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# INFORMED STAKEHOLDER ASSESSMENT

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# TABLE OF CONTENTS

|   |    |
|---|----|
| LIST OF FIGURES.....                          | 3  |
| LIST OF TABLES.....                           | 3  |
| LIST OF ACRONYMS .....                        | 3  |
| EXECUTIVE SUMMARY.....                        | 4  |
| INTRODUCTION .....                            | 5  |
| TASK 1: INFORMED STAKEHOLDER ASSESSMENT ..... | 6  |
| NARA OUTPUTS .....                            | 11 |
| NARA OUTCOMES .....                           | 12 |
| FUTURE DEVELOPMENT .....                      | 13 |

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# LIST OF FIGURES

| FIGURE NO. | FIGURE TITLE   | PAGE NO. |
|------------|--|----------|
| SA-1.1     | NARA Regions.....                                      | 7        |
| SA-1.2     | Informed Stakeholder Survey Results.....               | 8        |
| SA-1.3     | Level of Knowledge vs. Sources of Woody Biomass .....  | 8        |
| SA-1.4     | Level of Knowledge vs. Biomass Utilization.....        | 8        |
| SA-1.5     | Level of Knowledge vs. More Benefits than Risks .....  | 8        |
| SA-1.6     | Preferred Communication Methods.....                   | 9        |
| SA-1.7     | Survey results from Clallam and Jefferson County ..... | 13       |

# LIST OF TABLES

| FIGURE NO. | FIGURE TITLE   | PAGE NO. |
|------------|--|----------|
| SA-1.1.    | Demographic Description of Survey Participants.....              | 6        |
| SA-1.2     | Stakeholder Groups and Subgroups .....                           | 7        |
| SA-1.3.    | Survey Participants by Stakeholder Group, State, and Region..... | 7        |
| SA-1.4.    | Local Forest Conditions.....                                     | 9        |
| SA-1.5.    | Potential Benefits .....   | 9        |
| SA-1.6.    | Potential Drawbacks .....  | 9        |

# LIST OF ACRONYMS

|          |  |
|----------|--|
| AFRI-CAP | Agriculture and Food Research Initiative-Coordinated Agricultural Projects |
| BANR     | Bioenergy Alliance Network of the Rockies                                  |
| C2P      | Cascade to Pacific   |
| CAAM     | Community Asset Assessment Team  |
| CP       | Columbia Plateau   |
| ENGOS    | environmental nongovernment organizations                                  |
| IDX      | Integrated Design Experience   |
| NARA     | Northwest Advanced Renewables Alliance                                     |
| PNW      | Pacific Northwest  |
| U of I   | University of Idaho  |
| WMC      | Western Montana Corridor   |
| WSU      | Washington State University  |
| WWU      | Western Washington University  |

# EXECUTIVE SUMMARY

One of the Northwest Advanced Renewable Alliance's (NARA's) objectives is to evaluate and assess the environmental, social, and economic viability of the overall wood to biofuels supply chain. To address social sustainability, a large scale social assessment of informed stakeholders in the NARA region was conducted using a mixed methods survey to gain understanding of stakeholders' knowledge, levels of support, and perceived benefits and drawbacks of using woody biomass to produce liquid biofuels.

Researchers surveyed 868 stakeholders in Idaho, Montana, Washington, and Oregon; 298 participated, for a 34% response rate. Survey findings show that many stakeholders support using woody biomass to produce bioenergy, including liquid biofuels. Respondents who have higher levels of self-assessed knowledge are generally more supportive of biomass related activities. They also see potential

environmental and economic benefits including improving forest conditions, enhancing local and regional economies, and reducing catastrophic fires. In spite of this, respondents also have many concerns about the economic viability and environmental sustainability of harvesting biomass and producing liquid biofuels.

