

PRELIMINARY FINDINGS
OF THE
**MAINE FOREST AND
FOREST PRODUCTS SURVEY**



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Preliminary Findings
of the
Maine Forest and Forest Products Survey

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Executive Summary

The **Maine Forest and Forest Products Survey** was developed as part of the University of Maine's Forest Bioproducts Research Initiative (FBRI) to identify Maine residents' views towards forests, forest practices, and emerging technologies in forest-based biorefining. The mail survey, conducted in early 2009, was mailed to 3,000 Maine households and included two samples – a 1,750-household “State-wide” sample, and a 1,250-household “Mill Town” sample. The response rates were 42% and 41%, respectively.

The survey was divided into five sections that asked respondents about their: (1) perceptions of Maine's forests and the forest products industry; (2) views on forest-based biorefineries; (3) general perceptions of the natural environment; (4) perceptions about their household's economic well-being; and (5) socio-demographic information. Significant findings include:

- A relatively large percentage of respondents indicated that they worked or had worked within the forest products sector (15.3% and 43.9%, respectively, for State-wide and Mill Town respondents).
- On average, respondents in both samples held moderate levels of pro-environmental attitudes and beliefs. State-wide respondents indicated slightly higher levels of pro-environmental attitudes and beliefs as compared to respondents from Mill Towns.
- A series of questions on household finances revealed that respondents, on average, felt “economically insecure.” The Mill Town respondents indicated slightly higher insecurity ratings as compared to the State-wide sample.
- Both State-wide and Mill Town respondents felt that Maine's forest products industry was very important to the state's economy (41.9% and 58.3%, respectively). Expressed on a scale of 1 (not at all important) to 7 (very important), mean scores were 6.05 (State-wide) and 6.36 (Mill Towns).
- Across all survey questions, the respondents' strongest views were toward the importance of certain forest management objectives. In both samples, the most important objectives based on ordinal rankings were “maintain water quality,” “maintain wildlife populations,” and “maintain soil nutrients.”
- Respondents from both State-wide and Mill Town samples expressed strong support for the development of forest-based biorefinery projects in the state. Support for biorefinery projects declined slightly as the project location became more localized (i.e., support for a project “in Maine” vs. support for a project “in their community”).
- The potential positive impacts of forest-based biorefinery projects were, on average, rated higher by respondents in both samples than the potential negative impacts. “Increase in local jobs” and “energy independence” were rated the highest potential positive impacts in both samples, while the rating and ranking of the potential negative impacts were inconsistent, although “unsustainable logging” was always ranked/rated in the top three.

- When respondents were asked to rank alternative energy projects from “most supported” to “least supported” based on their level of support, forest-based biorefinery projects ranked 5th and 6th in the Mill Town and State-wide samples, respectively. The Mill Town sample ranked biorefineries below wind, solar, hydroelectric, and wood pellet energy projects, but ahead of wood biomass-fired electrical generating facilities, tidal power, and projects fueled by non-renewable energy sources such as fossil fuels. The State-wide sample also ranked tidal energy ahead of forest-based biorefineries.
- Both samples gave “medicines and pharmaceuticals” the highest rating among potential products that might be derived from “wood sustainably harvested from Maine’s forests.” Respondents in Mill Towns rated wood pellets equally high. Interestingly, ethanol and biodiesel were ranked last at 6th and 7th.
- In both samples, the University of Maine’s School of Forest Resources was rated the most creditable organization in providing information about the forest products industry, followed by university researchers and the Maine Forest Service.

In summary, respondents in both samples displayed strong support for the development of forest-based biorefinery projects in Maine, with both samples rating job creation as the primary benefit. As a potential biorefinery project’s location became more localized, moderate levels of resistance emerged, although to a lesser extent in the Mill Town sample. In both samples, preferred locations for forest-based biorefineries were alongside closed or existing pulp and paper mills rather than as separate stand-alone facilities.

Although overall support for biorefineries was observed, certain potential impacts related to the industry’s development were considered very important to the respondents and should be carefully considered in evaluating public support for the industry. For example, maintaining forest ecosystem values such as water quality, wildlife habitat, and soil nutrients were consistently rated and ranked as very important by respondents. In contrast, localized concerns such as increased truck traffic, noise, and odor were not rated as high, especially in the Mill Town sample. As a result, we believe that the key issues affecting the social acceptability of biorefinery development in Maine will be the industry’s impact on Maine’s forests and associated ecosystem services.

Introduction

The **Maine Forest and Forest Products Survey** was developed as part of the University of Maine's Forest Bioproducts Research Initiative (FBRI) in an effort to identify Maine residents' views towards forests, forest practices, and emerging technologies in forest-based biorefining. The survey, mailed to 3,000 Maine households between late January and early March of 2009, also included a set of questions to allow us to understand how respondent environmental and economic security views were likely to influence their responses.

Since forest-based biorefineries have neither a history in the State nor a project development equivalent to benchmark public sentiment, the survey asked the respondents to rate potential attributes related to a biorefinery project as a first step in understanding public attitudes. The attributes included both positive and negative potential impacts associated with the development of a forest-based biorefinery project, and preceded the section that asked respondents to directly rate their level of support for forest-based biorefinery projects. Since the industry has the potential to affect forest management practices in the State (Liliehalm et al. 2009), the survey included a section where respondents were asked to rate forest management objectives. Again, these questions were asked prior to questions relating to the level of support for biorefinery projects.

Survey Methodology

Two separate waves of surveys were mailed during the survey period. The first wave was sent in late January of 2009, with non-respondents sent a second survey in late March. Most survey questions utilized a seven-point Likert scale rating system, which ranged from "not at all" to "very" for each adjective. Many questions also included an ordinal ranking system in addition to the seven-point Likert scale – a novel approach that allowed us to better understand respondents' support for forest-based biorefinery projects and related attributes by forcing the respondents to choose which attributes were relatively more important than others.

We sampled two populations in the State: (1) a "State-wide" sample; and (2) a "Mill Town" sample that included households within a 10-mile radius of Maine's 10 pulp and paper processing facilities (Appendix C). These mill towns were over-sampled due to their smaller populations, and due to the fact that since forest-based biorefineries will likely be co-located with pulp and paper mills (Dickerson & Rubin 2008, Benjamin et al. 2009), resident attitudes in these communities is particularly important in evaluating the social acceptability of future projects.

Both the State-wide and Mill Town samples were randomly selected using a computer generated list of households in the state. The State-wide sample included all of Maine and did not exclude the 10 mill towns described above. The State-wide sample included a total of 1,750 households, and the Mill Town sample included a total of 1,250 households – roughly 125 households in each of the mill towns. Out of the State-wide sample 600 surveys were returned completed, 76 were returned blank (indicating that households did not wish to participate), and 126 were undeliverable. For the Mill Town sample, 430 were returned completed, 50 were returned blank, and 97 were undeliverable. The response rates were 42% and 41% for the State-wide and Mill Town samples, respectively. The samples have a statistical significance of +/- 4.00% (State-wide) and +/- 4.72% (Mill Town) at the 95% confidence level.

How the Survey was Structured

The survey, found in Appendix A, is divided into five sections, with each section corresponding to a specific area of interest considered relevant in determining the level of public support for forests, forestry, the forest products sector, and forest-based biorefineries. Sections included:

Section One

- In this section, we were interested in the respondent's perceptions of Maine's forests and the forest products industry. This section also measures respondent's attitudes toward organizations that may provide information about the forest products industry. In the survey, we defined the forest products industry to include logging, pulp and paper mills, lumber mills, and forest landowners.

Section Two

- In this section, we were interested in the respondent's views on forest-based biorefineries. This section includes ratings and rankings of attributes related to forest-based biorefinery projects, as well as forest management objectives and practices. We defined a forest-based biorefinery as a process that turns wood into gasoline substitutes like ethanol, plastics, and other chemicals normally made from fossil fuels.

Section Three

- In this section, we were interested in the respondent's general perceptions of the natural environment. Most of the questions in this section were taken from the Abbreviated New Environmental Paradigm based scales, which attempts to measure an individual's attitudes towards the environment (Cordano et al. 2003).

Section Four

- In this section, we were interested in the respondent's perceptions about their economic well-being in order to gauge their economic security.

Section Five

- In this section, we were interested in the respondent's socio-demographic information. This information is summarized in Appendix B.

How the Results are Presented

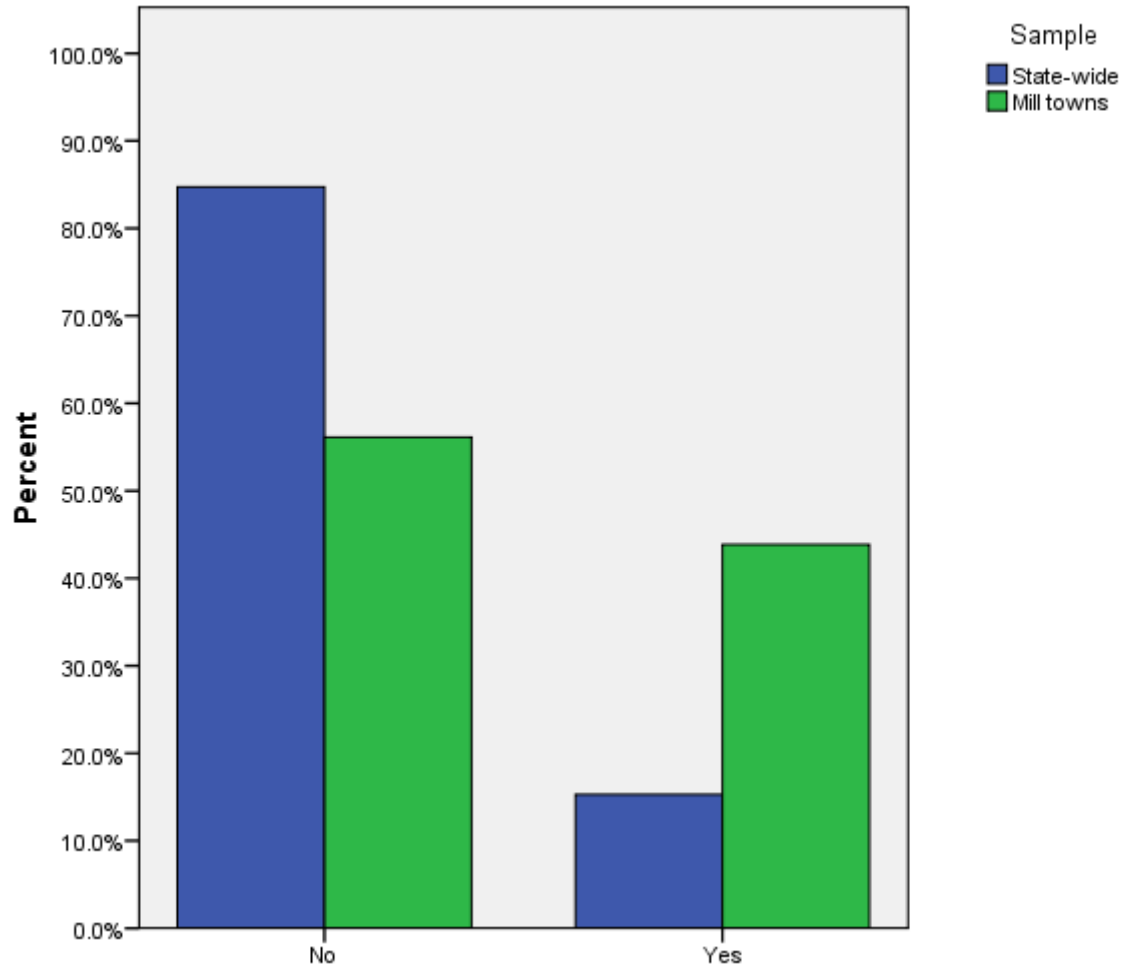
The seven-point Likert scale ratings and ordinal rankings described above are presented in two different formats -- as the percentage of respondents that chose each of the scale values or each ordinal value (i.e., "Percent in Each Category"), and/or in terms of the rating/ranking mean score (i.e., "Likert" or "Rank Mean Score"). Where appropriate or when interesting differences were found, we use both forms to present our findings. Standard deviations (SD) are also presented in the tables and interpreted as the amount of disagreement or lack of consensus around a specific ranking or rating. Here, the larger the standard deviation, the greater the disagreement. In the following sections, the State-wide and Mill Town samples are represented in blue and green, respectively, in all graphs. When mean values are compared and presented in the graphs or tables, they are sorted in ascending or descending order based on the Mill Town sample. Otherwise, the information is presented exactly how the choices or statements were ordered in the survey.

Section One

- *State-wide sample is represented in blue.*
- *Mill Town sample is represented in green.*
- *SD = standard deviation.*

1. Are you currently or have you ever been employed in the forest products industry?

When asked if the respondent currently or has ever been employed in the forest products industry, 15.3% of the respondents answered “yes” in the State-wide sample compared to 43.9% in the Mill Town sample.

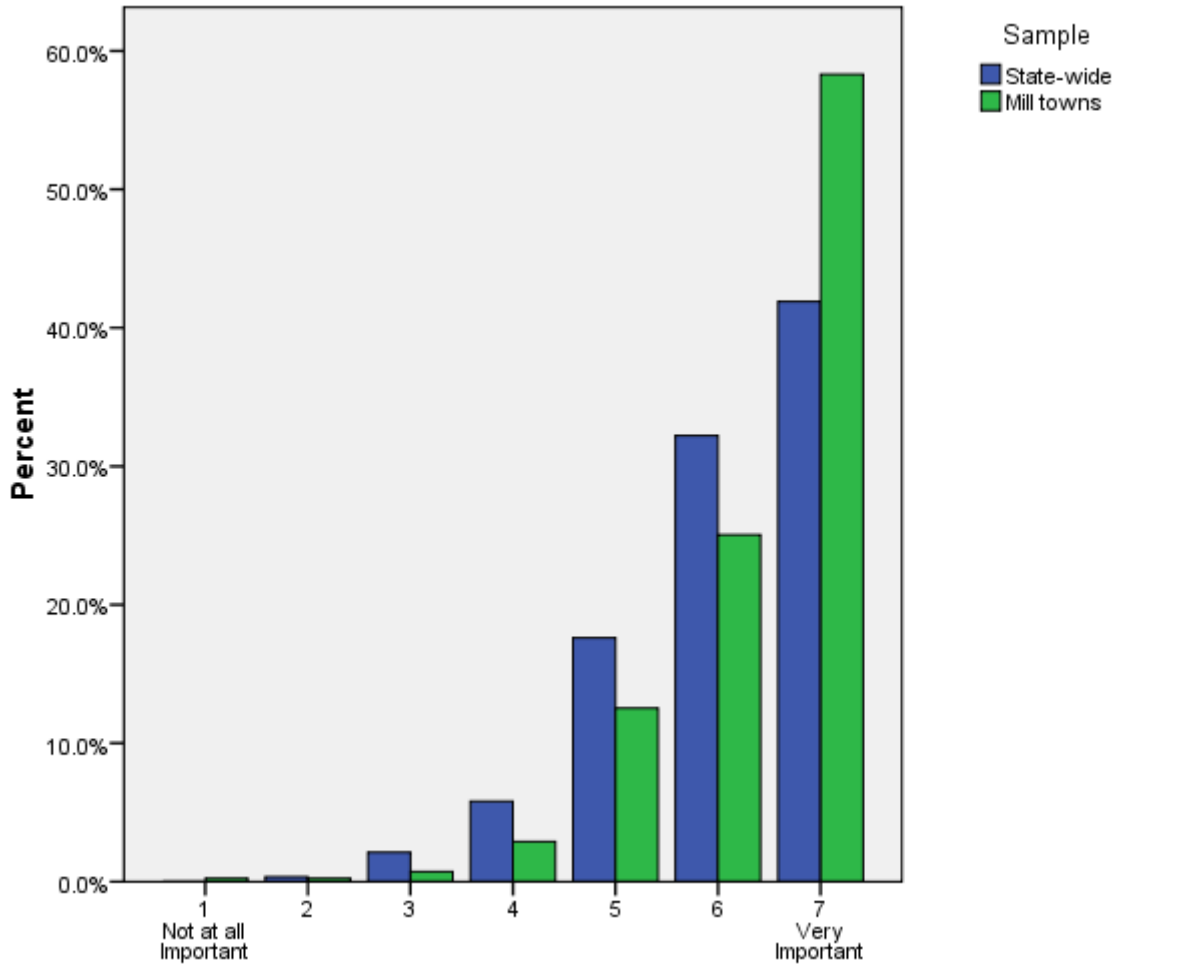


	<u>Yes</u>	<u>No</u>
<u>State-wide sample</u>	15.3%	84.7%
<u>Mill Town sample</u>	43.9%	56.1%

2. On a scale from 1 to 7, how important to Maine’s economy is the state’s forest products industry?

When asked how important the forest products industry is to Maine’s economy, 41.7% of the State-wide sample rated the industry as “7” (“Very important”), compared to 58.1% for the Mill Town sample. Seventy-four percent of the State-wide and 83.4% of the Mill Town samples rated the forest sector’s importance as a “6” or “7.” The mean rating for the State-wide sample was 6.05 with a standard deviation of 1.04, compared to 6.36 and 0.93, respectively, for Mill Towns.

Percentage in Each Category

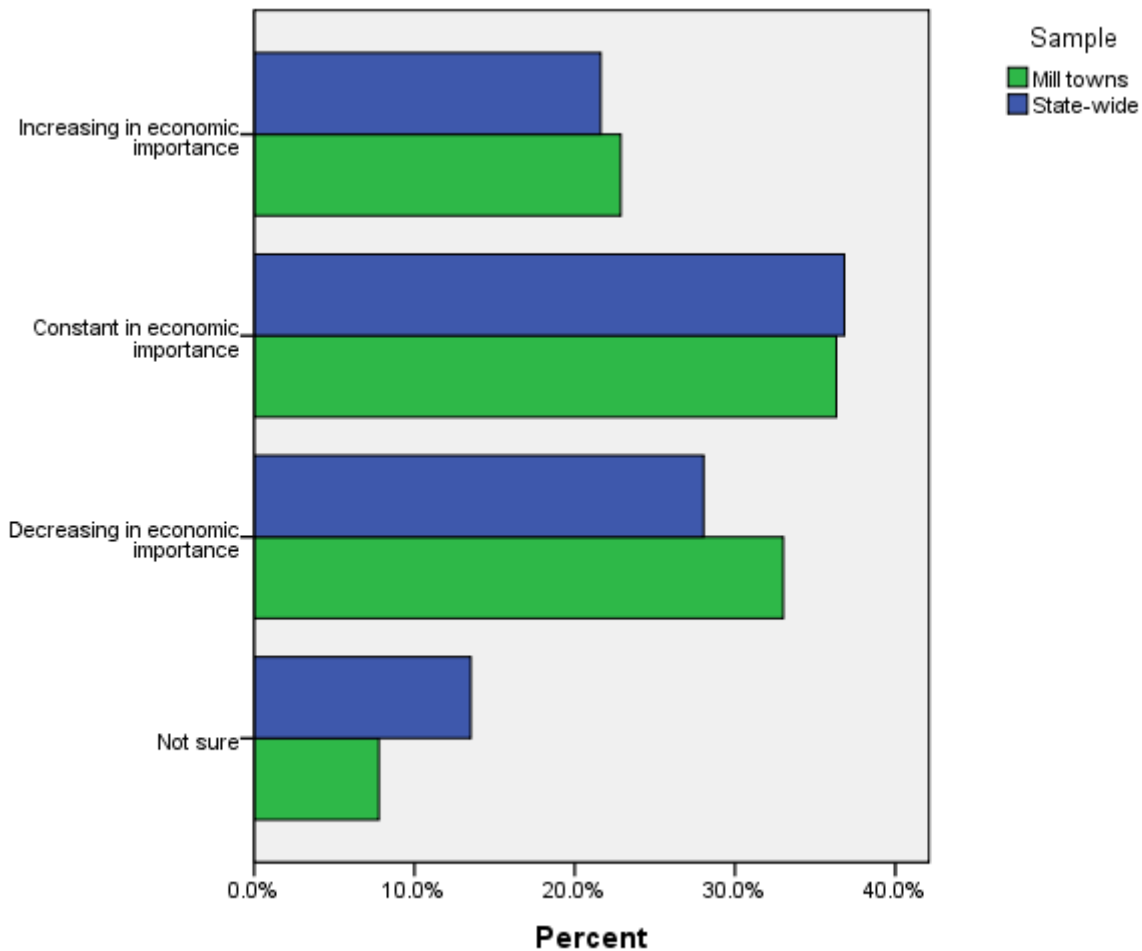


	Not at all Important			Very Important				Mean	SD
	1	2	3	4	5	6	7		
State-wide sample	0.0%	0.4%	2.1%	5.8%	17.6%	32.2%	41.9%	6.05	1.04
Mill Town sample	0.2%	0.2%	0.7%	2.9%	12.5%	25.1%	58.3%	6.36	0.93

3. In your opinion, is Maine’s forest products industry “increasing,” “constant,” or “decreasing” in economic importance to the state, or are you “not sure.”

