vermont materials high, though they rated the second material, the “Look Up” poster, significantly higher (at least at the 0.1 level) than the “Stop Invasive Pests” poster in all respects and at the 0.05 level in respect to “this material would make you share this information with others” and “would influence you not to bring your own firewood from where you live.” Tables 96 and 97 summarize the responses.

A plurality of respondents were unsure as to whether the materials would get most people to not bring firewood from where they live.

Table 96 Vermont Outreach Material 1: Stop Invasive Pests from Entering Vermont

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	5%	2%	2%	34%	55%	1%	83
Would make you want to share this information with others	6%	11%	1%	24%	58%	0%	83
Would make you want to check the trees near your home for invasive forest pests	13%	11%	11%	26%	39%	0%	82
Would make you want to report a potential forest pest finding to officials	8%	1%	2%	25%	63%	0%	83
Would influence you to not bring your own firewood from where you live	10%	5%	14%	8%	63%	0%	83
Would get most people to not bring firewood from where they live	18%	5%	6%	24%	13%	34%	83

Table 97 Vermont Outreach Material 2: Look UP!

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't know	Total Responses
Interest you	1%	4%	1%	23%	70%	1%	83
Would make you want to share this information with others	2%	8%	1%	23%	65%	0%	83
Would make you want to check the trees near your home for invasive forest pests	10%	8%	7%	13%	61%	0%	83
Would make you want to report a potential forest pest finding to officials	4%	4%	0%	20%	71%	1%	83
Would influence you to not bring your own firewood from where you live	4%	2%	10%	13%	70%	1%	83
Would get most people to not bring firewood from where they live	13%	5%	6%	20%	20.%	35%	83

CONCLUSIONS

While most participants did not move firewood, an alarming nearly 30 percent of the participants said that brought firewood on the camping trip in which they participated in the survey. A number of respondents expressed the idea of "safe" wood, but it is unclear whether the campers truly understood what "safe' wood means.

Most participating campers have heard of forest pests, but ALB was more well-known than EAB. The story of ALB in Worcester was well known among New England residents. People had heard about both the laws prohibiting firewood transport and the effect of invasive forest pests on the natural world, but the latter seemed to be the more compelling argument not to transport firewood. A majority of campers, however, claimed that forest pest concerns did not factor into their firewood decisions. It seemed like practical concerns such as convenience and ease of transport played just as large a role.

The campers overall seemed concerned about forest pests, especially the campers in Vermont and Maine. However forest pests were not seen as an issue that will directly affect the campers or their families. Campers also believed that their actions will make a difference in preventing an infestation.

State agency officials were the most common source for information about EAB and ALB, especially for campers in New Hampshire and Vermont. The media, especially TV news, was the frequently identified format, though "other" including witnessing devastation first hand, and seeing purple traps, was also frequently mentioned.

Campers rated the presented outreach materials highly, especially materials with clear pictures of the insects. Comments suggested that material that showed the effects of the insects on the landscape would be especially effective in convincing people not to move firewood.

Continued outreach about forest pests and the risks of firewood transport is an important tool to help prevent the spread of invasive forest pests to Northern New England.

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APPENDIX 1: CAMPGROUNDS VISITED

Campground	State	Public or Private	Date	Number of Surveys
KOA Bar Harbor	ME	Private	Aug. 22-25	16
Searsport Oceanfront Campground	ME	Private	July 18-21	13
Crooked River Campground	ME	Private	June 20-23	1
Lamoine State Park	ME	Public	Aug. 22-25	30
Camden Hills State Park	ME	Public	July 18-21	23
Sebago Lake State Park	ME	Public	June 20-23	14
Whit's End Campground	NH	Private	Aug. 29-Sept. 2	4
Pine Acres Resort	NH	Private	July 11-14	14
Autumn Hills Campground	NH	Private	July 4-7	10
White Lake State Park	NH	Public	Aug. 29-Sept. 1	15
Pawtuckaway State Park	NH	Public	July 11-14	27
Greenfield State Park	NH	Public	July 4-7	22
Mill Pond Campground	VT	Private	Aug.1-4	9
Dorset R.V Park	VT	Private	July 25-28	4
Lake Champlain Adult Campground	VT	Private	June 27-30	8
Lake Carmi State Park	VT	Public	Aug.1-4	20
Emerald Lake State Park	VT	Public	July 25-28	27
Grand Isle Campground	VT	Public	June 27-30	15