Researchers looked at stakeholders' preferred methods of communication and found that over 75% of respondents across all stakeholder groups and regions identified methods where they could access information themselves via email, website, and newspaper, and scenarios where they could interface with experts to ask questions such as field trips, demonstrations, and community meetings. Researchers suggest that outreach efforts should be made in the form of these preferred communication methods addressing stakeholder questions, concerns, and knowledge gaps.

# INTRODUCTION

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In year one, researchers conducted an extensive literature review, examining previous research to better understand salient issues, stakeholder groups, mixed methods measurement constructs and preliminary protocols for conducting an informed stakeholder survey about using woody biomass to produce liquid biofuels. In year two, stakeholders in the Pacific Northwest were surveyed about their levels of support, agreement, and worry regarding the use of woody as a biofuels feedstock. Starting in year three of the project, survey results were

analyzed and compared by state, region, and stakeholder group, as well as by rural/urban and political affiliation in order to understand how views varied geographically and demographically. The complete survey findings are published in J. Moroney's doctoral dissertation, *Barking up the Right Tree: A Social Assessment of Wood to Liquid Biofuels Stakeholders in the Pacific Northwest* (2015) (see "Outputs" in this report for reference).

# TASK 1: INFORMED STAKEHOLDER ASSESSMENT

## Objective

The task objective was to review the literature on the social acceptability of biofuels and review previous research methodologies and sampling frames, then to implement a stakeholder survey in Washington, Oregon, Idaho, and Montana. The survey was designed to identify stakeholder knowledge, concerns, and perceptions about utilizing woody biomass as a biofuels feedstock, and to understand the best methods to engage and communicate with stakeholders in an effort to remedy knowledge gaps and address questions they had.

## Methodology

A mixed-methods survey was developed using questions from surveys on related topics, early conversations with stakeholders, and input from individuals involved in the NARA project to explore stakeholders' perspectives on topics related to woody biomass feedstock collection, utilization, and biofuels production. The survey was reviewed by multiple researchers including those in the Advance Hardwood Biofuels Northwest and Southeast Partnership for Integrated Biomass Supply Systems, both AFRI CAP programs, who were conducting similar surveys. Prior to wide-scale distribution, the survey was piloted with ten stakeholders. Cognitive interviews were conducted with pilot respondents as they completed the survey to identify wording and design problems. The survey was further refined based on the results of the pilot. The final questionnaire consisted of 22 qualitative and quantitative questions including both scaling/likert type questions and open-ended questions.

The goal of the survey was to engage a targeted audience of individuals who represented a range of knowledge, experiences, and perspectives on different aspects of the wood-to-biofuels supply chain. A purposive sample of participants representing 39 stakeholder groups was compiled using input from university Extension personnel, economic development professionals, previous conference and information session attendees, and expanded via extensive Internet searches to maximize the potential number of participants to be contacted in each

stakeholder category. The sample included government officials working at the local, state, and federal levels; individuals working or involved in the wood products industry; tribal communities; nonindustrial private forestland owners; individuals with environmental conservation interests; and environmental nongovernmental organizations (ENGOS).

Participants were given the option to take the survey online, over the phone, or by mail to increase response rates by including multiple response methods<sup>1</sup>. Initial email invitations were sent to all stakeholders then were followed by a reminder email one week later, a phone call two weeks after the email reminder, and, finally, a hard copy in the mail one month to six weeks after the initial email invitation. The demographic breakdown of survey participants is displayed in Table SA-1.1.

Table SA-1.1. Demographic description of survey participants.

| Category                           | Description                               | %  |
|------------------------------------|---|----|
| Political Affiliation              | Liberal to Very Liberal Leaning           | 35 |
|                                    | Conservative to Very Conservative Leaning | 45 |
|                                    | Independent                               | 20 |
| Age                                | 20-29                                     | 01 |
|                                    | 30-39                                     | 11 |
|                                    | 40-49                                     | 16 |
|                                    | 50-59                                     | 31 |
|                                    | 60+                                       | 41 |
| Gender                             | Male                                      | 85 |
|                                    | Female                                    | 15 |
| Rural/Urban Continuum <sup>2</sup> | Metro                                     | 56 |
|                                    | NonMetro                                  | 35 |
|                                    | Completely Rural                          | 09 |

<sup>1</sup> Dillman, D.A., Smyth, J.D. & Christian, L.M. (2014). Internet, Phone, Mail and Mixed-Mode Surveys. 4th Edition. Hoboken, NJ: John Wiley & Sons, Inc.