When asked where the State’s forest products industry was headed in economic importance, 21.6% of the State-wide sample and 22.9% of the Mill Town sample thought that the industry was increasing in economic importance to Maine. Almost the same percentage for both samples (36.8% vs. 36.3%, respectively) thought it was at a “constant” level of importance to the State. Twenty-eight percent of the State-wide sample thought that the industry was “decreasing” in economic importance, compared to 33.0% for Mill Towns. Lastly, those that were “not sure” represented 13.5% of the State-wide sample, compared to 7.8% for Mill Towns.

Percentage in Each Category

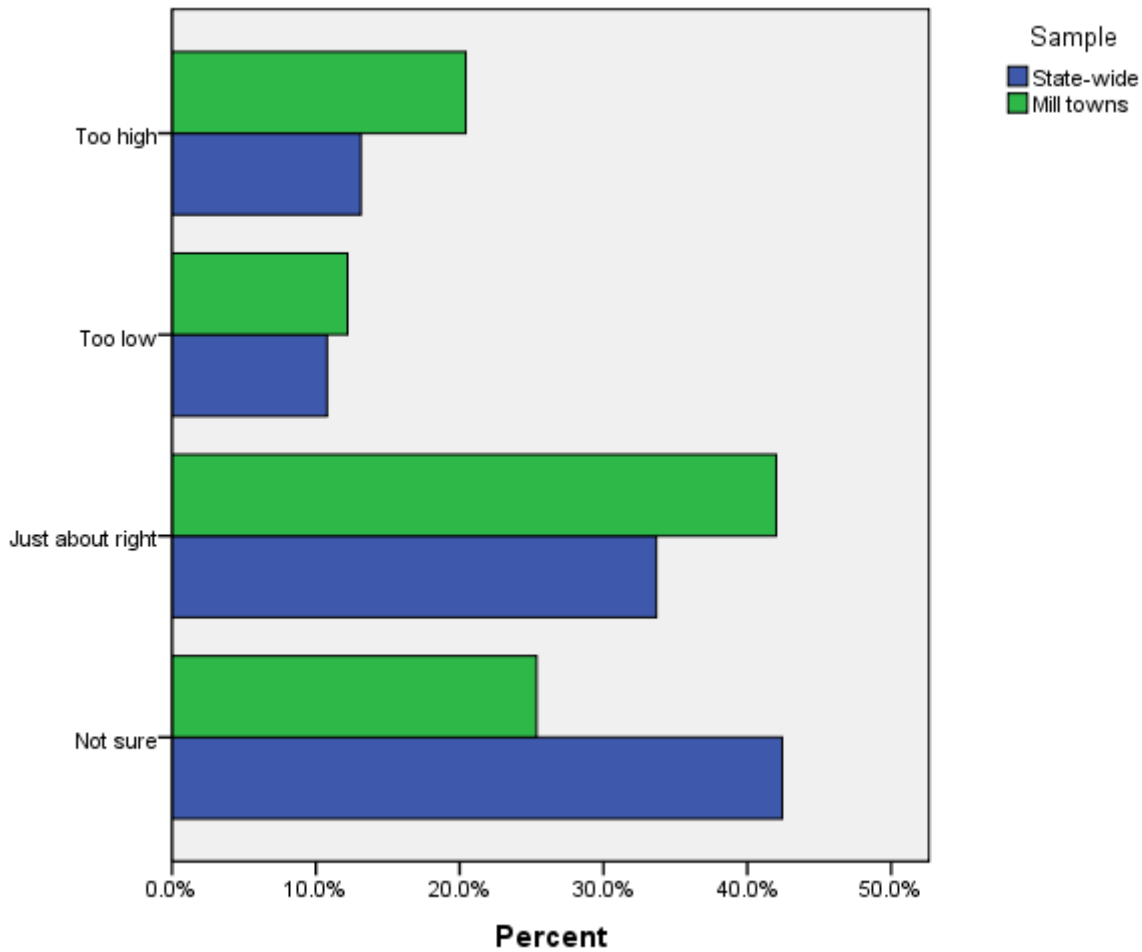


	<u>Increasing</u>	<u>Constant</u>	<u>Decreasing</u>	<u>Not sure</u>
<u>State-wide sample</u>	21.6%	36.8%	28.0%	13.5%
<u>Mill Town sample</u>	22.9%	36.3%	33.0%	7.8%

4. In your opinion, are timber harvest levels in Maine “too high,” “too low,” “just about right,” or are you “not sure.”

In the State-wide sample, 13.1% of respondents thought that harvest levels were “too high,” compared to 20.4% for the Mill Town sample. Only 10.8% (State-wide) and 12.2% (Mill Towns) of respondents thought that harvest levels were “too low.” In Mill Towns, the response “Just about right” was selected most often (42.0%), while “Not sure” was selected most often for the State-wide sample (42.4%).

Percentage in Each Category

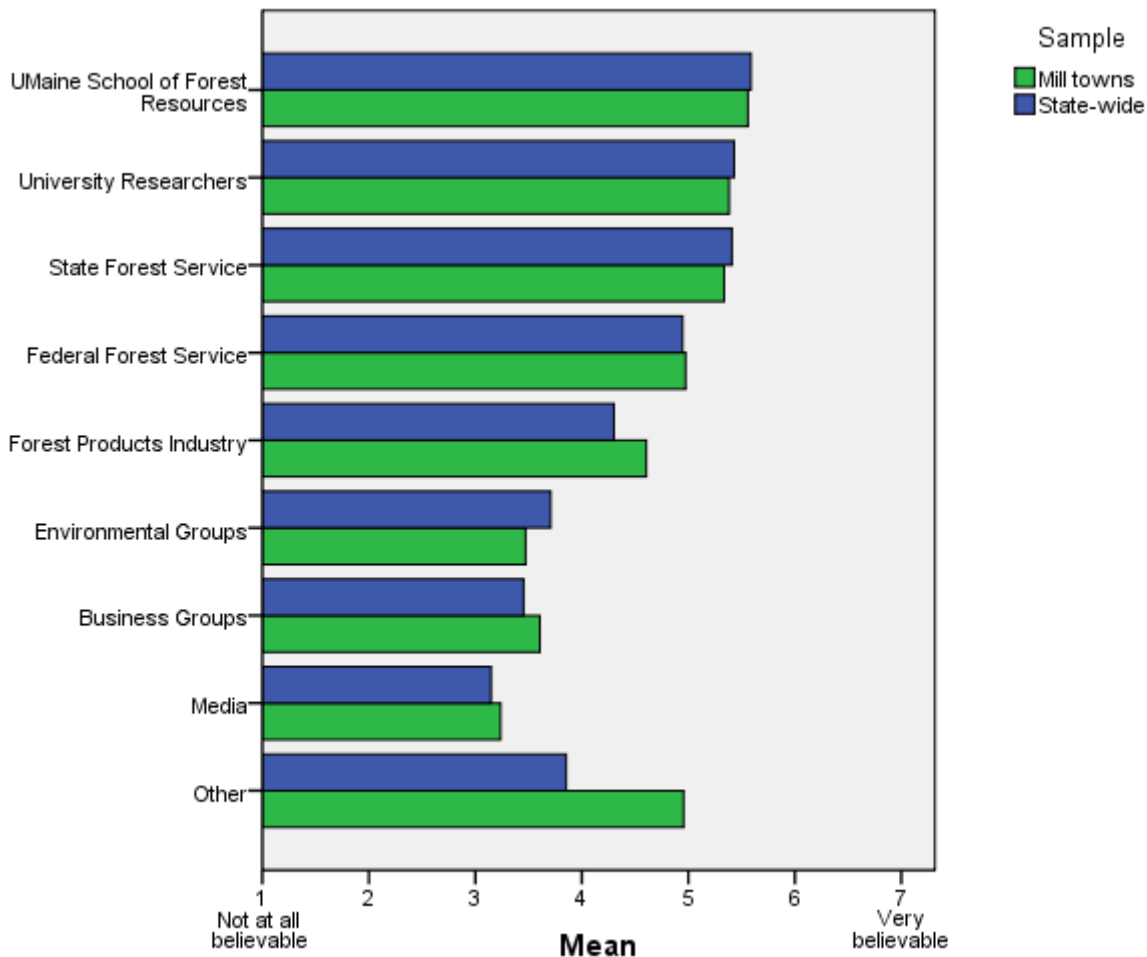


	<u>Too high</u>	<u>Too low</u>	<u>Just about right</u>	<u>Not sure</u>
<u>State-wide sample</u>	13.1%	10.8%	33.7%	42.4%
<u>Mill Town sample</u>	20.4%	12.2%	42.0%	25.4%

5. How believable are each of these organizations as a credible source of information about the forest products industry?

In both samples, the University of Maine's School of Forest Resources is rated the highest, with identical mean scores of 5.6 as well as the lowest standard deviations (1.19 for the State-wide sample, and 1.24 for Mill Towns). University researchers ranked next in credibility, followed by other public and private forest-related sources. The least credible source of information according to both samples was the media (e.g., TV, newspapers, etc.), with mean scores of 3.15 and 3.24 for both State-wide and Mill Town samples, respectively. Both environmental groups and business groups were rated at the lower end of the Likert mean scores in both samples, with nearly identical means. Interestingly, the State-wide sample considered environmental groups slightly more creditable than business groups, while Mill Towns thought business groups were slightly more creditable than environmental groups.

Likert Scale Mean Score for Each Organization

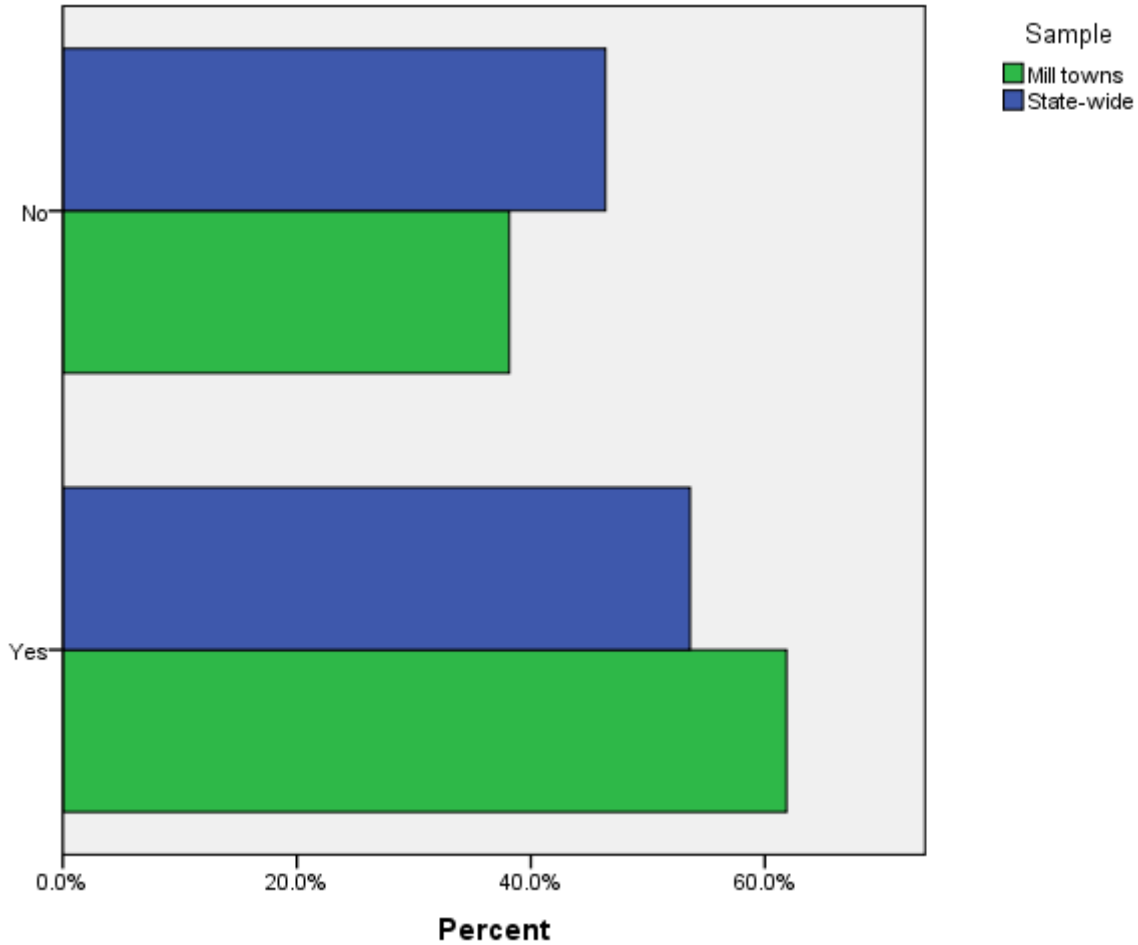


	State-wide sample		Mill Town sample	
	Mean	SD	Mean	SD
School of Forest Resources	5.59	1.19	5.56	1.24
University Researchers	5.43	1.23	5.38	1.33
State Forest Service	5.41	1.24	5.34	1.35
Federal Forest Service	4.95	1.34	4.97	1.45
Forest Products Industry	4.30	1.50	4.60	1.58
Business Groups	3.45	1.33	3.61	1.42
Environmental Groups	3.71	1.63	3.47	1.65
Media (TV, newspapers)	3.15	1.37	3.24	1.47
Other	3.85	2.22	4.96	1.73

6. In your opinion, do you believe Maine has enough protected forest area?

Forty-six percent of State-wide respondents thought that there was not enough protected forest area in Maine, compared to 38.2% for Mill Towns. A majority in both samples thought that there was enough protected forest area in Maine (53.6% and 61.8%, respectively).

Percentage in Each Category

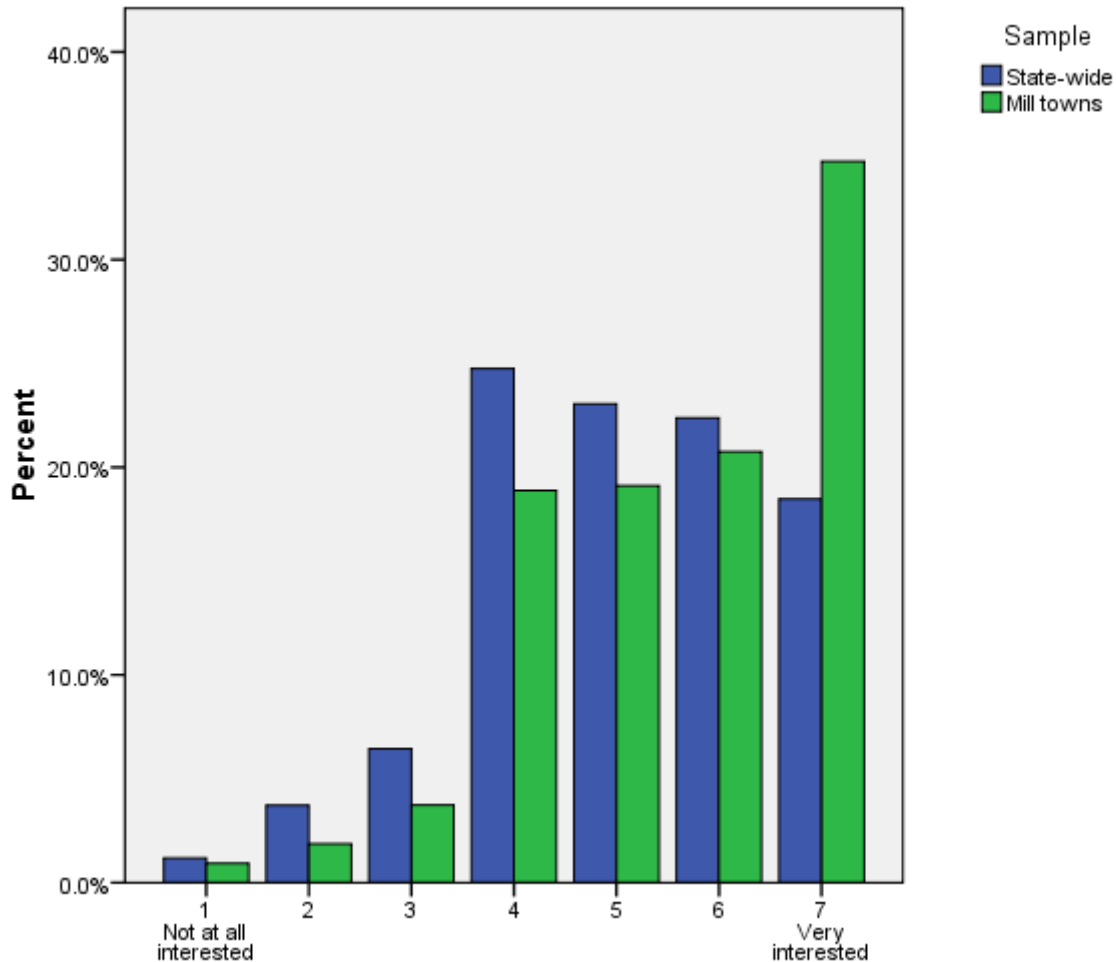


	<u>Yes</u>	<u>No</u>
<u>State-wide sample</u>	53.6%	46.4%
<u>Mill Town sample</u>	61.8%	38.2%

7. On a scale of 1 to 7, how interested are you in Maine’s forest products industry?

In the Mill Town sample, 34.7% of respondents chose the highest level (7) to describe their interest in the forest products industry, while just 18.5% of State-wide respondents chose similarly. The majority of Mill Town respondents (55.4%) selected either 6 or 7, compared to 40.9% for the State-wide sample. The most frequently chosen level was “7” for Mill Towns, and “4” for State-wide respondents. Mean ratings were 5.05 and 5.55, respectively, for State-wide and Mill Town respondents, with almost the same standard deviations (1.40 vs. 1.41, respectively).

Percentage in Each Category

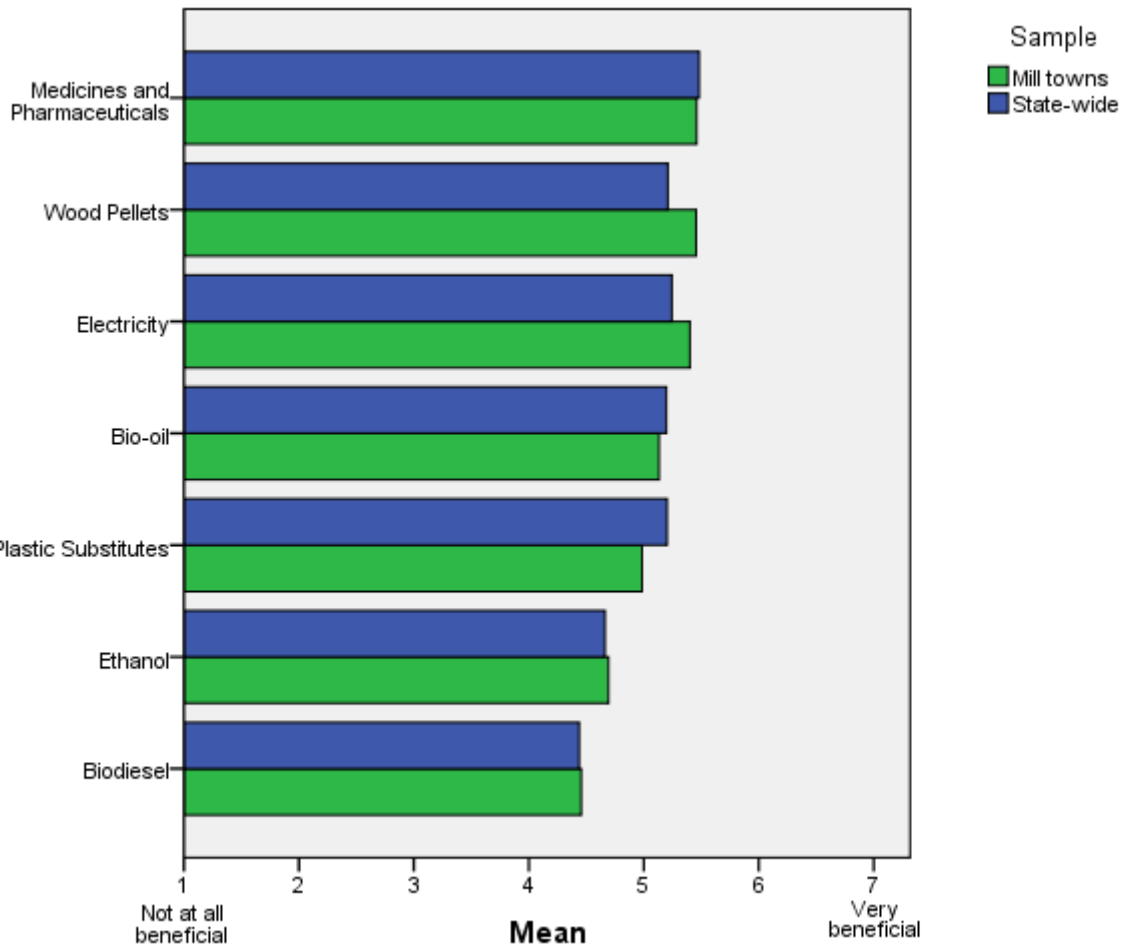


	Not at all Interested			Very Interested				Mean	SD
	1	2	3	4	5	6	7		
State-wide sample	1.2%	3.7%	6.4%	24.7%	23.1%	22.4%	18.5%	5.06	1.41
Mill Town sample	0.9%	1.9%	3.7%	18.9%	19.1%	20.7%	34.7%	5.55	1.40

8. Research and technology are expanding the range of products that can be made from wood. How beneficial would each of these products be to you if produced from wood sustainably harvested from Maine’s forests?