APPENDIX 2: CAMPGROUND SURVEY

Campground Name_____ Campsite Number_____ Surveyor's Name_____

1. Is this your first time in [STATE]?

☐ Yes ☐ No

2. Where are you from [currently live]?
City _____

State _____

Country _____

3. How many nights did you spend at a campground in [STATE] last year [in the last 12 months]?

☐ Zero nights ☐ One night ☐ 2 – 5 nights ☐ 6 – 10 nights ☐ More than 10 nights

4. How often do you bring firewood with you when camping in [STATE]?

☐ Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always ☐ Don't Know

5. Did you bring firewood with you on this weekend's trip to [STATE]?

☐ Yes ☐ No

If YES continue to 6.
If NO continue to 10.

(If YES to 5)

6. Why?

7. Where did you get the wood?

8. If you bought the wood, may we ask how much you paid?

Amount _____ per Unit _____

9. What would make you buy firewood at the campgrounds instead?

(Skip ahead to 15 after answering question 9)
(If NO to 5)

10. Why not?

11. Did you buy firewood here at the campground or nearby?

☐ Yes ☐ No

If YES, continue to 12.

If NO, continue to 14.

(If YES to 11)

12. Where did you buy the firewood?

☐ Campground ☐ Store ☐ Private Individual ☐ Other

13. May we ask how much you paid?

Amount _____ per Unit _____

(If NO to 11)

14. Why not?

15. Have you heard of invasive forest pests?

☐ Yes ☐ No

If YES continue to 16. **If NO continue to 17.

(If YES to 15)

16. Which invasive forest pests? _____

17. Invasive forest pests include insects that are native to another region and, when brought to another area, spread widely and cause harm to trees. On a scale of 1 to 5, would you say that invasive forest pests are:

Of concern to me	1	2	3	4	5	Of no concern to me
Matters to me	1	2	3	4	5	Does not matter to me
Impacts community where campground is located	1	2	3	4	5	Does not impact community where campground is located
Impacts my community	1	2	3	4	5	Does not impact my community
Impacts me or my family	1	2	3	4	5	Does not impact me or my family

18. How strongly do you disagree or agree with the following statements?

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't Know
There is not much one individual can do about invasive forest pests brought in by firewood	1	2	3	4	5	9
I don't think invasive forest pests brought in by firewood are very important	1	2	3	4	5	9
The threat of invasive forest pests brought in by firewood is serious	1	2	3	4	5	9
As long as other people continue to bring firewood from home, my efforts to prevent invasive forest pests are useless	1	2	3	4	5	9
The invasive forest pest risk from firewood is exaggerated	1	2	3	4	5	9
In the long run, things will balance out with invasive forest pests	1	2	3	4	5	9

19. Have you heard of Emerald Ash Borer (EAB)?

☐ Yes ☐ No

If YES continue to 20.
If NO continue to 21.

(If YES to 19)

20. How did you hear about Emerald Ash Borer (EAB)?

Source:

☐ Family
☐ Friends
☐ Campground Host / Attendant
☐ State Agency
☐ Other Campers
☐ Other

Format:

☐ Television
☐ Radio
☐ Newspaper
☐ Radio News
☐ Television News
☐ Email
☐ Internet
☐ Bumper Sticker
☐ Campground Website
☐ Onsite Campground
☐ Other

21. Have you heard of Asian Longhorned Beetle (ALB)?

☐ Yes ☐ No

***If YES continue to 22.*
***If NO continue to 23*.**

(If YES to 21)

22. How did you hear about Asian Longhorned Beetle (ALB)?

Source:

☐ Family
☐ Friends
☐ Campground Host / Attendant
☐ State Agency
☐ Other Campers
☐ Other

Format:

☐ Television
☐ Radio
☐ Newspaper
☐ Radio News
☐ Television News
☐ Email
☐ Internet
☐ Bumper Sticker
☐ Campground -Website
☐ Campground - Onsite
☐ Other

[If YES to either 19 or 21 (EAB or ALB)],

23. Did learning about the threat of invasive forest pests change your desire to bring firewood with you this weekend?

☐ Yes ☐ No

(If YES)

24. Why?

(If NO)

25. Why not?

26. Have you changed your firewood behavior as a result of EAB or ALB concerns?

☐ Yes ☐ No

If YES continue to Q27.
If NO continue to Q28.