<sup>2</sup> USDA Economic Research Service. 2013. Rural-Urban Continuum Codes. <http://www.ers.usda.gov/data-products/rural-urban-continuum-codes/documentation.aspx>

Based on professional background and similarities in respondents' answers to survey questions, the initial 39 stakeholder types identified in the sampling frame were condensed into four broad categories: Industry Professionals, Conservation/Tribal, Local Interests, and State/Federal Government. Sub-categories making up these four stakeholder groups are shown in Table SA-1.2.

Table SA-1.2. Stakeholder groups and subgroups engaged for surveying.

| Industry   | Conservation/Tribal  | Local Interests   | Federal/State Gov.  |
|--|--|---|---|
| <ul style="list-style-type: none"> <li>• Forest industry</li> <li>• Non-industrial land owners</li> <li>• Private foresters</li> <li>• Industrial land owners</li> <li>• Harvesters and haulers</li> <li>• Secondary, primary, and paper products</li> </ul> | <ul style="list-style-type: none"> <li>• Tribal members</li> <li>• ENGOS</li> <li>• Local resource managers</li> <li>• Wilderness outfitters and recreation</li> </ul> | <ul style="list-style-type: none"> <li>• University Extension</li> <li>• Economic and business development</li> <li>• Interested local business and investors</li> <li>• City/town elected officials</li> <li>• County elected officials</li> </ul> | <ul style="list-style-type: none"> <li>• Academic researchers</li> <li>• Extension foresters</li> <li>• State foresters</li> <li>• State and federal scientists</li> <li>• State and federal natural resource managers</li> <li>• District rangers</li> </ul> |

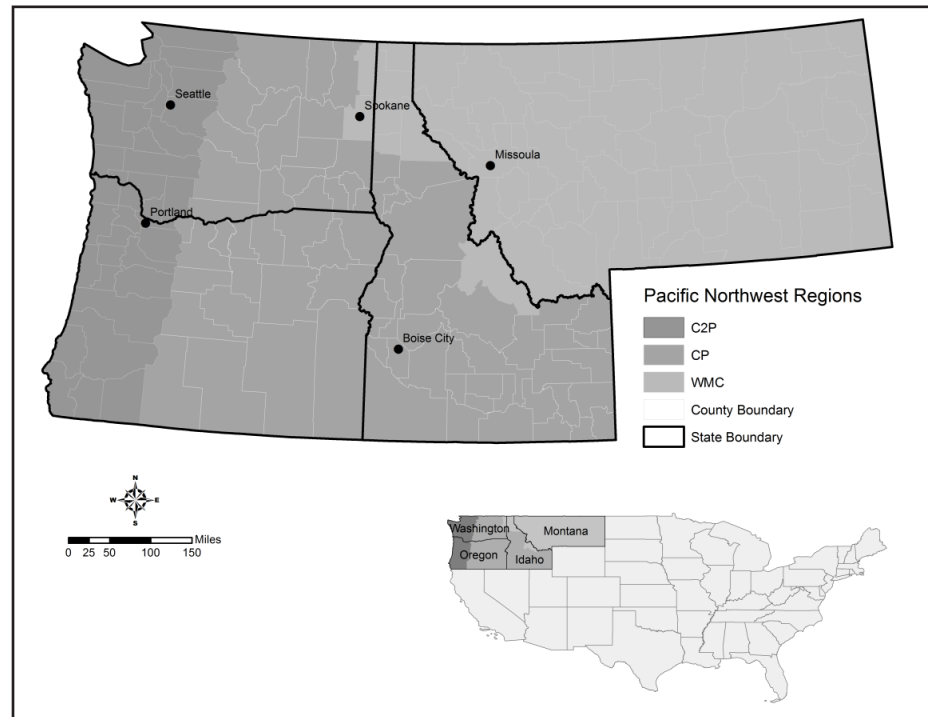


Figure SA-1.1. The three functional regions of NARA in the Northwestern United States.