Respondents in both groups rated these products similarly. Medicines and pharmaceuticals was the highest rated category, with mean scores of 5.48 (State-wide) and 5.46 (Mill Towns). The standard deviations in relation with this product were also the lowest at 1.57 (State-wide) and 1.61 (Mill Towns). Ethanol and biodiesel were rated the lowest. The mean scores for ethanol were 4.66 and 4.69 in the State-wide and Mill Town samples, respectively. Biodiesel mean scores were 4.44 and 4.45, respectively. The standard deviations for these products were also the highest, at roughly 2.0 for both products in both samples.

Likert Scale Mean Score for Each Product



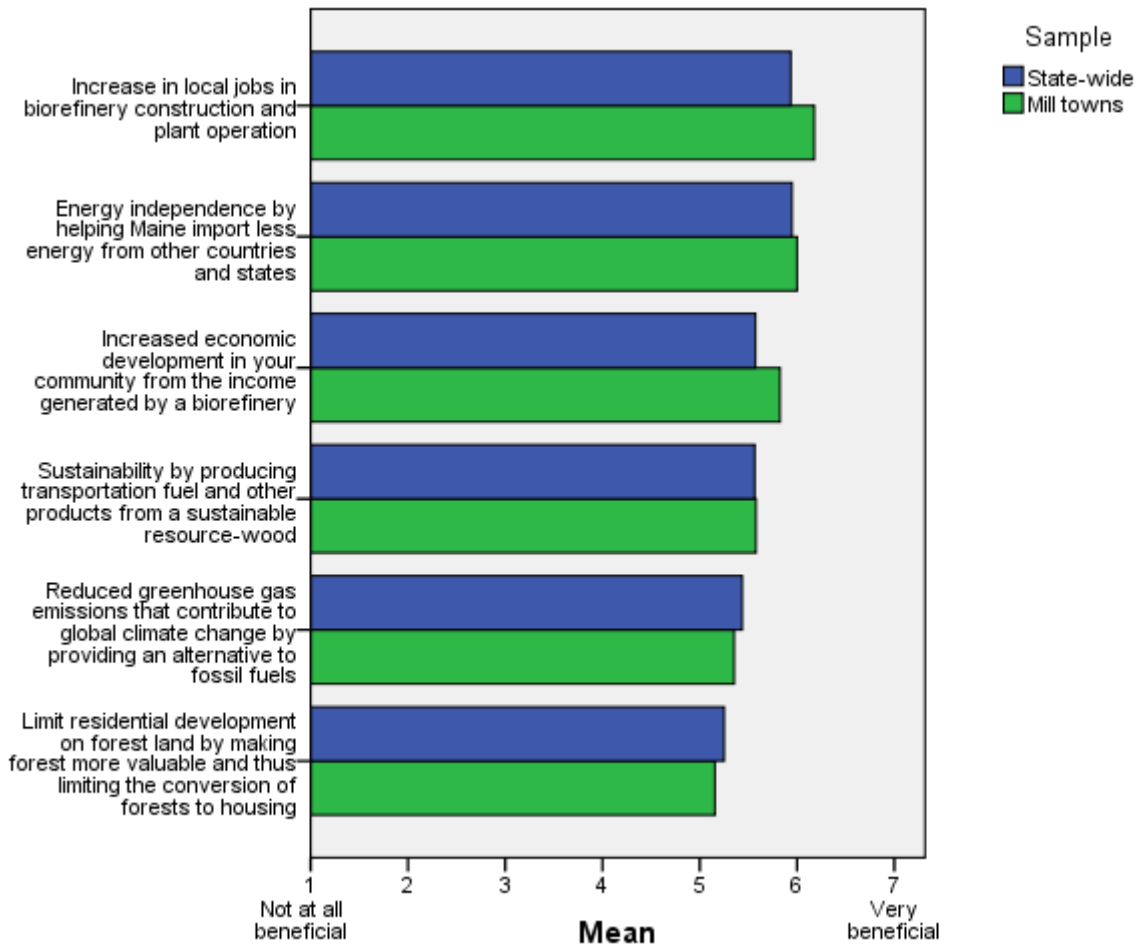
	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Medicines and pharmaceuticals	5.48	1.57	5.46	1.61
Wood pellets	5.21	1.83	5.46	1.73
Electricity	5.24	1.72	5.40	1.76
Bio-oil	5.20	1.80	5.13	1.86
Plastic substitutes	5.20	1.68	4.99	1.81
Ethanol	4.66	1.98	4.69	2.00
Biodiesel	4.44	2.01	4.45	2.05

Section Two

9. A forest-based biorefinery has the potential to bring positive impacts to Maine and local communities. If a forest-based biorefinery were to be developed in your community bringing the potential positive benefits described below, on a scale of 1 to 7 how beneficial would each positive impact be to you?

Both samples on average rated the positive impacts similarly, with the potential impact “increase in local jobs” rated the highest with means of 5.94 (State-wide) and 6.18 (Mill towns) while having very similar standard deviations, 1.33 (State-wide) and 1.29 (Mill towns). “Energy independence” was also rated highly in both samples, and in the State-wide sample was rated slightly higher than “increase in local jobs” but higher standard deviations related to this impact were present in both samples. “Limiting residential development on forest lands” was rated the lowest in both samples, at 5.25 (State-wide) and 5.15 (Mill Towns). These positive impacts were generally rated highly, with an overall average score of 5.62 (State-wide) and 5.68 (Mill Towns).

Likert Scale Mean Score for Each Potential Impact

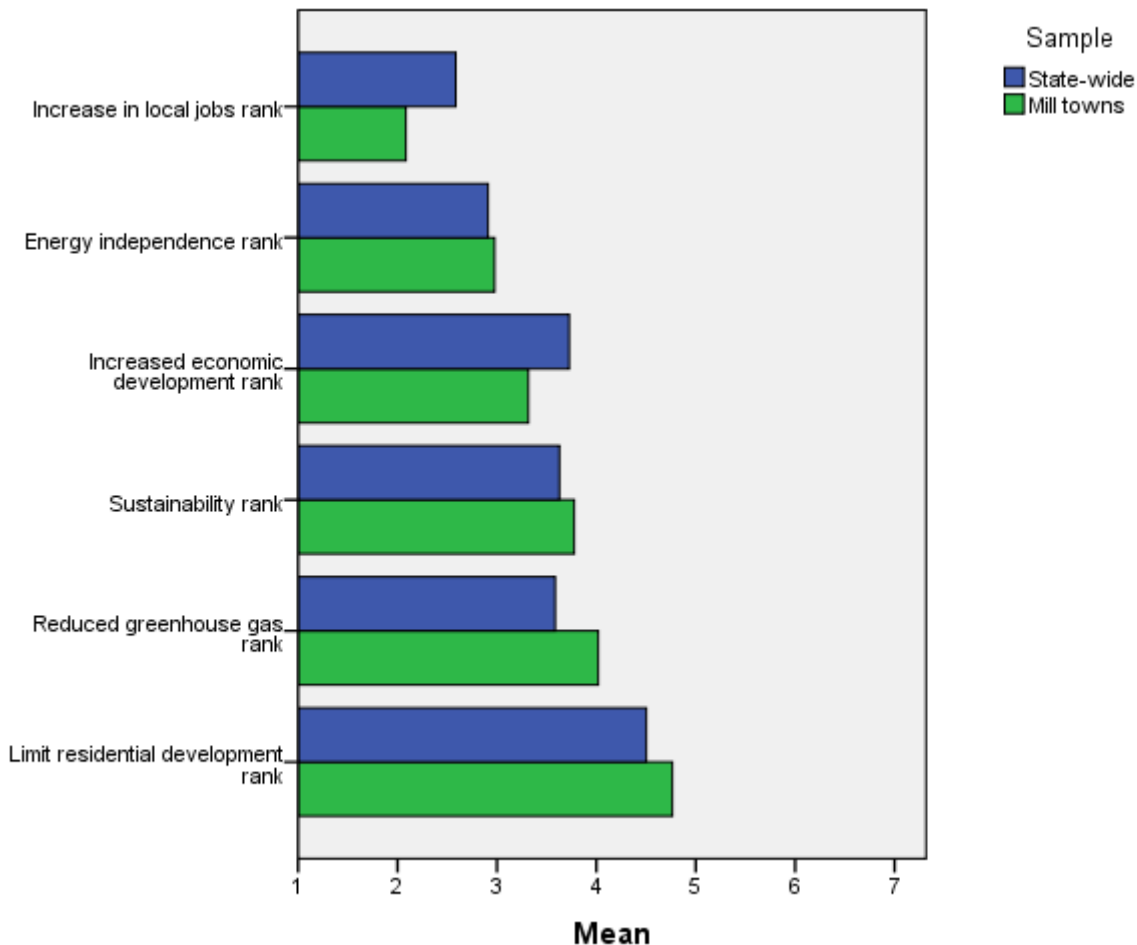


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Increase local jobs	5.94	1.33	6.18	1.29
Energy independence	5.95	1.41	6.00	1.45
Increased economic development	5.58	1.53	5.83	1.51
Sustainability	5.57	1.47	5.58	1.61
Reduced greenhouse gases	5.44	1.65	5.36	1.74
Limit residential development	5.25	1.63	5.15	1.70

10. Please rank the following potential positive benefits associated with a forest-based biorefinery. Begin by placing a “1” next to what you believe to be the most beneficial impact, a “2” next to the second-most beneficial impact, and so on, until all of the impacts have been ranked.

The ordinal ranking for the Mill Town sample exactly followed the Likert scale ratings, with “increase in local jobs” considered, on average, the most beneficial impact, and “limiting residential development” as the least beneficial. In the State-wide sample the order changed with “Reduced greenhouse gases” moving up to the third-most beneficial impact.

Rank Mean Score for Each Potential Impact

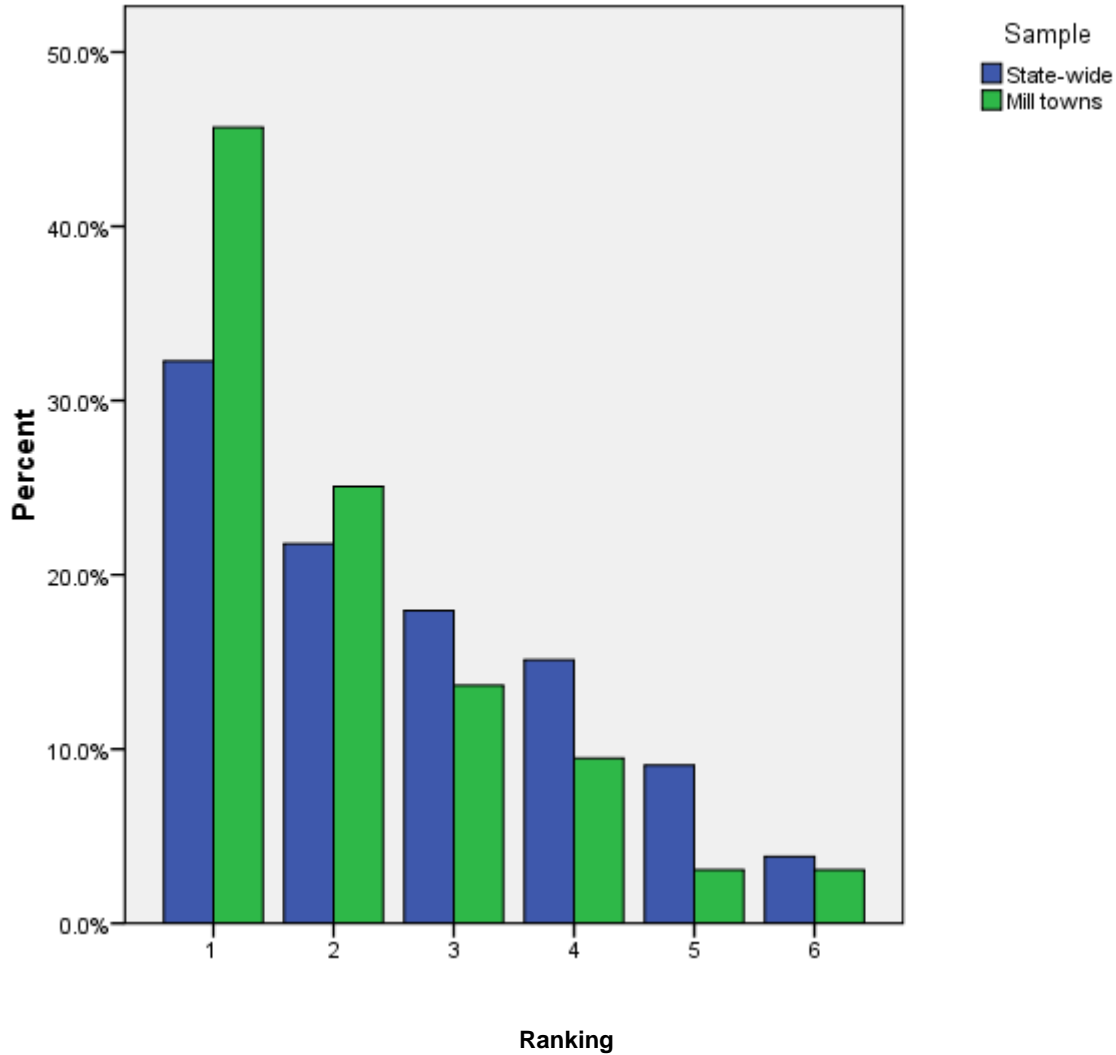


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Increase local jobs	2.58	1.48	2.08	1.32
Energy independence	2.91	1.50	2.97	1.33
Increased economic development	3.73	1.62	3.31	1.56
Sustainability	3.63	1.43	3.78	1.41
Reduced greenhouse gases	3.59	1.62	4.02	1.76
Limit residential development	4.50	1.63	4.76	1.48

The following results apply to the previous question.

In the State-wide sample, 32.3% of respondents ranked the potential positive impact “increase in local jobs” as the most important, compared to 45.7% for the Mill Towns. The majority of both samples ranked “increase in local jobs” as either the first- or second-most beneficial impact from the creation of forest-based biorefineries.

Percentage in Each Category for the Attribute “Increase in Local Jobs”

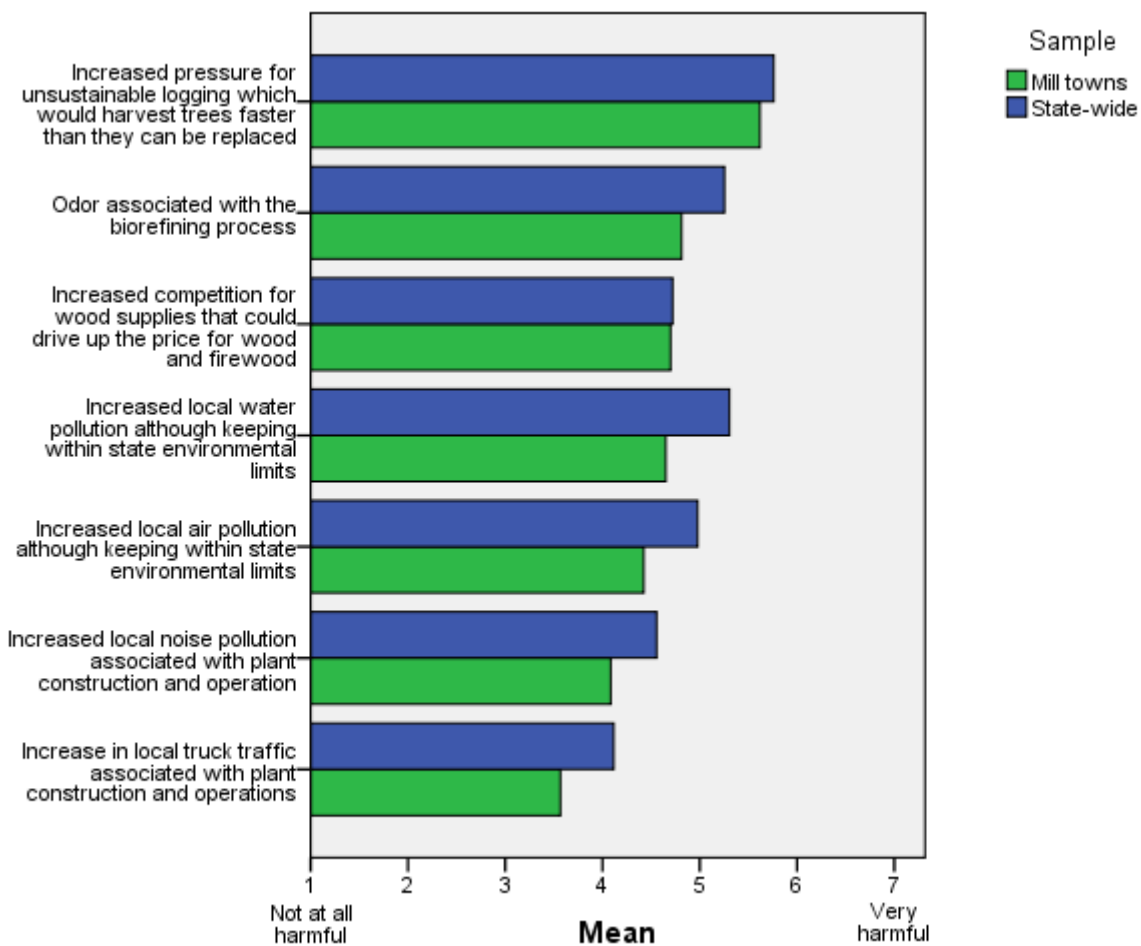


	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>	<u>6th</u>
State-wide sample	32.3%	21.8%	17.9%	15.1%	9.1%	3.8%
Mill Town sample	45.7%	25.1%	13.6%	9.5%	3.1%	3.1%

11. A forest-based biorefinery can potentially have negative impacts on a community and the state. If a forest-based biorefinery were to be developed in your community bringing the potential negative impacts described below, how harmful would each negative impact be to you?

Both samples on average rated the negative impacts differently. The highest-rated potential negative impact for both samples was “increased pressure for unsustainable logging,” with means of 5.76 (State-wide) and 5.62 (Mill Towns). The least harmful impact for both samples was “increased truck traffic,” with an average Likert score of 4.11 (State-wide) and 3.56 (Mill Towns). The divergence in the samples occurs with the impacts of “increased water pollution” and “increased air pollution.” The State-wide sample rates these impacts higher than “increased competition for wood.” The negative impacts were also rated lower on-average than the positive impacts, with a 4.95 (State-wide) and 4.55 (Mill Town) average rating.