[If YES to 26],
27. Why?

[If NO to 26],
28. Why not?

29. Please answer the following questions related to invasive forest pest threats. [use check mark if yes]

	What message(s) have you **heard** regarding EAB and ALB?	Which message(s) would **convince** you not to move firewood to prevent EAB and ALB from spreading?
Threat to the forest products industry		
Threat to towns and street trees		
Threat to Native American basket makers		
The government law banning out-of-state firewood		
The effect on the natural world from losing tree species		
The expense of having to buy firewood instead of bringing it from home		
I don't know		
I'm not sure		
I haven't heard any		
Other (please list / explain below)		

Please view outreach material #1.
30. How strongly do you disagree or agree with the following statements? "This outreach material…"

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't Know
Create interest for you?	1	2	3	4	5	9
Would this make you share this information with others	1	2	3	4	5	9
Would this make you want to check the trees near your home for invasive forest pests?	1	2	3	4	5	9
Make you want to report a potential forest pest finding to officials?	1	2	3	4	5	9
Would this influence you to not bring your own firewood from where you live	1	2	3	4	5	9
Would this get most people to not bring firewood from where they live	1	2	3	4	5	9

Please view outreach material #2.

31. How strongly do you disagree or agree with the following statements? "This outreach material…"

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree	Don't Know
Create interest for you?	1	2	3	4	5	9
Would this make you share this information with others	1	2	3	4	5	9
Would this make you want to check the trees near your home for invasive forest pests?	1	2	3	4	5	9
Make you want to report a potential forest pest finding to officials?	1	2	3	4	5	9
Would this influence you to not bring your own firewood from where you live	1	2	3	4	5	9
Would this get most people to not bring firewood from where they live	1	2	3	4	5	9

The final section of the survey has four simple demographic questions:

32. How many years have you been camping? _____Years

33. How many people are you traveling with today, including yourself?

_____ Number of Adults **_____ Number of Children**

34. Age of survey participant:

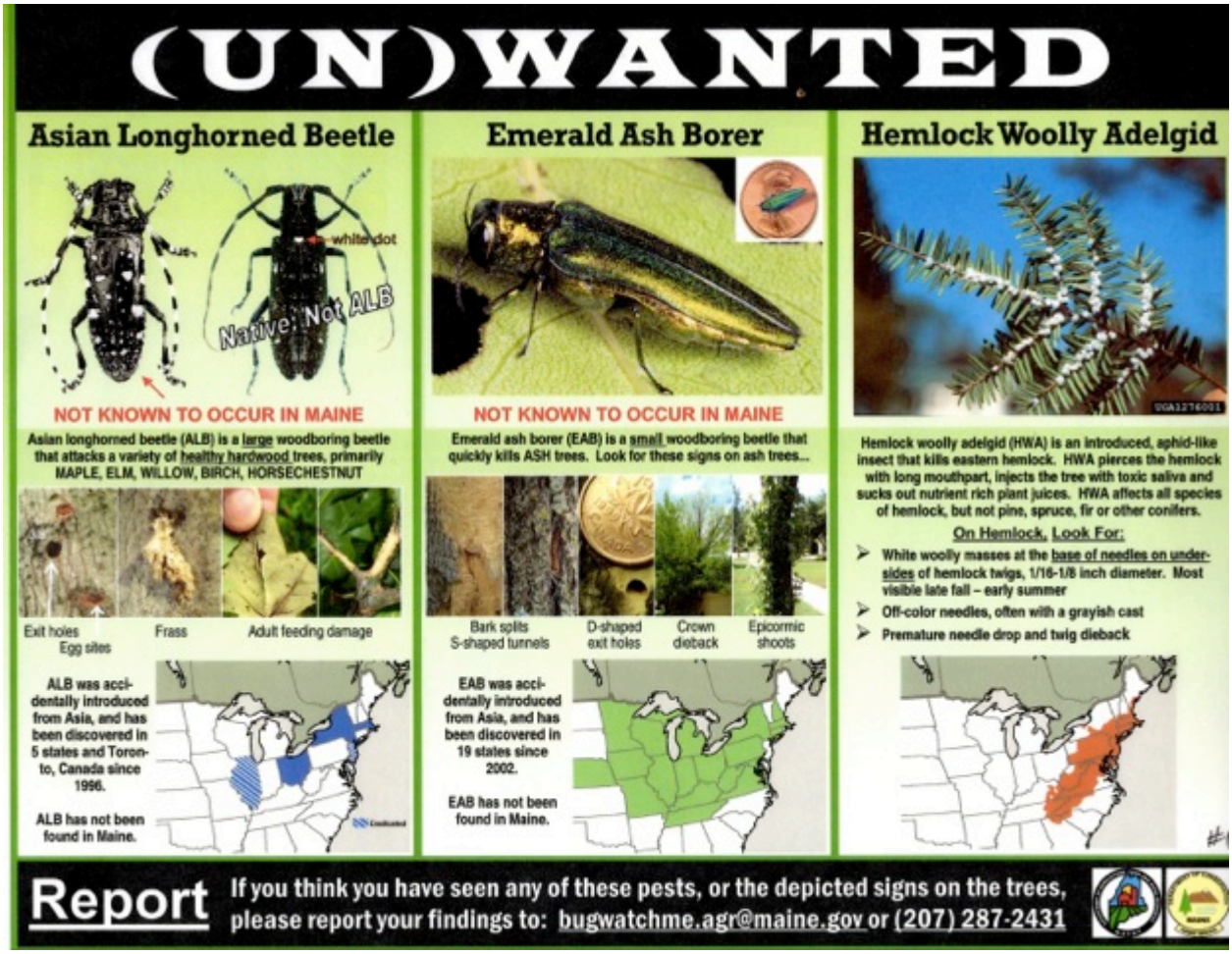
_____ (18 – 29) _____ (30 – 39) _____ (40 – 49)
_____ (50 – 59) _____ (60 – 69) _____ (70 or >)