Survey respondents were also categorized by state and region. Following the functional regions delineated by NARA based on biogeophysical similarities, three regions were defined: Cascade to Pacific (C2P) (western Washington and western Oregon), Western Montana Corridor (WMC) (western Montana, northern Idaho, and northeastern Washington), and Columbia Plateau (CP) (eastern Washington, eastern Oregon, and southern Idaho) (Figure SA-1.1). Table SA-1.3 shows the breakdown of respondents by stakeholder group, state, and region.

Table SA-1.3. Survey participants by stakeholder group, state and region.

| Category          | Description              | %  |
|-------------------|--------------------------|----|
| Stakeholder Group | Industry                 | 33 |
|                   | Conservation/Tribal      | 19 |
|                   | Local Interest           | 27 |
|                   | State/Federal Government | 21 |
| State             | Idaho                    | 29 |
|                   | Montana                  | 18 |
|                   | Washington               | 29 |
|                   | Oregon                   | 24 |
| Region            | WMC                      | 27 |
|                   | C2P                      | 33 |
|                   | CP                       | 40 |

## Results

The regional informed stakeholder survey (n = 298) found that, whether categorized by region, state, or stakeholder group, all respondents agree that woody biomass should be used as a raw material to a supply bioenergy plant or a liquid biofuels refinery. And they disagree with the statement that woody biomass should not be removed from the forest regardless of its potential use (Figure SA-1.2).

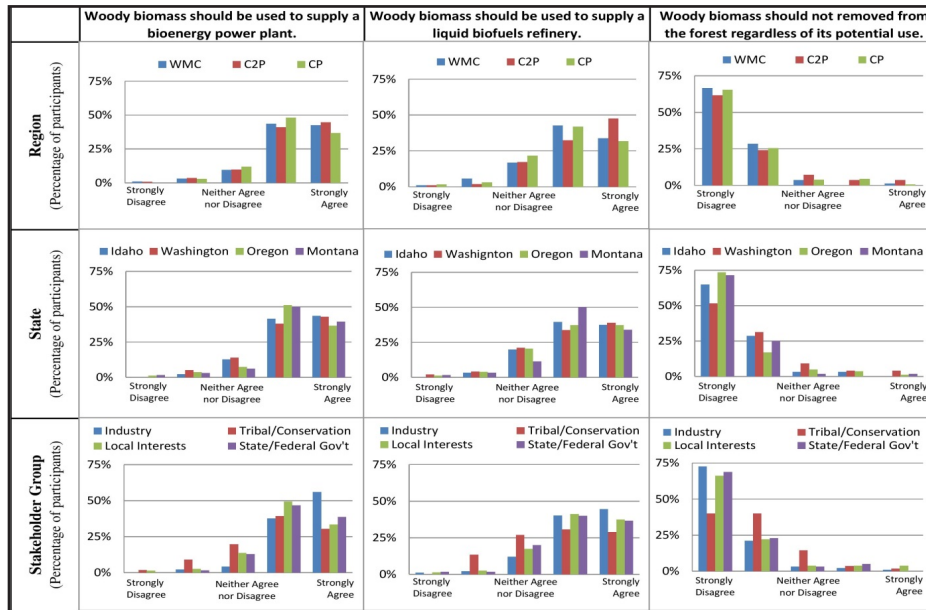


Figure SA-1.2. Informed stakeholder survey results by region, state, and stakeholder group