Likert Scale Mean Score for Each Potential Impact

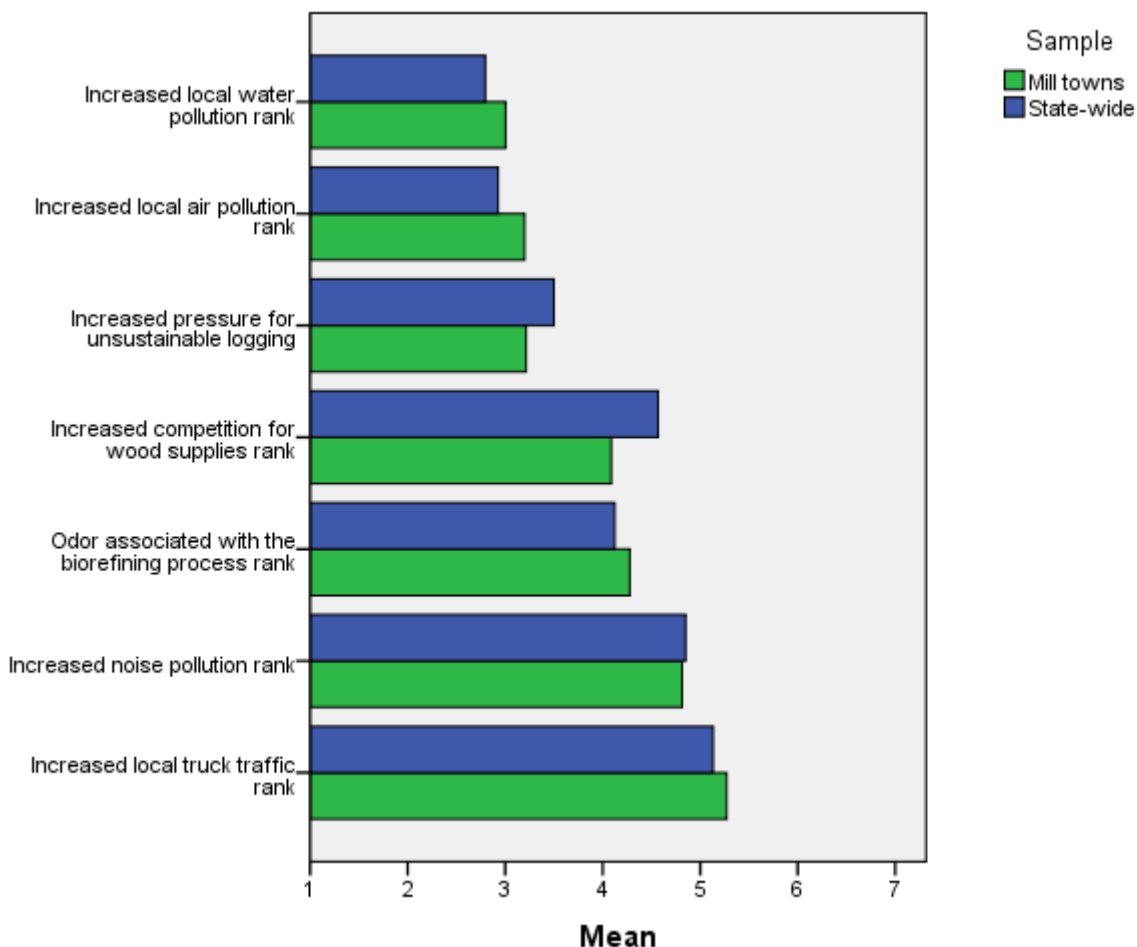


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Unsustainable logging	5.76	1.52	5.62	1.62
Odor	5.25	1.56	4.81	1.82
Increased competition	4.72	1.81	4.70	1.88
Water pollution	5.30	1.67	4.65	1.89
Air pollution	4.97	1.67	4.42	1.84
Noise pollution	4.55	1.81	4.09	1.99
Increased truck traffic	4.11	1.70	3.56	1.80

12. Please rank the following potential negative impacts associated with a forest-based biorefinery. Begin by placing a “1” next to what you believe to be the most harmful impact, a “2” next to the second most harmful impact, and so on, until all the impacts have been ranked.

Interestingly, the ordinal ranking of the same negative attributes differed from the Likert scale ratings. “Increased water pollution” and “increased air pollution” are ranked first and second, followed by “unsustainable logging,” which was rated the highest using the Likert scale. “Noise” and “truck traffic” are considered the least harmful in both the rating and rankings measurements. The only divergence between the two samples on the ranking occurred with “odor” and “increased competition for wood supplies.” Here, the State-wide sample considered “odor” more harmful, while Mill Towns considered “increased competition for wood supplies” more harmful.

Rank Mean Score for Each Potential Impact

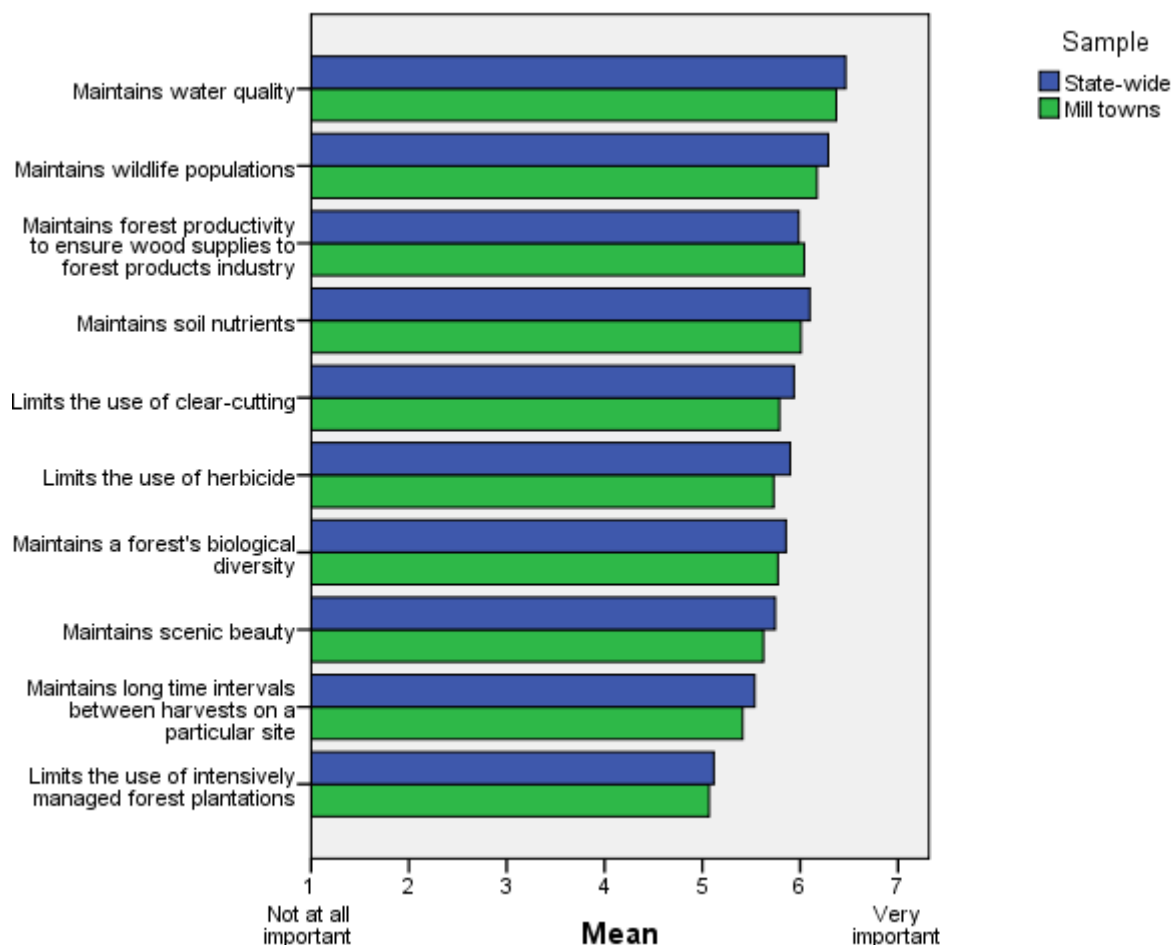


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Water pollution	2.80	1.60	3.00	1.64
Air pollution	2.93	1.59	3.20	1.71
Unsustainable logging	3.50	2.09	3.21	2.10
Increased competition	4.57	2.05	4.09	2.05
Odor	4.12	1.91	4.28	1.94
Increased noise pollution	4.85	1.47	4.81	1.50
Increased truck traffic	5.13	1.84	5.27	1.74

13. The establishment of forest-based biorefineries has the potential to impact forest management practices in Maine. In your opinion, how important are each of the following forest management objectives to you? (Note to reader: In the survey, each objective listed below was preceded by the phrase “Managing forests in a way that . . .”)

On average, all of the forest management objectives were rated highly, with relatively low standard deviation. Managing forests in a way that “maintains water quality” was rated the highest on average (6.46 for State-wide respondents and 6.37 for Mill Towns) and had the lowest standard deviation (0.82 and 0.98, respectively). Managing forests in a way that “limits the use of intensively managed plantations” was rated the lowest in importance, with mean scores of 5.11 (State-wide) and 5.07 (Mill Towns), although the question did reveal much higher standard deviation.

Likert Scale Mean Score for Each Forest Management Objective

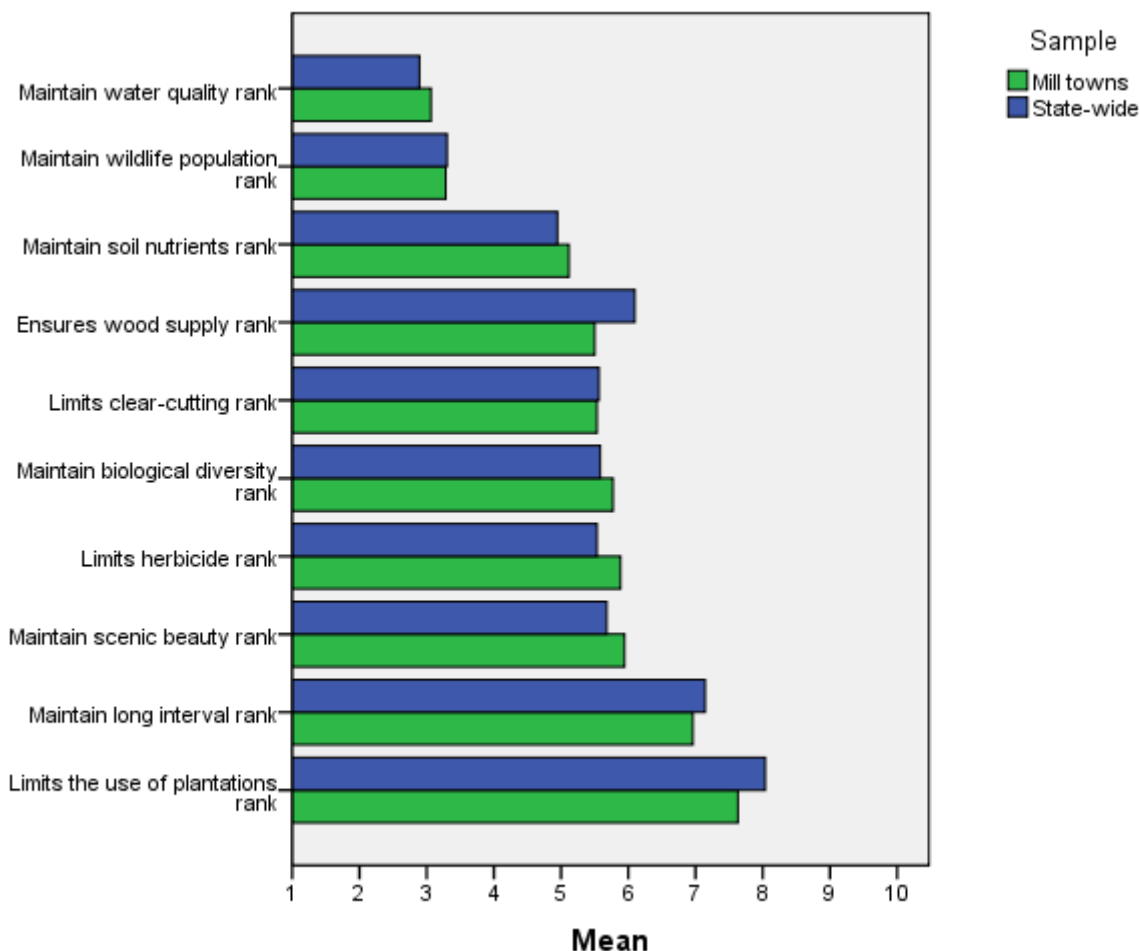


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Maintains water quality	6.46	0.82	6.37	0.98
Maintains wildlife populations	6.29	1.05	6.17	1.12
Ensures wood supplies	5.99	1.16	6.04	1.19
Maintains soil nutrients	6.10	1.09	6.01	1.08
Limits clear-cutting	5.94	1.37	5.79	1.49
Limits herbicides	5.90	1.29	5.73	1.38
Maintains biological diversity	5.86	1.23	5.77	1.27
Maintains scenic beauty	5.75	1.31	5.62	1.32
Maintains long harvest intervals	5.53	1.41	5.41	1.48
Limits the use of plantations	5.11	1.48	5.07	1.58

14. Please rank the importance of the following forest management objectives. Begin by placing a “1” next to what you believe to be the most important objective, a “2” next to the second most important objective, and so on, until all the objectives have been ranked.

The top two forestry objectives under both the Likert and ordinal ranking systems were “maintain water quality” and “maintain wildlife populations.” Ensuring wood supplies to the forest products industry drops from the third-highest Likert score, to fourth in the ordinal ranking in the Mill town sample. The three lowest-scored objectives in the Mill town sample were managing forests in a way that “maintains scenic beauty,” “maintains long intervals between harvests,” and “limits the use of intensively managed forest plantations.” The lowest-scored objectives were almost the same in the State-wide sample, except that “ensures wood supply” replaced “maintains scenic beauty.”

Rank Mean Score for Each Forest Management Objective

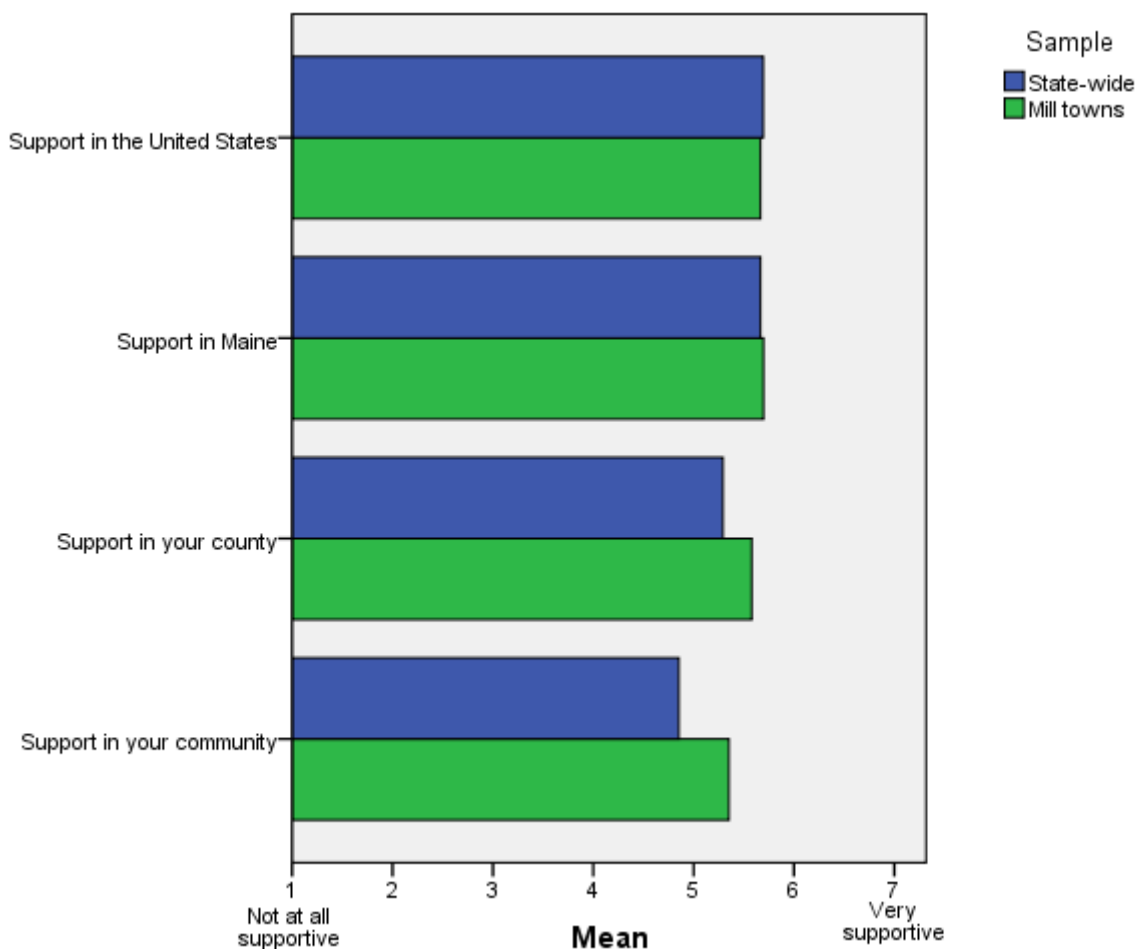


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Maintains water quality	2.89	1.99	3.06	2.06
Maintains wildlife populations	3.30	2.28	3.28	2.38
Maintains soil nutrients	4.94	2.21	5.12	2.36
Ensures wood supplies	6.10	3.29	5.50	3.14
Limits clear-cutting	5.56	2.68	5.54	2.81
Limits herbicides	5.53	2.43	5.77	2.57
Maintains biological diversity	5.58	2.53	5.88	2.48
Maintains scenic beauty	5.68	2.62	5.94	2.61
Maintains long harvest intervals	7.14	2.32	6.96	2.57
Limits the use of plantations	8.04	1.99	7.63	2.27

15. On a scale from 1 to 7, how supportive would you be if a forest-based biorefinery were developed in the United States, the State of Maine, your county, and your community?

Overall support for forest-based biorefinery projects on all regional scales was fairly high, with a moderate amount of diminishing support as scale became more localized. Mill Town respondents showed the least amount of diminishing support, moving from a mean of 5.67 for support at the state scale, to 5.35 for their own communities – a reduction of just 0.32 Likert-scale points. The State-wide difference was more pronounced, with the average level of support decreasing from 5.68 to 4.87 – a loss of 0.87 points. Standard deviations in both samples increased as scale became localized, moving from 1.53 to 1.91 (State-wide), and 1.62 to 1.95 (Mill Towns). Again, the State-wide sample showed a greater increase in standard deviation as the scale became more localized.