35. What is the highest level of formal education you have completed?

☐	☐	☐	☐
High School / GED	Technical / Community College Degree	Bachelor's Degree	Above Bachelor's Degree

APPENDIX 3: OUTREACH MATERIALS

Maine Outreach Material 1: (Un)Wanted



Maine Outreach Material 2: Maine ALB Brochure

What Can You Do?

All initial discoveries of ALB have been made by the general public—someone noticing that something isn't quite right with their trees—or noticing an unusual large beetle. There is evidence that ALB was present in Worcester for 10 or more years before being reported by a resident!

- **Learn to recognize** ALB and the signs and symptoms of infestation;
- **Be on the lookout** for ALB adults from August to October, and for exit holes and oviposition sites year-round;
- **Report** suspect insects to the Maine Department of Agriculture (207-287-3891);
- **Leave your firewood at home.** Many species of insects, including ALB, can hitch a ride on your firewood and get introduced to a new area. You can help stop the spread of invasive insects by buying firewood near where you burn it;
- **Become a volunteer** and help to spread the word about ALB. Contact the Maine Department of Agriculture for opportunities.

For more information, go to **www.albmaine.org**

Why is ALB Unwanted?

Adult beetles feed on leaves, twigs, and young bark. Females dig pits into the bark of trees and lay eggs, up to 90 per female. When the eggs hatch, the developing larvae tunnel through the wood disrupting the flow of nutrients and weakening the tree's structure.

All trees infested with ALB eventually die.

ALB attacks and kills healthy trees.

ALB infests a variety of species including:
All species of maple, horsechestnut, mountain ash, willow, birch, elm, and ash.

ALB has devastated the city of Worcester, Massachusetts, just 90 miles from the Maine border.

The United States Department of Agriculture estimates the beetle has the potential to cause $669 billion of damage to the nation's lumber, maple syrup, nursery, and tourism industries. Urban landscapes—trees in your yard and your streets—are also vulnerable to this pest.

BUG WATCH

Maine Department of Agriculture
28 State House Station
Augusta, ME 04333
Phone: 207-287-3891
Fax: 207-287-7548
www.albmaine.org

This material was made possible, in part, by a cooperative agreement from the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). It may not necessarily express APHIS' views.