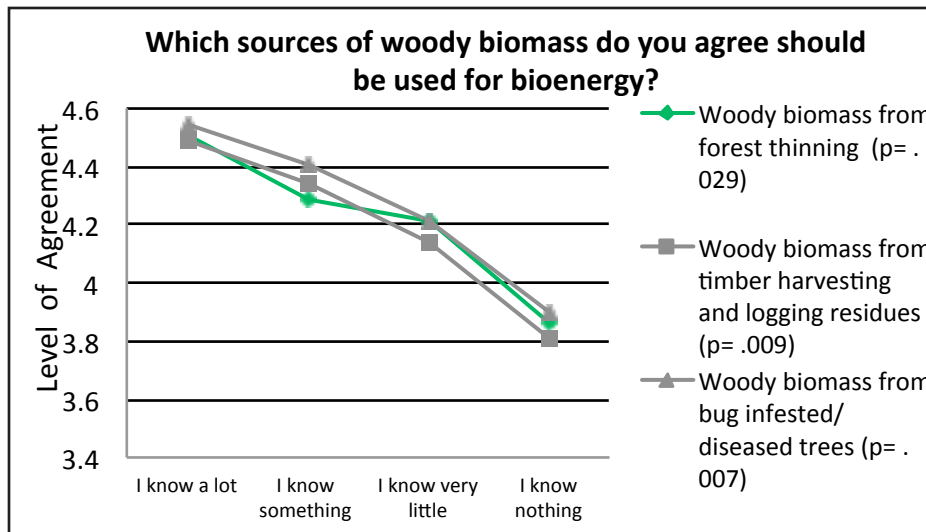


Figure SA-1.3. Level of Knowledge vs Sources of Woody Biomass

Further analysis found that the more a stakeholder knows about using wood biomass to produce liquid biofuels, the more supportive they are of various aspects of the wood-to-biofuels industry, including the source of biomass to be used (Figure SA-1.3), biomass utilization (Figure SA-1.4), and the benefits vs. the risks (Figure SA-1.5).