Likert Scale Mean Score for Each Regional Scale

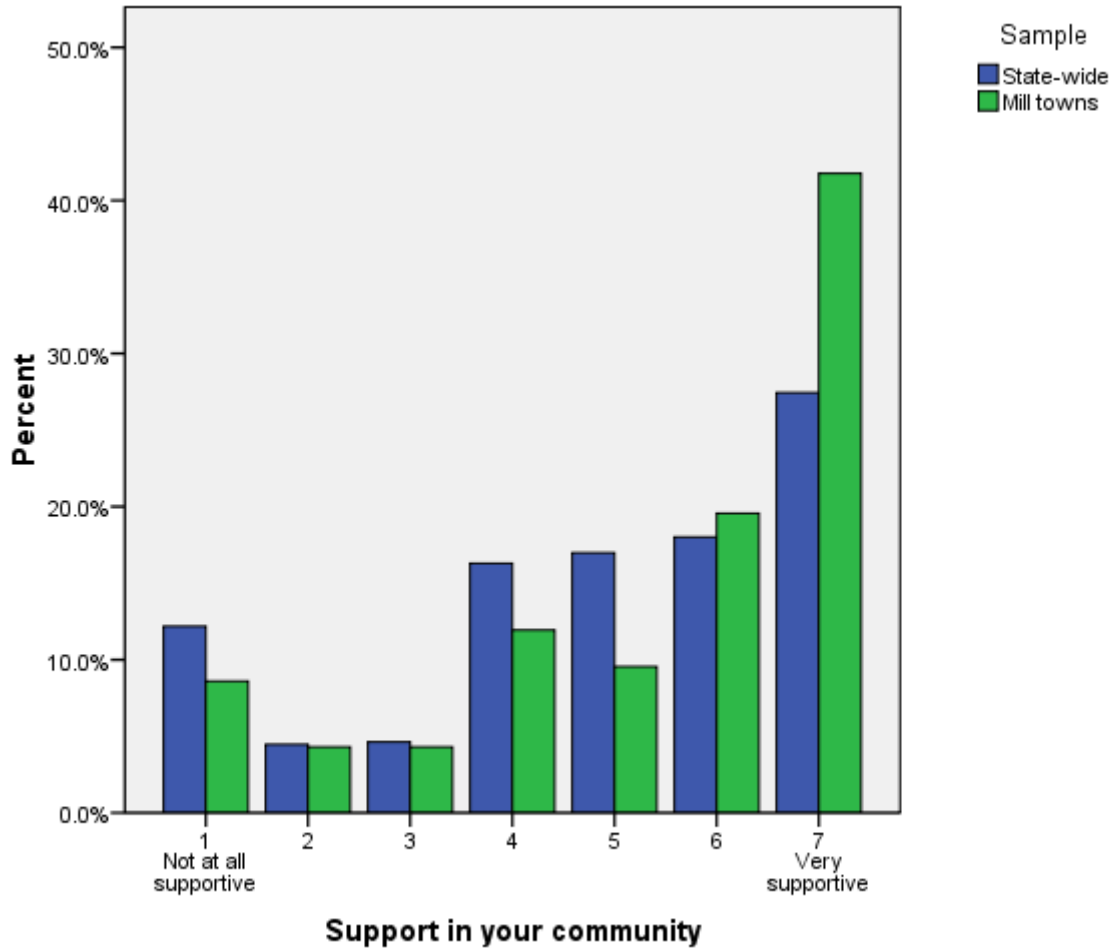


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Support in the U.S.	5.71	1.53	5.67	1.62
Support in Maine	5.68	1.59	5.69	1.68
Support in your county	5.31	1.79	5.58	1.77
Support in your community	4.87	1.91	5.35	1.95

The following results apply to the previous question.

In the Mill Town sample, 41.8% of respondents chose the highest level of support (7) for forest-based biorefinery projects on a community level, compared to just 27.4% for the State-wide sample. In both samples, the most frequently chosen level of support was the highest (7). Sixty-one percent of Mill Town respondents chose either a “6” or “7” in their rating of support, compared to 45.4% for State-wide respondents.

Percentage in Each Category

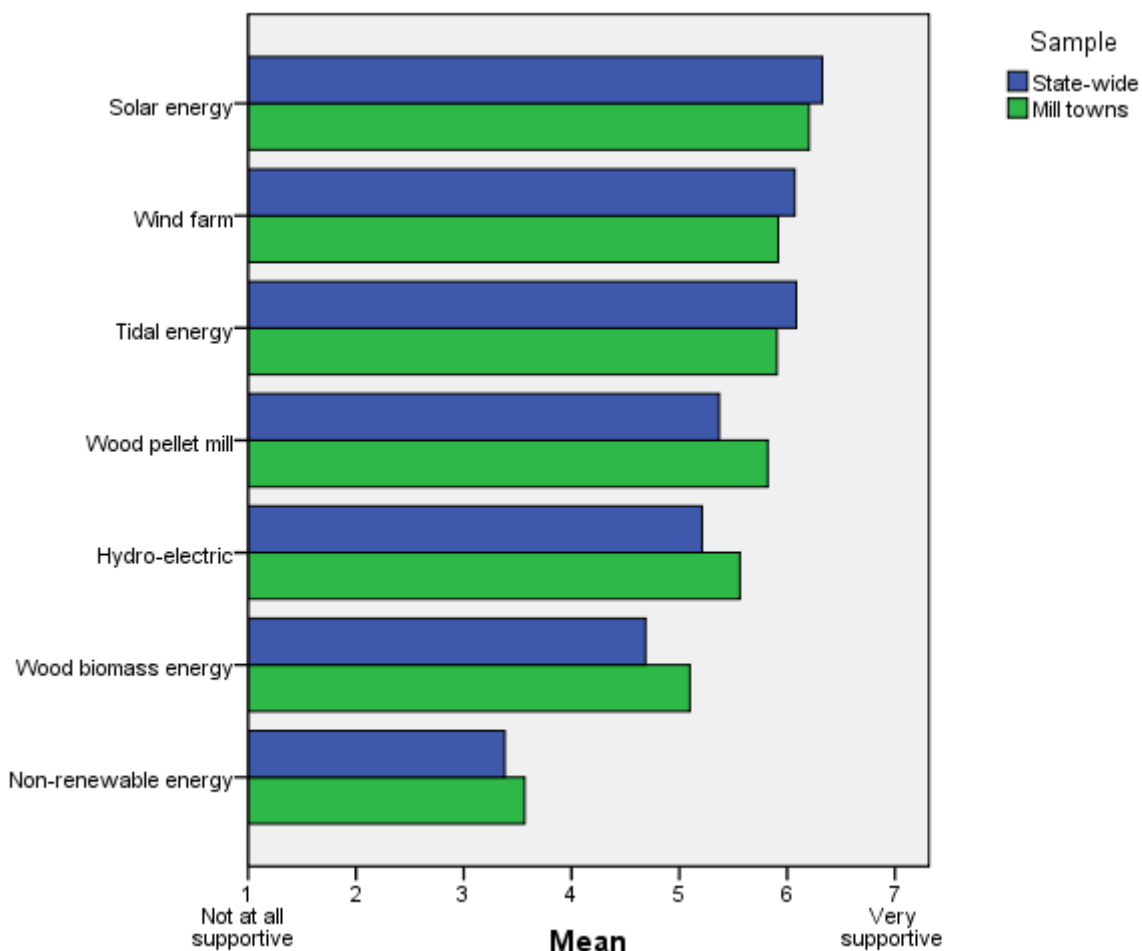


	Not at all Supportive						Very supportive
	1	2	3	4	5	6	7
State-wide sample	12.2%	4.5%	4.6%	16.3%	17.0%	18.0%	27.4%
Mill Town sample	8.6%	4.3%	4.3%	11.9%	9.5%	19.6%	41.8%

16. How supportive would you be if each of the following energy projects were being considered for development in your community?

The highest level of support for energy projects in both samples are solar, tidal, and wind energy projects, with mean scores all above 6.00 in the State-wide sample, and 5.91 in Mill Towns. These energy projects also had the lowest standard deviations, except in the mill towns where wood pellet mills had a slightly lower standard deviation than tidal and wind. Non-renewable energy projects were rated the lowest, with mean scores of 3.39 (State-wide) and 3.56 (Mill Towns) and relatively high standard deviation of 1.96 (State-wide) and 2.09 (Mill Towns). As a reference point, we included forest-based biorefinery projects in the table below. It rated slightly above wood biomass energy projects on a mean score Likert scale ranking.

Likert Scale Mean Score for Each Energy Project

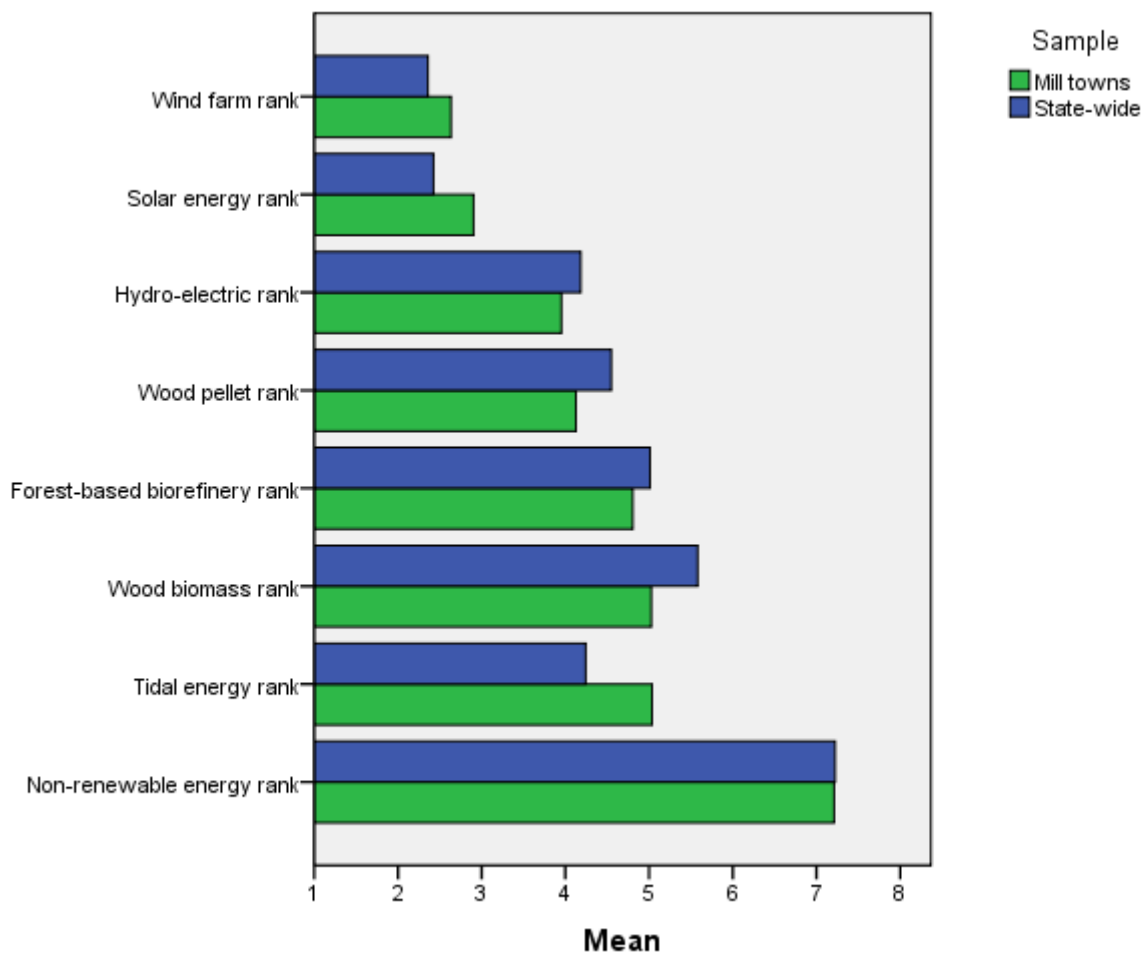


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Solar energy project	6.33	1.14	6.20	1.40
Wind farm	6.07	1.43	5.92	1.69
Tidal energy project	6.08	1.38	5.91	1.66
Wood pellet mill	5.38	1.64	5.57	1.50
Hydro-electric project	5.21	1.85	5.57	1.77
Wood biomass energy project	4.69	1.87	5.10	1.84
Non-renewable energy project	3.39	1.96	3.56	2.09
Forest-based biorefinery	4.87	1.91	5.35	1.95

17. Please rank your support for the following potential energy projects, imagining that they were being considered for development in your community. Begin by placing a “1” next to the energy project you would most support, a “2” next to your second-most supported energy project, and so on, until all of the energy projects have been ranked.

In this question, we included forest-based biorefinery projects in the ranking list. Both State-wide and Mill Town samples ranked the energy projects similarly and close to their Likert scale ratings. Wind ranked ahead of solar, and tidal energy dropped to 7th in the Mill Town sample when ranked on an ordinal basis (tidal was second highest in the Likert scale ratings). Relatively high standard deviations occurred with the tidal energy projects, which may explain its drop in the ordinal ranking system. Forest-based biorefinery projects are ranked 6th in the ordinal ranking (Mill Towns), matching its Likert scale ranking and revealing some consistency in respondents’ judgment of these projects. Non-renewable energy projects are ranked last, with the least amount of disagreement based upon standard deviation.

Rank Mean Score for Each Energy Project

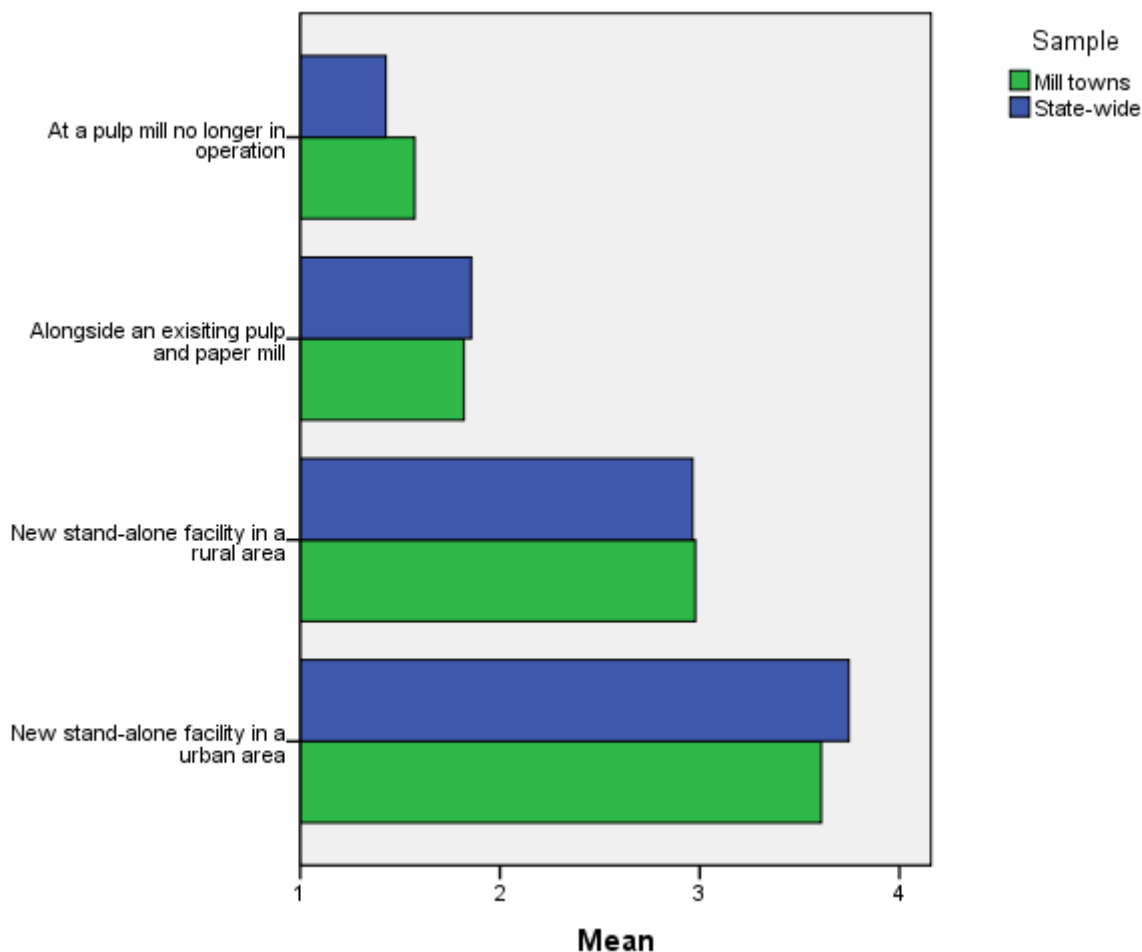


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Wind farm	2.36	1.65	2.63	1.88
Solar energy project	2.42	1.52	2.90	1.82
Hydro-electric project	4.18	1.83	3.95	2.00
Wood pellet mill	4.55	1.65	4.12	1.83
Forest-based biorefinery project	5.01	1.75	4.81	1.83
Wood biomass energy project	5.58	1.47	5.03	1.73
Tidal energy project	4.24	2.28	5.04	2.25
Non-renewable energy project	7.22	1.42	7.21	1.31

18. Please rank the following potential locations for the development of a forest-based biorefinery. Begin by placing a “1” next to your most preferred location, a “2” next to your second-most preferred location, and so on, until all the locations have been ranked.

In both samples, respondents on average favored developing a forest-based biorefinery at a pulp and paper mill no longer in operation, or alongside an existing mill rather than building a new stand-alone facility in either a rural or urban setting.

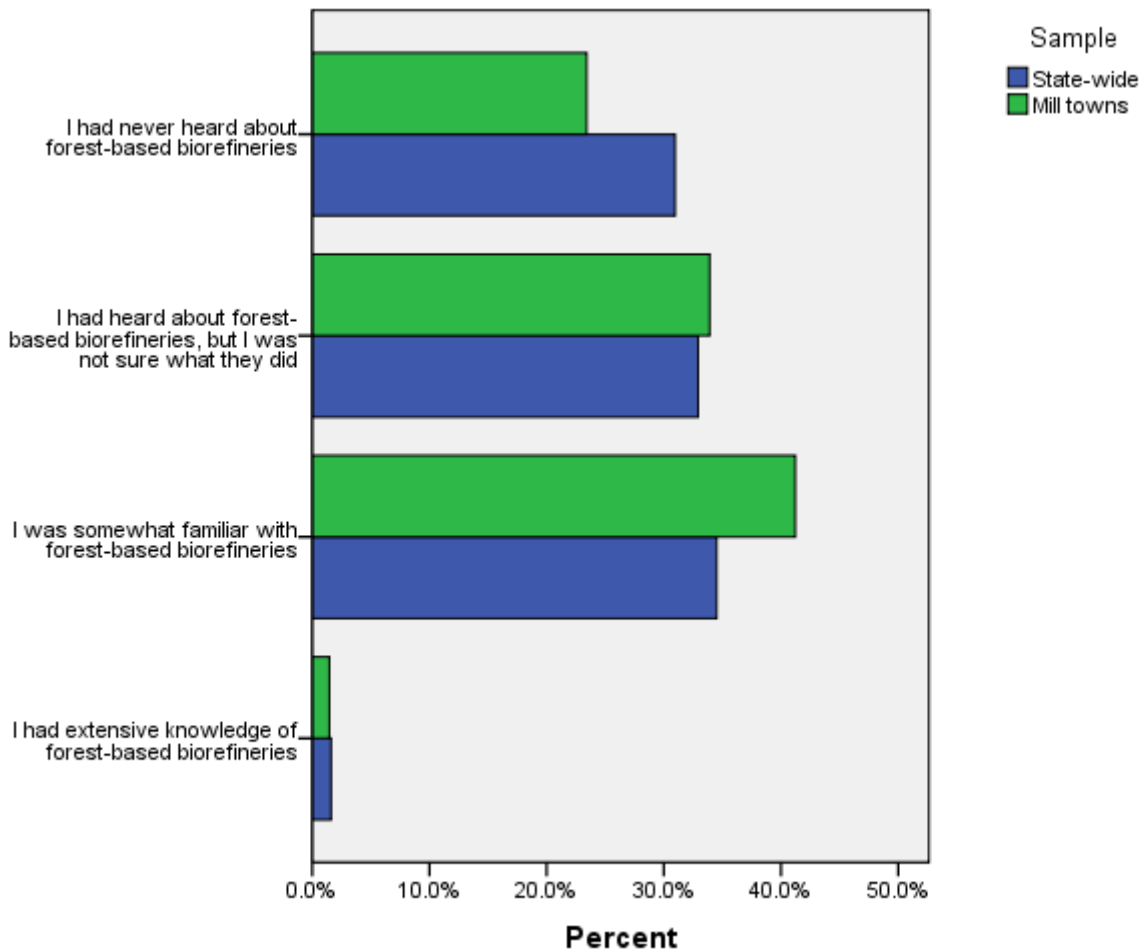
Rank Mean Score for Each Potential Location for a Forest-based Biorefinery



	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
<u>At a mill no longer in operation</u>	1.43	0.63	1.57	0.72
<u>Alongside an existing mill</u>	1.86	0.71	1.82	0.79
<u>New stand-alone facility (rural)</u>	2.96	0.72	2.98	0.80
<u>New stand-alone facility (urban)</u>	3.75	0.52	3.61	0.67

19. Prior to this survey, how much would you say you knew about forest-based biorefineries?
In the State-wide sample, 31.0% said that they had never heard about forest-based biorefineries, compared to only 23.4% of Mill Town respondents. Forty-one percent of Mill Town respondents said that they were somewhat familiar with forest-based biorefineries, compared to 34.5% of the State-wide sample. Less than 2% in both samples said they had extensive knowledge of forest-based biorefineries.