Photos: ALB in hand— Jennifer Forman Orth, Massachusetts Department of Agricultural Resources; Adult ALB and Poplar Borer—Pennsylvania Department of Conservation and Natural Resources—Forestry Archive, Bugwood.org; Oviposition Sites, Frass, Whitespotted Sawyer, Northeastern Sawyer and Broadnecked Root Borer—Michael Bohne, USDA Forest Service; Exit Hole—Dennis Haugen, USDA Forest Service, Bugwood.org; Cerambycoidea Incisitarsi— Joseph Berger, Bugwood.org.

Maine Department of Agriculture
Division of Plant Industry

#2

(UN)WANTED: Asian Longhorned Beetle

www.albmaine.org

The Asian Longhorned Beetle

The Asian longhorned beetle (ALB), *Anoplophora glabripennis*, is a woodboring beetle native to Asia. It attacks, and eventually kills, healthy hardwood trees, including maples, birches, poplars, willows, and others.

ALB was first discovered in the United States in 1996 in Brooklyn, New York and has since been found in New Jersey, Illinois, Massachusetts, and Toronto, Canada. It is presumed to have been transported into the country through solid wood packing materials from Asia.

The only successful method for eradication is to cut down and chip infested trees. ALB has been successfully eradicated in Illinois and parts of New Jersey.

ALB has not been found in Maine, but residents and visitors are being asked to be on the lookout for this destructive insect, because early detection is the key to successful eradication.

What to look for:

Adult ALB:

- Are active August to October;
- Are large: 1 to 1½ inches long;
- Are glossy black with irregular white splotches on the wing covers;
- Have very long antennae, with alternating bands of black and white, that are as long or longer than the length of their bodies.

Oviposition Sites:

Roundish pockmarks in the bark where an adult female has chewed a depression to lay an egg. One female lays up to 90 eggs, so there may be many of these on a single tree.

Exit Holes:

Round holes 3/8 inch in diameter on the trunk or branches where the adult beetles emerge. A pencil can be inserted at least an inch into an ALB exit hole.

Frass:

Sawdust-like material which comes out the exit hole with the beetle and may be found on the ground or in the junctions of branches and trunk.

Report

1. **Catch** a suspect insect and place it in the freezer (it can chew its way out of a bag or metal jar lid). If it is not possible to catch the insect, take a picture of it or the exit holes and oviposition sites;
2. **Note** where you found the insect or damage: location, type of tree and the date;
3. **Call** the Maine Department of Agriculture at: 207-287-3891
   OR the ALB toll-free hotline at 866-702-9938
   OR go to **www.albmaine.org**

ALB may be confused with:

New Hampshire Outreach Material 1: Use Local Firewood

Help Protect our Trees

USE LOCAL FIREWOOD!

Bringing firewood into New Hampshire from other areas can accidentally spread damaging insects and diseases that threaten the health of our forests. Once infestation occurs, control of these exotic pests involves drastic measures, including complete removal of **all** trees (infested or otherwise) in the affected and surrounding areas.

Adult Asian Longhorned Beetle. Actual size is 1 to 1.5 in

Asian Longhorned Beetle
Prefers Maple Trees

Emerald Ash Borer
Attacks Ash Trees

Transporting firewood spreads insects and tree diseases.

Firewood and pallets may contain insects and diseases

What you can do to help:

- ✓ **Don't travel with firewood**
- ✓ **Use local firewood**
- ✓ **Contact the Forest Health Office with concerns about pests in your firewood**
- ✓ **Report sightings of exotic insects**

NH Division of
Forests and Lands
Forest Health Section

PO Box 1856
Concord, NH 03302
(603) 464-3016
nhdfl.org

New Hampshire Outreach Material 2: Regulation

Help Protect Our Trees

The transportation of untreated firewood into NH is now restricted.

Moving untreated out-of-state firewood into New Hampshire can spread damaging insects and diseases that threaten the health of our forests. A quarantine banning the entry of untreated out-of-state firewood into NH has been established by the N.H. Department of Resources and Economic Development and the N.H. Department of Agriculture, Markets & Food. Movement of firewood heat-treated by an approved vendor or in accordance with a compliance agreement is allowed.
RSA 227-K:2 III,K:14; K:15; and RSA 227-G:3.