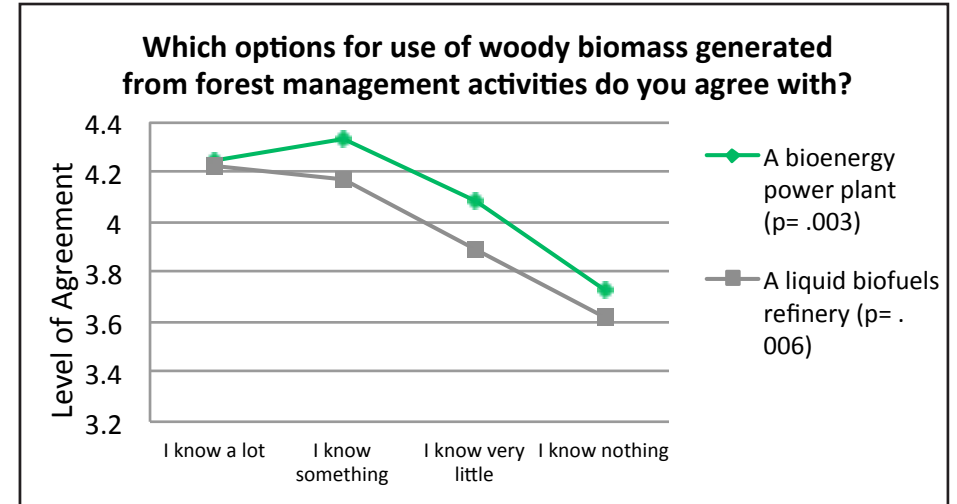


Figure SA-1.4. Level of Knowledge vs. Biomass Utilization

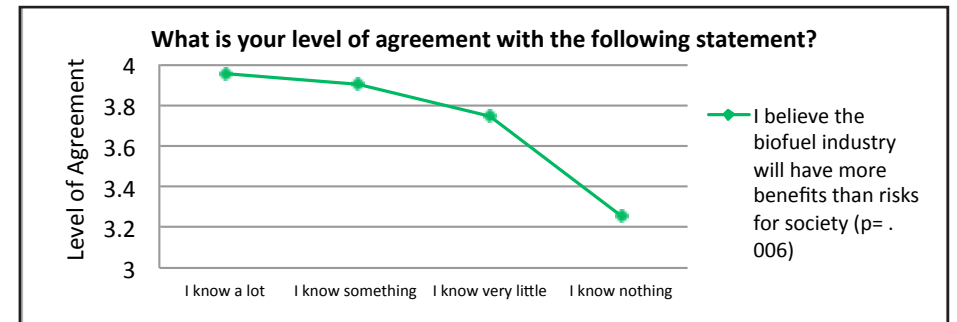


Figure SA-1.5. Level of Knowledge vs. More Benefits than Risks

The regional informed stakeholder survey findings are important because they show that 1) there is general support for the wood-to-biofuels industry in the Pacific Northwest, and 2) if those who know “very little” or “nothing” about it are informed, they are likely to be more supportive of it.

In addition to the quantitative information generated from the survey discussed above, several open-ended questions were asked regarding participants’ concerns about their local forests, possible benefits, and potential negative drawbacks of using woody biomass for biofuels production.



When asked about conditions in forests most familiar to survey participants, many mentioned fire hazards as an issue. Participants from Idaho most frequently mentioned disease in their forests, participants from Montana mentioned fire hazards more than any other issue, and many Oregon and Washington participants mentioned excess fuel (Table SA-1.4).

Table SA-1.4. Issues mentioned when survey participants were asked about forest conditions in their local forests.

| State      | N  | Diseased | Excess Fuel | Fire Hazard | Insect Problems |
|------------|----|----------|-------------|-------------|-----------------|
| Idaho      | 85 | 32%      | 24%         | 28%         | 5%              |
| Montana    | 50 | 24%      | 14%         | 28%         | 24%             |
| Oregon     | 71 | 32%      | 39%         | 21%         | 9%              |
| Washington | 82 | 11%      | 28%         | 23%         | 12%             |

Survey participants were asked what potential benefits, if any, they saw from using woody biomass to produce liquid biofuels. When looking at these results by stakeholder group, we can see that one benefit that all groups agree on is reduced fires. Industry stakeholders mentioned economic benefits and renewable energy as a benefit more than any other groups. Local Interest stakeholders saw healthier forest stands as a benefit (Table SA-1.5).

Table SA-1.5. Benefits to using woody biomass to produce liquid biofuels as mentioned by survey participants.

| Stakeholder Group (SHG) | n  | Economic Benefits | Reduce Fires | Healthier Forest Stands | Decrease Insect Damage | Renewable Energy |
|-------------------------|----|-------------------|--------------|-------------------------|------------------------|------------------|
| Industry                | 81 | 35%               | 67%          | 38%                     | 14%                    | 22%              |
| Tribal/Conservation     | 47 | 23%               | 55%          | 38%                     | 9%                     | 19%              |
| Local Interests         | 63 | 30%               | 71%          | 47%                     | 3%                     | 8%               |
| State/Federal           | 67 | 30%               | 76%          | 44%                     | 10%                    | 12%              |

Participants were also asked to list any potential drawbacks they saw from using woody biomass to produce liquid biofuels. When these answers are reviewed at the stakeholder group level, we see that Industry stakeholders and Local Interest stakeholders were both more likely to say there are no negative effects. The Tribal/Conservation stakeholders and the State/Federal government stakeholders both saw loss of habitat and soil degradation as potential drawbacks (Table SA-1.6).