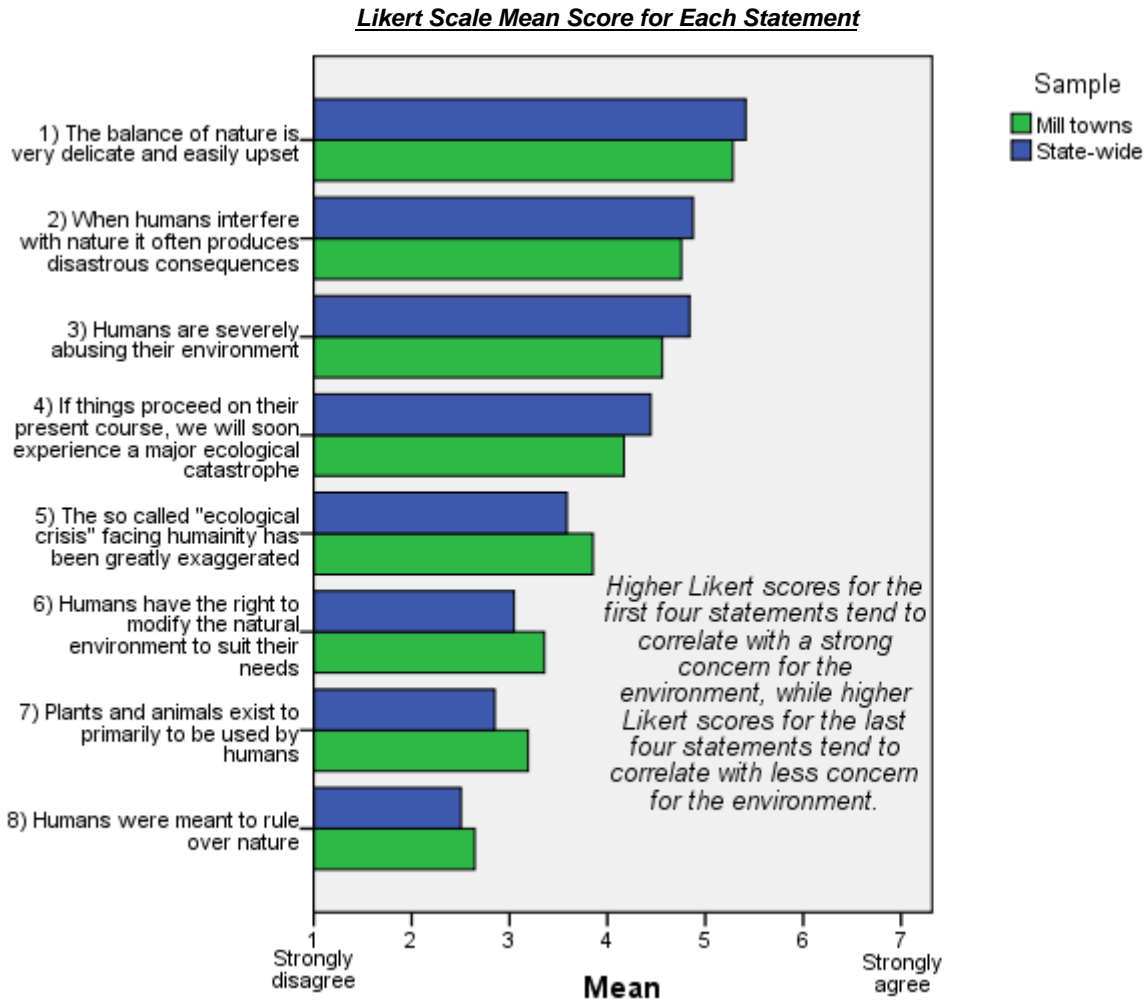
Percentage in Each Category



	<u>Had never heard</u>	<u>Had heard</u>	<u>Somewhat familiar</u>	<u>Extensive Knowledge</u>
<u>State-wide sample</u>	31.0%	32.9%	34.5%	1.6%
<u>Mill Town sample</u>	23.4%	33.9%	41.2%	1.5%

Section Three

20. On a scale of 1 to 7, how strongly do you disagree or agree with the following statements. *The environmental scores were very similar for both samples. Mill Town respondents ranked slightly lower in the statements that coincide with a greater concern for the environment or pro-environmental attitudes, while also having higher scores for the statements that express less environmental concern or lower pro-environmental tendencies.*

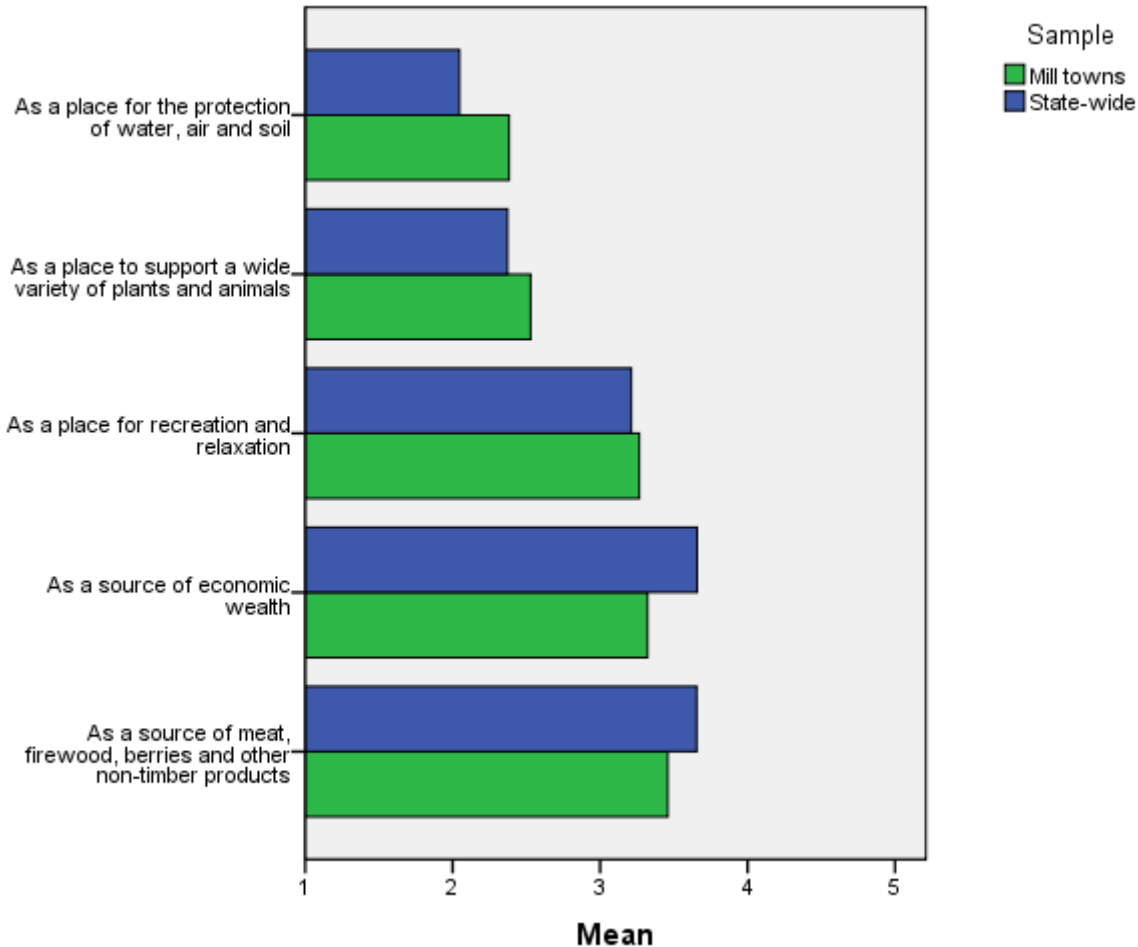


	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
1) The balance of nature...	5.41	1.56	5.28	1.58
2) When humans interfere...	4.87	1.63	4.76	1.65
3) Humans are severely abusing...	4.84	1.84	4.56	1.87
4) If things proceed on their present...	4.44	2.00	4.17	1.98
5) The so called "ecological crisis"...	3.59	1.94	3.85	1.89
6) Humans have the right to modify...	3.05	1.67	3.35	1.80
7) Plants and animals exist to...	2.85	1.78	3.19	1.93
8) Humans were meant to rule...	2.50	1.73	2.65	1.83

21. Please rank the importance of the following uses for Maine’s forests. Begin by placing a “1” next to what you believe to be the most important use, a “2” next to the second-most important use, and so on, until all the uses have been ranked.

Respondents in both samples consider “the protection of water, air and soil” to be the most important use of Maine’s forests, closely followed by “a place to support plants and animals.” Both samples also ranked the use of forests “as a source of economic wealth” and “as a source of meat, firewood, berries and other non-timber products” last, with similar ranking scores for the two uses (3.65 and 3.65 for the State-wide sample, respectively, and 3.32 and 3.46 for Mill Towns).

Rank Mean Score for Each Use of Maine’s Forests



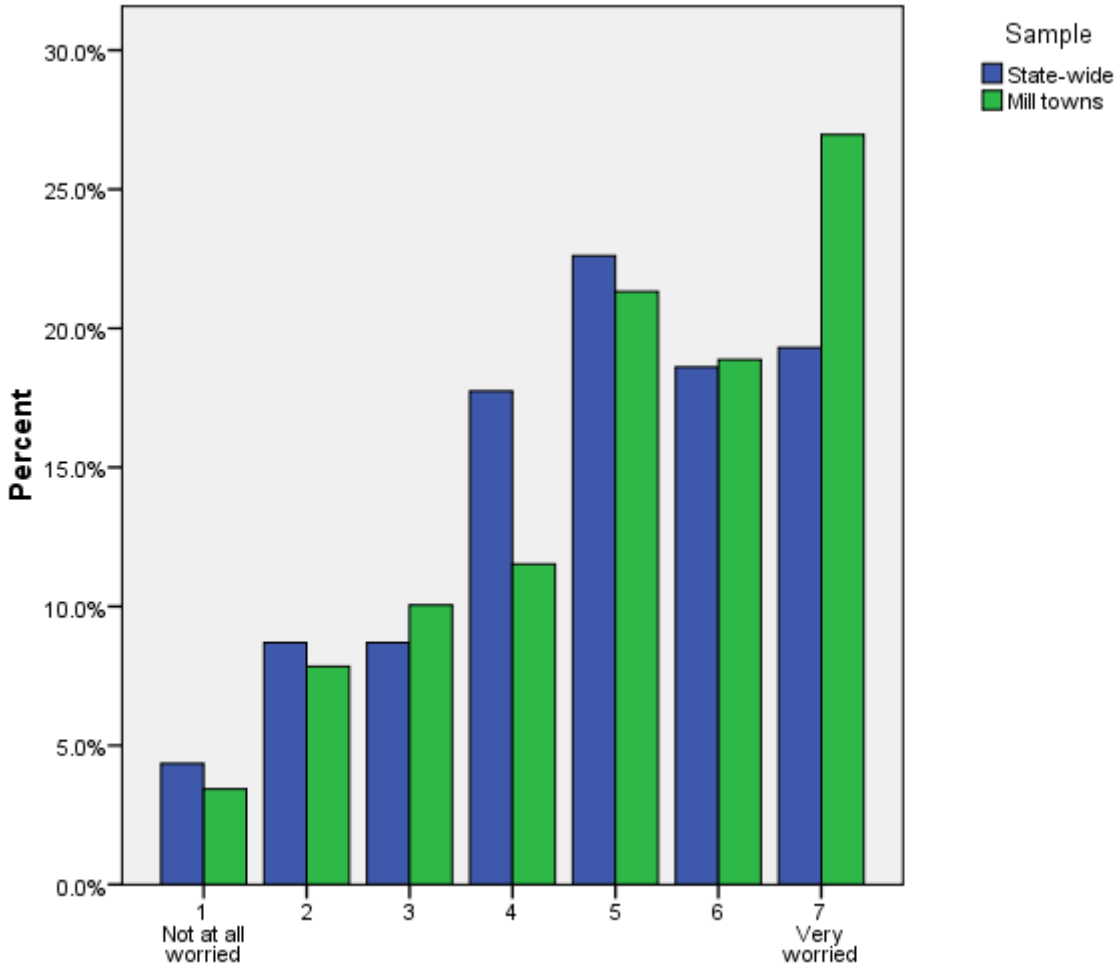
	<u>State-wide sample</u>		<u>Mill Town sample</u>	
	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
For the protection of water, air and soil	2.05	1.15	2.38	1.33
To support a wide variety of plants and animals	2.37	1.19	2.52	1.19
For recreation and relaxation	3.21	1.17	3.27	1.23
As a source of economic wealth	3.65	1.19	3.32	1.65
As a source of meat, firewood, berries...	3.65	1.53	3.46	1.28

Section Four

22. Overall and on a scale of 1 to 7, how worried are you about your economic security? By economic security, we mean your ability to keep your job, maintain your income, pay your mortgage or rent on time, have health insurance coverage, and retire comfortably?

In the Mill Town sample, 27.0% of respondents chose the highest Likert scale score of “7” (i.e., “very worried”) to express their sense of economic security. For comparison, 19.3% of State-wide respondents answered similarly. On average, Mill Town respondents were more worried, with a mean of 5.04 compared to 4.79 for the State-wide sample.

Percentage in Each Category

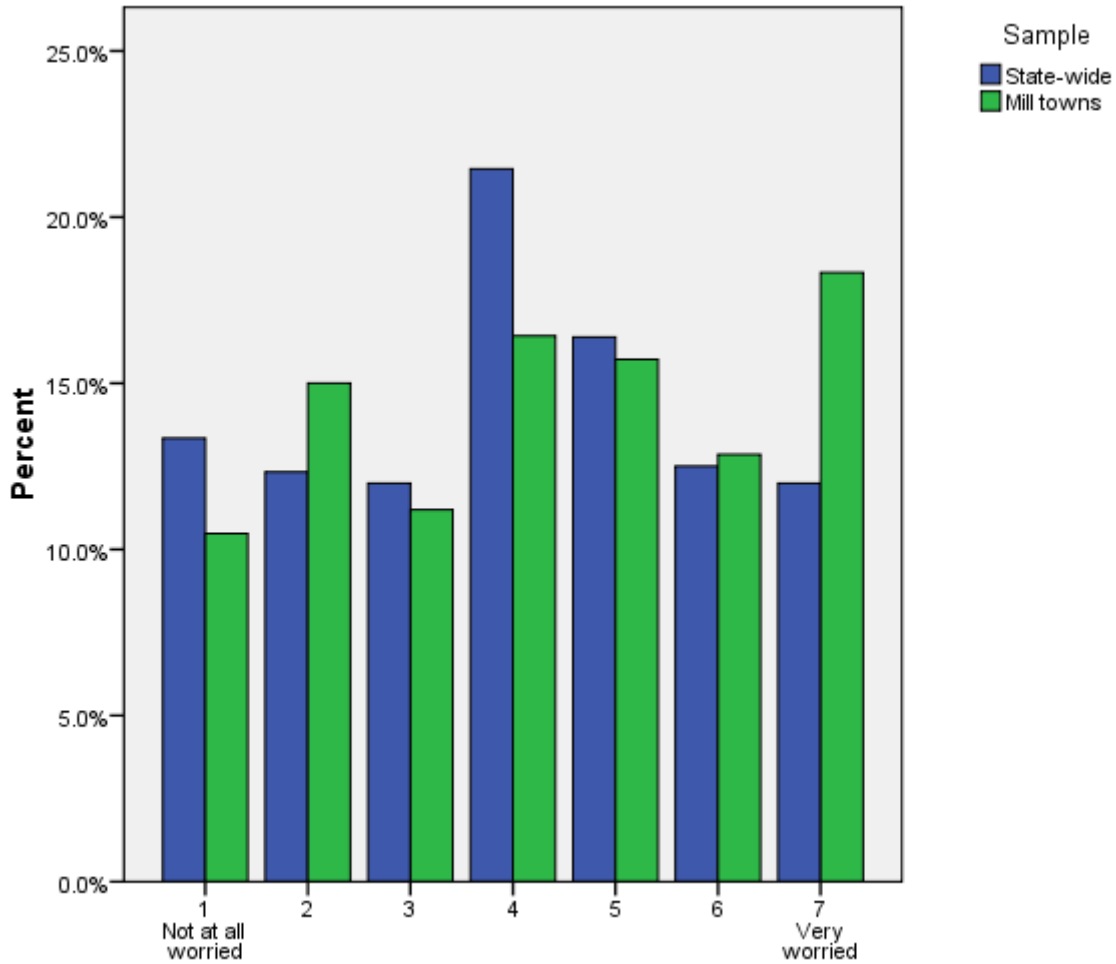


	1	2	3	4	5	6	7	Mean	SD
State-wide sample	4.3%	8.7%	8.7%	17.7%	22.6%	18.6%	19.3%	4.79	1.70
Mill Town sample	3.4%	7.8%	10.0%	11.5%	21.3%	18.9%	27.0%	5.04	1.75

23. How worried are you about your household debt?

Eighteen percent of Mill Town respondents chose “7” or “very worried,” compared to 12.0% for the State-wide sample. The average Likert score for Mill Towns was 4.24, compared to 4.01 for the State-wide sample.

Percentage in Each Category

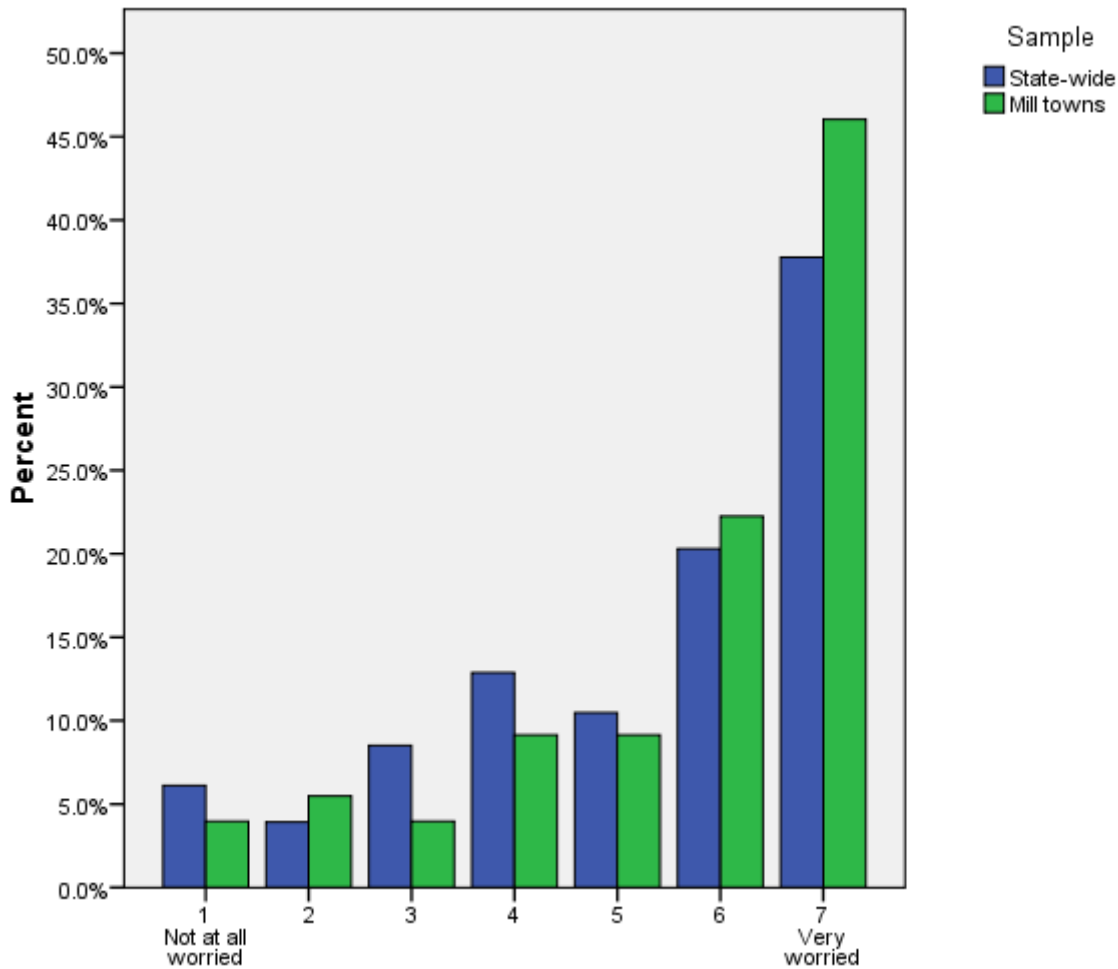


	1	2	3	4	5	6	7	Mean	SD
State-wide sample	13.3%	12.3%	12.0%	21.5%	16.4%	12.5%	12.0%	4.01	1.89
Mill Town sample	10.5%	15.0%	11.2%	16.4%	15.7%	12.9%	18.3%	4.24	1.99

24. If something happened and you lost your job, how worried would you be about finding a new job that pays the same?

In both samples, respondents' insecurity about losing their job was rated highly with means of 5.30 (State-wide) and 5.65 (Mill Towns). Forty-six percent of Mill Town respondents were "very worried" (i.e., selected "7" on the Likert scale), compared to 37.8% for the State-wide sample.