Split firewood with pupating insects

Any person violating the provisions of the quarantine will be guilty of a violation and subject to a fine and confiscation of firewood. RSA 227-K:17

Transporting firewood can spread insects and tree disease.

Untreated firewood contains large numbers of insects and tree pathogens.

- ✓**Don't travel with firewood from out-of state**
- ✓**Find New Hampshire firewood sources**
- ✓**Contact agencies below with questions or for information regarding compliance agreements**

Contact Information:

N.H. Division of Forests and Lands
603-464-3016
nhdfl.org

N.H. Division of Plant Industry
603-271-2561
nh.gov/agric/

New Hampshire
Department of Agriculture, Markets & Food

Vermont Outreach Material 1: Stop Invasive Pests from Entering Vermont

Stop Invasive Pests From Entering Vermont

Non-native, invasive insects are often small, but they are one of the biggest menaces facing Vermont's natural and urban landscapes.

The Asian longhorned beetle, emerald ash borer, and hemlock woolly adelgid are of great concern to Vermont. These pests have already killed millions of trees in the US and Canada, and have racked up huge ecological, recreational, and commercial costs. They also alter the availability of habitat, shade, and shelter, and disrupt the food web, water cycle, and carbon cycle in forest ecosystems. **Help us protect Vermont's natural splendor: learn about** each of the three pests below, **be on the lookout** for these insects, and **know how to report a sighting**.

Asian Longhorned Beetle

Anoplophora glabripennis

Threat:

Attacks and can kill maple trees and other hardwoods. This insect could potentially destroy our hardwood forests and upset the balance of our forest ecosystem.

Insect Description

Size: 3/4" to 1 1/2" body length; antennae are 1 to 2 times the body length

Color: Adult beetles are glossy black with irregular white spots. Antennae have black and white bands. Feet and antennae may have a bluish tint.

Maple Tree

What to look for:

- Adult beetles emerge July - September
- Pencil-sized exit holes along tree trunks and larger branches
- Egg laying sites may ooze sap or be healed over and knot-like

Hosts:

Asian longhorned beetle shows a particular preference to maples. Also feed on many common hardwood species, birches, horsechestnuts, elms, hackberries, ashes, poplars, aspens, and willows.

Hemlock Woolly Adelgid

Adelges tsugae

Threat:

Kills hemlocks. Hemlocks play an important role by providing deep shade along creeks, maintaining cool micro-climates critical to survival of trout and other cold water species, and are also critical to deer yards.

Insect Description

Size: Adult insects are 1 millimeter and oval shaped.

Color: White, cottony balls surround tiny purplish-black adults and reddish-brown nymphs.

Eastern hemlock

What to look for:

- White, cottony balls at the base of hemlock tree needles
- Yellowing needles, needle fallout, branch dieback, crown thinning

Hosts:

Eastern hemlock and Carolina hemlock

Emerald Ash Borer

Agrilus planipennis

Threat:

EAB attacks and kills all native North American ash species. EAB has killed tens of millions of ash trees and threatens to kill most of the 7.5 billion ash trees throughout North America.

Insect Description

Size: 1/2" body length;1/8" body width

Color: Adults are 'bullet' shaped and have metallic green wing covers and purple to coppery red abdomens.

Green ash

What to look for:

- Adult beetles emerge May - September
- Leafy offshoots from the lower trunk of ash trees
- S-shaped tunnels behind bark
- D-shaped exit holes 1/8" wide on bark surface
- Dead top branches of ash trees

Hosts:

All ash species

What can YOU do to help?

- Learn how to recognize forest pests.
- Keep a sharp eye out in parks and neighboring communities.
- Buy and use local firewood. Encourage others to do the same.
- Report beetle sightings or signs of infestation to the Agency of Agriculture, Department of Forest, Parks and Recreation or your local UVM extension office.

Learn More here:

Vermont Invasives: www.vtinvasives.org

Asian Longhorned Beetle: www.beetlebusters.info

Emerald Ash Borer: www.emeraldashborer.info

Firewood: www.dontmovefirewood.org

DONT MOVE FIREWOOD

VERMONT AGENCY OF AGRICULTURE DEPARTMENT OF FORESTS, PARKS & RECREATION

Funded by the Vermont Agency of Agriculture, Food and Markets, Plant Industry, CAPS Program

Vermont Outreach Material 2: Look UP!