Table SA-1.6. Drawbacks to using woody biomass to produce liquid fuels as listed by survey participants.

| SHG                 | N  | Loss of Material | Soil Degradation | Loss of Habitat | No Negative Effects |
|---------------------|----|------------------|------------------|-----------------|---------------------|
| Industry            | 78 | 30%              | 24%              | 10%             | 40%                 |
| Tribal/Conservation | 47 | 21%              | 34%              | 28%             | 19%                 |
| Local Interests     | 64 | 14%              | 19%              | 19%             | 41%                 |
| State/Federal       | 66 | 24%              | 26%              | 26%             | 17%                 |

At the end of the survey, respondents could write in questions or suggest topics that had not been addressed in the survey. These questions were compared by state and showed some interesting trends. The top questions from each state were the same: “Is this economically feasible?” and “What are the environmental impacts?” Beyond these two questions, additional responses reflected policy and local issues unique to each state. In Idaho, a state with over 60% federal lands, stakeholders asked questions that had to do with accessing materials on public lands. In Washington, the composition of the feedstock was on the minds of stakeholders, where many people asked if municipal and construction waste could be used in biofuels, most likely because of the presence of large cities such as Seattle. In Oregon, they had many environmental concerns about nutrient loads. Montana stakeholders simply asked, “When can we start?”

A goal of the informed stakeholder assessment survey was to ultimately be able to address knowledge gaps, concerns about potential drawbacks, and general stakeholder questions in effective ways, so the survey asked respondents their preferred methods of communication when learning about biomass projects. Little variation in outreach methods was seen when looked at by state or stakeholder group. Respondents were most interested in being able to access information themselves and opportunities where they can receive information and ask questions face-to-face (Figure SA-1.6).

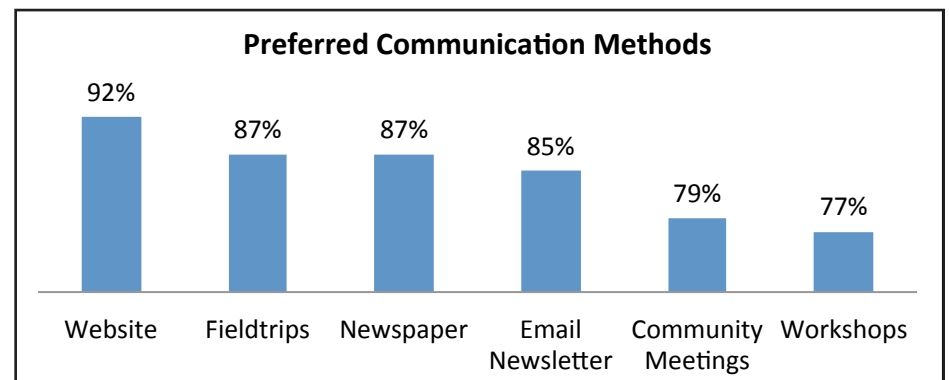


Figure SA-1.6. Stakeholders’ preferred communication methods when receiving information about biomass to biofuel projects.

Overall, survey participants showed high levels of support for a woody biomass to liquid biofuel supply chain in the PNW. Reoccurring themes throughout the survey were questions or uncertainty about environmental impacts and economic feasibility. Concerns and perceived benefits impact levels of support for a wood based biofuels supply chain; therefore, these topics should be addressed through outreach methods. Methods should include information, which can be accessed by stakeholders in their own time, and two-way communications where stakeholders can get information and ask questions.

## Conclusions

Findings from the informed stakeholder survey contribute to the literature related to the social acceptability of a wood-based biofuels industry in the northwest United States. Our findings show that many stakeholders support using woody biomass to produce bioenergy, including liquid biofuels. We also know that most stakeholders see potential environmental and economic benefits including improved forest conditions, enhanced local and regional economies, and reduced catastrophic fires. Stakeholder support is an important step in developing a successful wood-based biofuels supply chain in the Northwest. Knowing what questions, concerns, and perceived benefits will help researchers and educators better tailor educational materials and reach out to different stakeholder groups to lay the groundwork for a two-way conversation about industry development in the PNW.

# NARA OUTPUTS

## Publications

Newman, Soren, Daren Saul, Tamara Laninga, and Jillian L. Moroney. "The Devil's in the Details: Stakeholders' Perspectives on Forest-based Bioenergy Development in the Inland Northwest." USA. Submitted to the *Biomass and Bioenergy* June, 2016. *In-review*.