Percentage in Each Category

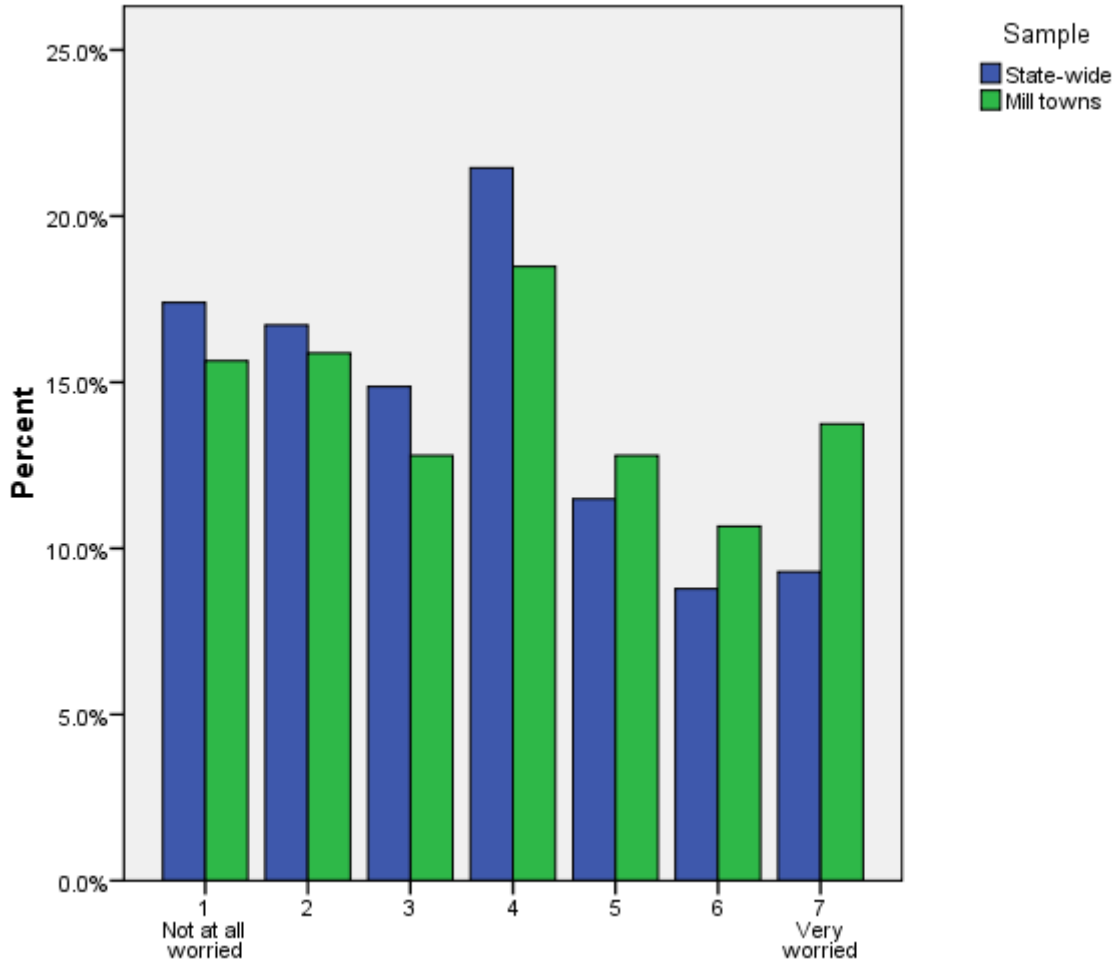


	Not at all worried			Very worried				Mean	SD
	1	2	3	4	5	6	7		
State-wide sample	6.1%	3.9%	8.5%	12.9%	10.5%	20.3%	37.8%	5.30	1.85
Mill Town sample	4.0%	5.5%	4.0%	9.1%	9.1%	22.3%	46.0%	5.65	1.74

25. How worried are you about having enough money to put food on the table?

Both samples rated this question on average very closely, with means of 3.56 (State-wide) and 3.84 (Mill Towns). Mill Town respondents chose “7” (i.e., “very worried”) slightly more than State-wide sample respondents (13.7% vs. 9.3%, respectively).

Percentage in Each Category

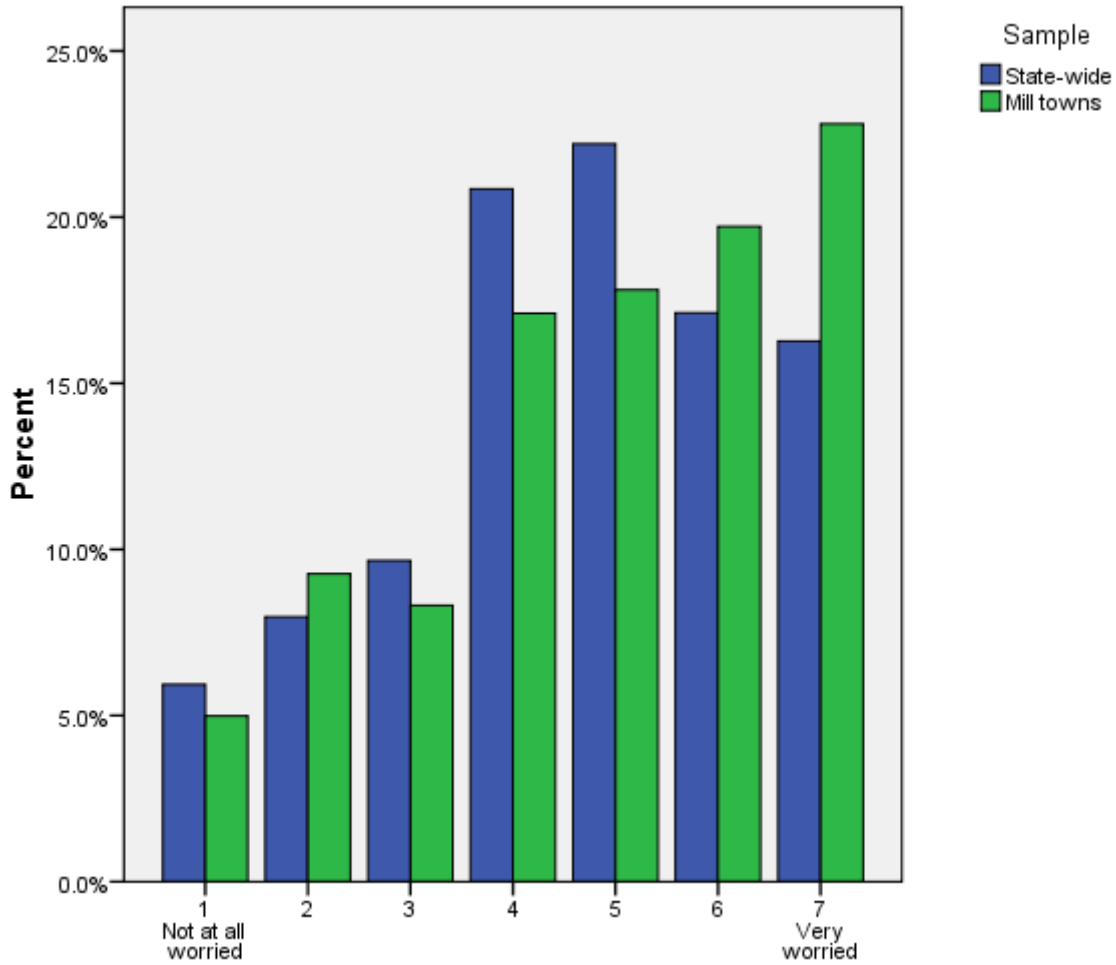


	Not at all worried			Very worried				Mean	SD
	1	2	3	4	5	6	7		
State-wide sample	17.4%	16.7%	14.9%	21.5%	11.5%	8.8%	9.3%	3.56	1.87
Mill Town sample	15.6%	15.9%	12.8%	18.5%	12.8%	10.7%	13.7%	3.84	1.99

26. How worried are you about keeping up with the cost-of-living?

Again, both samples rated this question similarly on average (4.62 vs. 4.84, respectively), although Mill Town respondents chose the “very worried” category slightly more (22.8% vs. 16.3%, respectively).

Percentage in Each Category

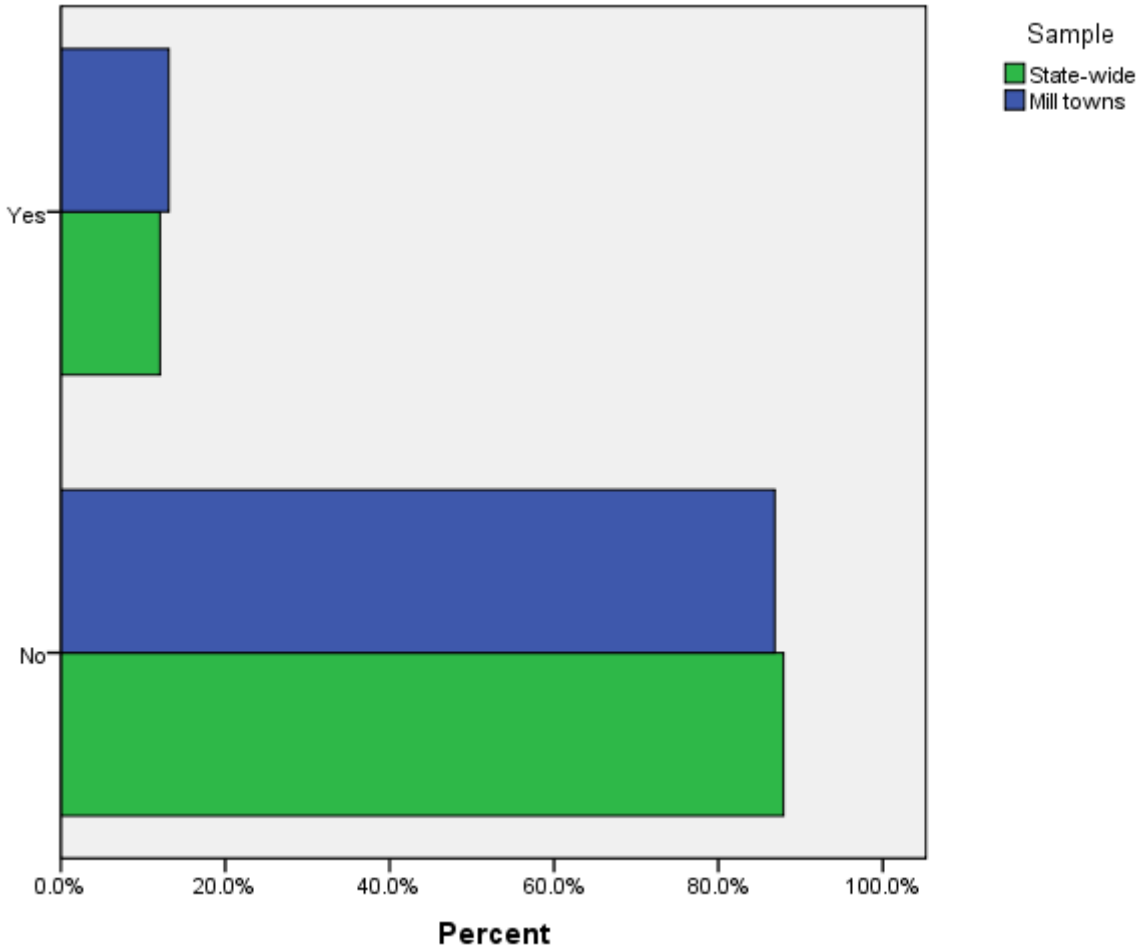


	1	2	3	4	5	6	7	Mean	SD
State-wide sample	5.9%	8.0%	9.7%	20.8%	22.2%	17.1%	16.3%	4.62	1.72
Mill Town sample	5.0%	9.3%	8.3%	17.1%	17.8%	19.7%	22.8%	4.84	1.80

27. During anytime over the past year, have you been unemployed and unable to find a job? If so, how many months were you unemployed?

Thirteen percent of Mill Town respondents were unemployed and unable to find a job at some point during the last year, compared to 12.1% of State-wide respondents. To provide a point of comparison, the national unemployment rate was 8.9% in April 2009, and Maine's unemployed rate was 7.9% during the same month. The average amount of time that respondents were unemployed was 6.1 months for the State-wide sample, and 5.6 months for Mill Town respondents, with standard deviations of 4.56 and 6.75, respectively.

Percentage in Each Category



<u>State-wide sample</u>	
<u>Yes</u>	<u>No</u>
12.1%	87.9%

<u>Mill Town sample</u>	
<u>Yes</u>	<u>No</u>
13.1%	86.9%

Summary and Conclusions

Overall, State-wide and Mill Town responses were fairly similar based on a comparison of mean values. Below we summarize the significant findings in this preliminary analysis of the data. The first section describes respondents' socio-demographic characteristics, their environmental attitudes, and views regarding their household's economic security. The next section summarizes respondent views towards the forest products industry, forest management objectives, level of support for forest-based biorefinery projects, and the value of potential forest-based bioproducts.

Respondents' Socio-demographic Characteristics and Views toward the Environment and their Household's Economic Security

- The average age of respondents was 55.5 years (State-wide) and 54.9 years (Mill Towns). The median – 55 years – was the same for both samples. For comparison, July 2008 Census data lists Maine's median age at 42 years. While this is significantly younger than that of survey respondents, this is not surprising because the state-wide Census median age includes individuals under 18 years old that were excluded from participating in our survey. Both the study's median and mean fall solidly within the State's largest age segment of 45 to 64 years (38.2%). Refer to Appendix B for more detail.
<http://www.census.gov/popest/states/asrh/tables/SC-EST2008-02-23.xls>
- The proportion of respondents owning their own home was quite high, 88.3% (State-wide) and 89.6% (Mill Towns). For comparison, 2000 U.S. Census data for Maine reveal an average of 71.6%. Also, respondents tended to live in their community for a long period of time, 27.1 years (State-wide) and 33.3 years (Mill Towns). Refer to Appendix B for more detail. <http://www.census.gov/hhes/www/housing/census/historic/owner.html>
- The proportion of respondents that were male was also high compared to the state average. Males represented 67.1% (State-wide) and 71.4% (Mill Towns) of the respondents, respectively, compared to the state average of 48.8% (2007). Refer to Appendix B for more detail.
<http://quickfacts.census.gov/qfd/states/23000.html>
- Respondents in both samples were, on average, fairly “environmentally concerned” based on their responses to the Abbreviated NEP-Based Scale questions (Corndano et al. 2003). The State-wide sample was marginally more “environmentally concerned” than the Mill Town sample. The average agreement scores for the “ecological balance” statements were 4.89 (State-wide) and 4.69 (Mill towns) on a 7-point Likert scale, where higher scores represent greater concern for the environment and pro-environmental attitudes. The average scores for the negative environmental or “human domination” statements were 3.00 (State-wide) and 3.26 (Mill Towns) on the same 7-point Likert scale, where higher scores represent less concern for the environment. Refer to Question 20 on page 26 for more detail.

- Respondents were, on average, “economically insecure” given their responses to the economic security questions, with the Mill Town sample rating their insecurity slightly higher. Based on a Likert scale where “7” represented “Very worried,” scores ranged from 3.56 to 5.30 (average of 4.46) for the State-wide sample, and 3.84 to 5.65 (average of 4.72) for Mill Towns. For both samples, the highest rated score occurred in response to a question related to “loss of the respondent’s job” (5.30 and 5.65, respectively, for the State-wide and Mill Town samples) (Question 24 on page 30). Also, 27.0% of Mill Town respondents selected the highest Likert scale score of “7” (very worried) compared to 19.3% for the State-wide sample when rating their overall “economic security” (Question 22 on page 28). Refer to Questions 22 through 26 (pages 28-32) for more detail.

Respondent’s Attitudes toward the Forest Products Industry, Forest Management Objectives, Forest-Based Biorefinery Projects, and Potential Forest-Based Bioproducts

- Nearly 44% of Mill Town respondents indicated that they work or have worked in the forest products industry, compared to 15% for the State-wide sample. Refer to Question 1 on page 6 for more detail.
- Fifty-eight percent of Mill Town respondents considered the forest products industry as “very important” to Maine’s economy, compared to 41.8% for the State-wide sample. In both samples, respondents were consistent in expressing their strong view of the economic importance of the industry. Refer to Question 2 on page 7 for more detail.
- Almost 22% of the State-wide sample and 23.9% of the Mill Town sample thought that Maine’s forest products industry was “increasing” in economic importance to the State. For comparison, 36.8% (State-wide) and 36.3% (Mill Towns) thought that the industry was holding “constant” in economic importance, while 28.0% (State-wide) and 33.0% (Mill Towns) thought it was “decreasing.” Just 13.5% (State-wide) and 7.8% (Mill Towns) were “not sure” where the industry was headed. Refer to Question 3 on page 8 for more detail.
- In the State-wide sample, 13.1% of respondents considered harvest levels “too high,” compared to 20.4% for the Mill Town sample. Only 10.8% (State-wide) and 12.2% (Mill Towns) thought that harvest levels were “too low.” In Mill Towns, the response “just about right” was selected most often at 42.0%, while “not sure” was selected most often for the State-wide sample (42.4%). Refer to Question 4 on page 9 for more detail.
- The highest Likert scale responses in the survey dealt with outcomes associated with forest management objectives. The average response across all forestry objectives on a scale of 1 to 7 was 5.89 State-wide and 5.80 for Mill Towns. The most important forestry objectives in both samples were to “maintain water quality” and “maintain wildlife populations.” The third highest-rated objective for the State-wide sample was to manage forests in a way that “maintains soil nutrients.” For comparison, “ensuring wood supplies to the forest products industry” was rated third-highest in the Mill Town sample. Refer to Question 13 on page 19 for more detail.

- The potential positive impacts of forest-based biorefinery projects were, on average, rated higher than potential negative impacts. The average scores across all positive attributes were 5.62 (State-wide) and 5.68 (Mill Towns), vs. average scores for negative attributes of 4.96 (State-wide) and 4.55 (Mill towns). “Increase in local jobs” and “energy independence” were considered the most important positive impacts related to the development of a biorefinery project. The State-wide sample rated “energy independence” slightly higher than “increase in local jobs,” and the Mill Town rated “increase in local jobs” higher than “energy independence.” Refer to Question 9 on page 14 and Question 11 on page 17 for more detail.
- Respondents from both State-wide and Mill Town samples expressed strong support for the development of forest-based biorefinery projects in the State, with the mean Likert scale level of support at 5.68 and 5.69, respectively (7= “very supportive”). Support for biorefinery projects declined slightly as the project’s location became more localized. The decline was more pronounced in the State-wide sample (mean response decreasing to 4.87 for the State-wide sample, and 5.35 for Mill Towns – a loss of 14.3% and 6%, respectively). Refer to Question 15 on page 21 for more detail.
- When respondents were asked to rank the development of certain energy projects from the “most supported” to “least supported” based on their level of support, forest-based biorefinery projects ranked 5th and 6th in the Mill Town and State-wide sample, respectively. Forest-based biorefinery projects ranked below wind, solar, hydroelectric, and wood pellet mills in the Mill Town sample, and above wood biomass-fired electrical generating facilities, tidal energy, and non-renewable energy projects. In the State-wide sample, biorefineries fell behind tidal projects, but maintained its rank ahead of wood biomass and non-renewable projects. Refer to Question 17 on page 24.
- The highest-rated product that could be potentially produced from “wood sustainably harvested” was “medicines and pharmaceuticals,” with a mean score of 5.48 (State-wide) and 5.46 (Mill Towns). Interestingly, Mill Towns rated wood pellets the same as “medicines and pharmaceuticals,” although the mean score had a slightly higher standard deviation associated with the product. Refer to Question 8 on page 13.

Overall, respondents in both samples favorably viewed the development of forest-based biorefinery projects in the state. As project development became more localized (i.e., “Support in state” versus “Support in community”), support was slightly diminished, although less so in the Mill Town sample. The standard deviations for both samples also increased as project development became more localized, signifying less consensus.

While overall support for biorefineries was observed, some impacts related to the industry’s development and potential impact on forest management were rated particularly high and should be taken into account in gauging social acceptance. For example, respondents believed that a biorefinery’s greatest benefits were job creation, energy independence, and generating economic development within their communities. In contrast, several ecologically-focused impacts such as the potential reduction in greenhouse gases and potentially limiting residential development on

forestlands resonated less with respondents. For potentially negative impacts, inconsistency in the rating and ranking was observed but the attribute “unsustainable logging” was always rated in the top three.

Given the overall high rating of forest management objectives and the high and consistent rating/ranking of concern over “unsustainable logging,” particular attention should be focused on forestry-related impacts associated with the development of the industry. Ecological services such as maintaining water quality, soil nutrients, and wildlife populations were considered the most important objectives, while maintaining scenic beauty was consistently rated/ranked in the bottom three objectives, along with maintaining long intervals between harvests and limiting the use of intensively managed forest plantations.

Respondents’ concern for the industry’s potential impact on Maine’s forests could also have been a factor in their rating/ranking of other energy projects, where solar, wind, hydro-electric, and tidal were consistently rated/ranked above forest-based biorefineries. In all of these higher rated/ranked energy projects it is implied that forests would be minimally impacted and not used the primary input for energy creation. It is for these reasons we believe that the industry’s impact on forests and forest management practices will be a key issue in the formation of public opinion toward the development of the forest bioproducts industry.

Ultimately, public views toward biorefineries will be influenced by industry performance and personal and community experiences. Also important, however, will be objective analyses of the industry’s likely effects on communities, forest health, and the provision of ecosystem services. Here, in both the State-wide and Mill Town samples, university and state-level agencies were considered highly credible sources of information – much more so than environmental groups, business groups, and the media. This public endorsement comes with the responsibility to continue to provide accurate and unbiased information regarding these issues, and to anticipate future issues in advance of public sentiment.

Literature Cited

Benjamin, J., R.J. Lillieholm, and D. Damery. 2009. Challenges and Opportunities facing the Northeast Bioproducts Industry. *Journal of Forestry* 107(3):125-131.

Cordano, M., S.A. Welcomer, and R.F. Scherer. 2003. An Analysis of the Predictive Validity of the New Ecological Paradigm Scale. *Journal of Environmental Education* 34(3):22-28.

Lillieholm, R.J., P. Van Walsum, J. Benjamin, D. Gardner, and A. Halog. 2009. Forest-based Biofuels and Bioproducts. In F.W. Cabbage, ed., *Forests and Forestry in the Americas: An Encyclopedia*. Society of American Foresters and International Society of Tropical Foresters.

Dickerson, K., and J. Rubin. 2008. *Maine Bioproducts Business Pathways*. University of Maine's Margaret Chase Smith Policy Center, Forest Bioproducts Research Initiative, and the School of Economics.

APPENDIX A

SECTION ONE

In this section, we are interested in your perceptions of Maine's forest products industry. The forest products industry includes logging, pulp and paper mills, lumber mills, and the landowners that grow timber.

1. In your opinion and on a scale of 1 to 7, **how important to Maine's economy** is the state's forest products industry? (PLEASE CIRCLE ONE NUMBER)



2. In your opinion, is Maine's forest products industry: (PLEASE CHECK ONE BOX)

- Increasing in economic importance to the state
- Constant in economic importance to the state
- Decreasing in economic importance to the state
- Not sure

3. In your opinion, are timber harvest levels in Maine: (PLEASE CHECK ONE BOX)

- Too high
- Too low
- Just about right
- Not sure

4. **How believable are each of these organizations** as a credible source of information about the forest products industry? (PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Organization	Not at all Believable	←————— —————→					Very Believable
	1	2	3	4	5	6	7
Environmental groups	1	2	3	4	5	6	7
Business groups	1	2	3	4	5	6	7
University researchers	1	2	3	4	5	6	7
Federal Forest Service	1	2	3	4	5	6	7
State Forest Service	1	2	3	4	5	6	7
Media (TV, newspapers, etc.)	1	2	3	4	5	6	7
University of Maine School of Forest Resources	1	2	3	4	5	6	7
Forest products industry	1	2	3	4	5	6	7
Other (please specify): _____	1	2	3	4	5	6	7

5. In your opinion, do you believe Maine has enough protected forest area?

- Yes
- No

6. How interested are you in Maine's forest products industry? (PLEASE CIRCLE ONE NUMBER)



7. Research and technology are expanding the range of products that can be made from wood.

How beneficial would each of these products be to you if produced from wood sustainably harvested from Maine's forests? (PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Potential Products							
	1	2	3	4	5	6	7
Electricity	1	2	3	4	5	6	7
Gasoline substitutes like ethanol	1	2	3	4	5	6	7
Diesel substitutes like biodiesel	1	2	3	4	5	6	7
Bio-oil for home heating	1	2	3	4	5	6	7
Wood pellets for home heating	1	2	3	4	5	6	7
Plastic substitutes	1	2	3	4	5	6	7
Medicines and pharmaceuticals	1	2	3	4	5	6	7

8. Please include any comments you would like to make about the **forest products industry**:

SECTION TWO

*In this section, we are interested in your views on a new forest products technology being developed in Maine – **forest-based biorefineries**. A forest-based biorefinery processes wood into gasoline substitutes like ethanol, as well as plastics and other chemicals normally made from fossil fuels. A forest-based biorefinery can be located alongside an existing paper mill, or built as a separate stand-alone facility.*

1. A forest-based biorefinery has the **potential to bring positive impacts** to Maine and local communities. If a forest-based biorefinery were to be developed **in your community** bringing the potential positive benefits described below, on a scale of 1 to 7 **how beneficial** would each positive impact be to you?

(PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Potential Positive Impacts	Not at all Beneficial	←————— —————→					Very Beneficial
	1	2	3	4	5	6	7
Reduced greenhouse gas emissions that contribute to global climate change by providing an alternative to fossil fuels	1	2	3	4	5	6	7
Increase in local jobs in biorefinery construction and plant operation	1	2	3	4	5	6	7
Sustainability by producing transportation fuel and other products from a sustainable resource – wood	1	2	3	4	5	6	7
Energy independence by helping Maine import less energy from other countries and states	1	2	3	4	5	6	7
Limiting residential development on forest land by making forests more valuable and thus limiting the conversion of forests to housing	1	2	3	4	5	6	7
Increased economic development in your community from the income generated by a biorefinery project	1	2	3	4	5	6	7

2. Now **please rank** the following potential positive benefits associated with a forest-based biorefinery. Begin by placing a "1" next to what you believe to be the **most beneficial impact**, a "2" next to the **second most beneficial impact**, and so on, until all the impacts have been ranked.

Rank (PLEASE RANK FROM 1 TO 6)

- | | |
|--|--|
| <p>___ Reduced greenhouse gas emissions</p> <p>___ Increase in local jobs</p> <p>___ Sustainability</p> <p>___ Energy independence</p> | <p>___ Limiting residential development on forest land</p> <p>___ Increased economic development in your community</p> |
|--|--|

3. A forest-based biorefinery can potentially have negative impacts on a community and the state. If a forest-based biorefinery were to be developed in your community bringing the potential negative impacts described below, how harmful would each negative impact be to you?
 (PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Potential Negative Impacts	Not at all Harmful ←————— ————→ Very Harmful						
Increased local truck traffic associated with plant construction and operations	1	2	3	4	5	6	7
Increased local air pollution although keeping within state environmental limits	1	2	3	4	5	6	7
Increased local water pollution although keeping within state environmental limits	1	2	3	4	5	6	7
Increased noise pollution associated with plant construction and operations	1	2	3	4	5	6	7
Increased competition for wood supplies that could drive up the price for wood and firewood	1	2	3	4	5	6	7
Increased pressure for unsustainable logging which would harvest trees faster than they can be replaced	1	2	3	4	5	6	7
Odor associated with the biorefining process	1	2	3	4	5	6	7

4. Now please rank the following potential negative impacts associated with a forest-based biorefinery. Begin by placing a "1" next to what you believe to be the most harmful impact, a "2" next to the second most harmful impact, and so on, until all the impacts have been ranked. (PLEASE RANK FROM 1 TO 7)

Rank

- ____ Increased local truck traffic
- ____ Increased local air pollution
- ____ Increased local water pollution
- ____ Increased local noise pollution
- ____ Increased competition for wood supplies
- ____ Increased pressure for unsustainable logging
- ____ Odor associated with the biorefining process

5. The establishment of forest-based biorefineries has the potential to impact forest management practices in **Maine**. In your opinion, **how important** are each of the following forest management objectives to you? (PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Forest Management Objectives	Not at all Important ←————— ————→ Very Important						
	1	2	3	4	5	6	7
Managing forests in a way that maintains wildlife populations	1	2	3	4	5	6	7
Managing forests in a way that maintains scenic beauty	1	2	3	4	5	6	7
Managing forests in a way that maintains water quality	1	2	3	4	5	6	7
Managing forests in a way that maintains soil nutrients	1	2	3	4	5	6	7
Managing forests in a way that maintains a forest's biological diversity	1	2	3	4	5	6	7
Managing forests in a way that limits the use of herbicides	1	2	3	4	5	6	7
Managing forests in a way that limits the use of clear-cutting	1	2	3	4	5	6	7
Managing forests in a way that limits the use of intensively managed forest plantations	1	2	3	4	5	6	7
Managing forests in a way that maintains long time intervals between harvests on a particular site	1	2	3	4	5	6	7
Managing forests in a way that maintains forest productivity to ensure wood supplies to the forest products industry	1	2	3	4	5	6	7

6. Now **please rank** the importance of the following forest management objectives. Begin by placing a "1" next to what you believe to be the **most important objective**, a "2" next to the **second most important objective**, and so on, until all the objectives have been ranked.

Rank (PLEASE RANK FROM 1 TO 10)

- | | |
|--|--|
| <input type="checkbox"/> Maintaining wildlife populations | <input type="checkbox"/> Limiting the use of clear-cutting |
| <input type="checkbox"/> Maintaining scenic beauty | <input type="checkbox"/> Limiting the use of intensively managed forest plantations |
| <input type="checkbox"/> Maintaining water quality | <input type="checkbox"/> Maintaining long time intervals between harvests on a particular site |
| <input type="checkbox"/> Maintaining soil nutrients | <input type="checkbox"/> Maintaining forest productivity to ensure wood supplies to the forest products industry |
| <input type="checkbox"/> Maintaining a forest's biological diversity | |
| <input type="checkbox"/> Limiting the use of herbicides | |

7. How **supportive** would you be if a forest-based biorefinery were developed in:
(PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Regional Scale	Not at all Supportive ←—————+————→ Very Supportive						
The United States?	1	2	3	4	5	6	7
The State of Maine?	1	2	3	4	5	6	7
Your county?	1	2	3	4	5	6	7
Your community?	1	2	3	4	5	6	7

8. How **supportive** would you be if each of the following energy projects were being considered for development in your community? (PLEASE CIRCLE ONE NUMBER FOR EACH ROW)

Energy Project	Not at all Supportive ←—————+————→ Very Supportive							Not Applicable
A wind farm project that generates electricity from wind	1	2	3	4	5	6	7	8
A solar energy project that converts sunlight to electricity	1	2	3	4	5	6	7	8
A hydro-electric project that dams rivers to generate electricity	1	2	3	4	5	6	7	8
A wood pellet mill that creates pellets for home heating	1	2	3	4	5	6	7	8
A wood biomass energy project that burns wood to generate electricity (note that this is not a biorefinery)	1	2	3	4	5	6	7	8
A tidal energy project that converts ocean currents to electricity	1	2	3	4	5	6	7	8
A non-renewable energy project using natural gas or oil to create electricity	1	2	3	4	5	6	7	8

9. Now **please rank** your support for the following potential energy projects, imagining that they were being considered for development in your community. Begin by placing a "1" next to the energy project you would **most support**, a "2" next to your **second most supported** energy project, and so on, until all the energy projects have been ranked. (PLEASE RANK FROM 1 TO 8)

Rank

- ___ Forest-based biorefinery
- ___ Wind farm
- ___ Solar energy
- ___ Hydro-electric
- ___ Wood pellet mill
- ___ Wood biomass
- ___ Tidal energy
- ___ A non-renewable energy project

10. Now **please rank** the following potential locations for the development of a forest-based biorefinery. Begin by placing a "1" next to your **most preferred location**, a "2" next to your **second most preferred location**, and so on, until all the locations have been ranked. (PLEASE RANK FROM 1 TO 4)

Rank

- ____ Alongside an **existing** pulp and paper mill
- ____ At a pulp and paper mill **no longer in operation**
- ____ At a new stand-alone facility in a **rural area** zoned for industrial use
- ____ At a new stand-alone facility in an **urban area** zoned for industrial use

11. Prior to this survey, how much would you say you knew about forest-based biorefineries?
(PLEASE CHECK ONE BOX)

- I had never heard about forest-based biorefineries
- I had heard about forest-based biorefineries, but I was not sure what they did
- I was somewhat familiar with forest-based biorefineries
- I had extensive knowledge of forest-based biorefineries

12. Please include any comments you would like to make about **forest-based biorefineries**:

SECTION THREE

In this section, we are interested in your general perceptions about the natural environment.

1. On a scale of 1 to 7, how strongly do you disagree or agree with the following statements.

Statements	Strongly Disagree	←		→	Strongly Agree		
The balance of nature is very delicate and easily upset	1	2	3	4	5	6	7
The so-called "ecological crisis" facing humanity has been greatly exaggerated	1	2	3	4	5	6	7
When humans interfere with nature, it often produces disastrous consequences	1	2	3	4	5	6	7
Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5	6	7
Humans are severely abusing the environment	1	2	3	4	5	6	7
Humans were meant to rule over nature	1	2	3	4	5	6	7
If things continue on their present course, we will soon experience a major ecological catastrophe	1	2	3	4	5	6	7
Plants and animals exist primarily to be used by humans	1	2	3	4	5	6	7

2. Now **please rank** the importance of the following uses for Maine's forests. Begin by placing a "1" next to what you believe to be the **most important use**, a "2" next to the **second most important use**, and so on, until all the uses have been ranked. (PLEASE RANK FROM 1 TO 5)

Rank

- ___ As a source of economic wealth
- ___ As a place for recreation and relaxation
- ___ As a place for the protection of water, air and soil
- ___ As a place to support a wide variety of plants and animals
- ___ As a source of meat, firewood, berries and other non-timber products

SECTION FOUR

In this section, we are interested in your general perceptions about your economic well-being.

1. Overall and on a scale of 1 to 7, **how worried** are you about your economic security? By economic security, we mean your ability to keep your job, maintain your income, pay your mortgage or rent on time, have health insurance coverage, and retire comfortably? (PLEASE CIRCLE ONE NUMBER)



2. **How worried** are you about your household debt? (PLEASE CIRCLE ONE NUMBER)



3. If something happened and you lost your job, **how worried** would you be about finding a new job that pays the same? (PLEASE CIRCLE ONE NUMBER)

Check here if you are retired or not working



4. **How worried** are you about having enough money to put food on the table? (PLEASE CIRCLE ONE NUMBER)



5. **How worried** are you about keeping up with the cost-of-living? (PLEASE CIRCLE ONE NUMBER)



6. During anytime over the past year, have you been unemployed and unable to find a job? (PLEASE CHECK ONE BOX)

- Yes → How many months were you unemployed? _____ months
 No

SECTION FIVE

In this last section, we would like to know a little bit about you for statistical purposes. We would like to remind you that all of your answers are strictly confidential. However, we need this information to compare your responses with other Maine residents. We thank you again for taking the time to complete this survey.

1. Are you currently or have you ever been employed in the forest products industry? (PLEASE CHECK ONE BOX)
 Yes No

2. How long have you lived in your community? ____ Years

3. Do you rent or own your home? (PLEASE CHECK ONE BOX)
 Rent Own

4. What is your gender? (PLEASE CHECK ONE BOX)
 Male Female

5. What is your race/ethnicity? (PLEASE CHECK ONE BOX)
 White Non-Hispanic Asian or Pacific Islander
 Black American Indian or Alaskan Native
 Hispanic or of Spanish origin Other, please specify: _____

6. What is your age? ____ Years old

7. What is the highest level of education that you have completed? (PLEASE CHECK ONE BOX)
 0-11 years
 High school graduate or GED
 Associates degree or some college
 College graduate (Bachelor degree or equivalent)
 Postgraduate, masters degree, doctorate, law degree, or other professional degree

8. Are there any children under the age of 18 living in your household at least part of the year? (PLEASE CHECK ONE BOX)
 No Yes → How many children live in your household? ____ Children

9. What was your total household income before taxes last year? (PLEASE CHECK ONE BOX)
 Less than \$10,000 \$50,000 to \$74,999
 \$10,000 to \$14,999 \$75,000 to \$99,999
 \$15,000 to \$24,999 \$100,000 to \$149,999
 \$25,000 to \$34,999 \$150,000 to \$199,999
 \$35,000 to \$49,999 \$200,000 or more

In the space below, please feel free to share any additional comments you may have relating to the topics covered in this survey:

THANK YOU FOR YOUR HELP!

Please return your completed survey in the postage-paid, self-addressed envelope provided.
If you need further information, please contact:

Dr. Robert Lillieholm
University of Maine
School of Forest Resources
5755 Nutting Hall
Orono, ME 04469-5755

APPENDIX B

Socio-Demographic Information

How many years have you lived in your community?

<u>State-wide sample</u>		<u>Mill Town sample</u>	
<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
27.1	20.4	33.26	22.06

Do you own or rent your home? State average: 71.6% (2000)

<u>State-wide sample</u>		<u>Mill Town sample</u>	
<u>Own</u>	<u>Rent</u>	<u>Own</u>	<u>Rent</u>
88.3%	11.7%	89.6%	10.4%

What is your gender? State average: 51.2% (2007)

<u>State-wide sample</u>		<u>Mill Town sample</u>	
<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
67.1%	32.9%	71.4%	28.6%

What is your race/ethnicity? State average: 96.5% White (2007)

	<u>State-wide sample</u>	<u>Mill Town sample</u>
White Non-Hispanic	97.4%	98.4%
Asian or Pacific Islander	0.2%	0.0%
Black	0.5%	0.5%
American Indian or Alaskan Native	0.2%	0.2%
Hispanic or of Spanish origin	0.5%	0.5%
Other	1.2%	0.5%

What is your age in years?

<u>State-wide sample</u>		<u>Mill Town sample</u>	
<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
55.4	13.52	54.6	14.18

What is the highest level of education that you have completed? State average: 22.9% BA

	<u>State-wide sample</u>	<u>Mill Town sample</u>
0-11 years	4.1%	3.8%
High school graduate or GED	27.4%	37.6%
Associates degree or some college	30.8%	26.9%
College graduate (Bachelor degree or equivalent)	19.6%	16.8%
Postgraduate, Masters degree, Doctorate, law or other professional degree	18.2%	14.9%

Are there any children under the age of 18 living in your household at least part of the year?

<u>State-wide sample</u>			<u>Mill Town sample</u>		
Yes	No	Children (Mean)	Yes	No	Children (Mean)
27.1%	72.9%	1.79	29.6%	70.4%	1.84

What was your total household income before taxes last year?

	<u>State-wide sample</u>	<u>Mill Town sample</u>
Less than \$10,000	3.8%	4.6%
\$10,000 to \$14,999	5.6%	5.9%
\$15,000 to \$24,999	9.9%	11.8%
\$25,000 to \$34,999	8.3%	13.8%
\$35,000 to \$49,999	16.4%	15.1%
\$50,000 to \$74,999	25.5%	22.5%
\$75,000 to \$99,999	13.0%	14.8%
\$100,000 to \$149,999	0.8%	7.9%
\$150,000 to \$199,999	3.1%	2.0%
\$200,000 or more	3.6%	1.5%

Median Household Income in Maine (2006-2007): \$47,415

APPENDIX C

The Mill Town sample was a random sample drawn from an area that included a 10-mile radius from the geographic center of the following towns:

- 1. Madawaska
- 2. Baileyville
- 3. East Millinocket
- 4. Lincoln
- 5. Madison
- 6. Rumford
- 7. Old Town
- 8. Skowhegan
- 9. Jay
- 10. Bucksport