Moroney, Jillian L., Tamara J. Laninga. "Renewable Energy in the Pacific Northwest: Stakeholder Perceptions of Woody Biofuel in the United States." Submitted to *Energy Research and Social Science*. May, 2016. *In-review*.

Moroney, Jillian L., Tamara J. Laninga, and Randall H. Brooks. "Harnessing Woody Biomass for Aviation Biofuels: What do Stakeholders Know and What are the Most Effective Communication Methods to Reach Them?" *Journal of Extension*. December, 2015. *Accepted, in-press*.

Laniga, Tamara J., Jillian L. Moroney, Kenzie Payne, Soren Newman, and Darin Saul. "Wood to Wing: Stakeholder Perspectives on a Wood-based Biofuels Industry in the Northwestern United States." Submitted to the *Journal of Environmental Planning and Management* September, 2015. *In-revision*.

Moroney, Jillian. 2015. *Barking up the Right Tree: A Social Assessment of Wood to Liquid Biofuels Stakeholders in the Pacific Northwest*. (Doctoral Dissertation). University of Idaho. April 2015.

## Presentations

Jillian Moroney. 2016. "Biofuels from Forest Residuals: What is on the Minds of Stakeholders?" Presented at the Forest Products Society International Meeting, Portland, OR. June.

Laniga, Tamara J., Jillian L. Moroney. 2016. "Flying Planes with Trees? Stakeholders' levels of knowledge and support for a wood-based industry in the Pacific Northwest." Presented at Northwest Wood-based Biofuels + Co-Products Conference, Seattle, WA. April.

Lowell, Eini, Jillian L. Moroney, Tamara J. Laninga, Vikram Yadama. 2016. "Biofuels from Forest Residuals – What is on the Minds of Stakeholders?" Society of Wood Science and Technology. Curitiba, Brazil. March.

Laniga, Tamara J. and Moroney, Jillian L. 2014. "Wood To Wing: Stakeholder Perspectives on a Wood-Based Aviation Biofuels Industry in the Pacific Northwest." The Association of Collegiate Schools of Planning Annual Conference. Philadelphia, PA. October.

Moroney, Jillian L. 2014. "The Informed Stakeholder Assessment: Measuring the Social Acceptability of Biomass and Biofuels." NARA Annual Meeting. Seattle, WA. September.

Moroney, Jillian L. 2014. "Social Sustainability" (Panel Member). Northwest Advanced Renewables Alliance Annual Meeting. Seattle, WA. September.

Moroney, Jillian L. 2014 "Social Acceptability of Biomass and Biofuels." Northwest Wood-based Biofuels and Co-Products Conference. Seattle, WA. April.

Smith, P.M., K. Gagnon, I. Eastin, I. Ganguly. 2012. Stakeholder Perceptions. Presented at the Western Montana Corridor NARA Community Roadmap Development Meeting. University of Montana, Missoula, MT. 13 June.

## Posters

Moroney, Jillian L., and Tamara J. Laninga. 2015. "Communicating with Stakeholders: Addressing Concerns, Worries, and Knowledge Gaps." NARA Annual Meeting. Spokane, WA. September.

Moroney, Jillian L., Katie Gagnon, Tamara J. Laninga, Paul Smith, Michael Gaffney and Season Hoard. 2014. "Understanding Informed Stakeholder Perceptions: Assessment Criteria for Biomass-to-Biojet Supply Chain Siting." Washington State University's 2014 Academic Showcase. Pullman, WA. March.

Brooks, Randall, Jillian L. Moroney, Robert Keefe and Tamara J. Laninga. 2013. "Biomass Survey Assessment of Idaho Loggers." NARA Annual Meeting. Corvallis, OR. September.

Moroney, J., K. Gagnon, T. Laninga, P. Smith, M. Gaffney, and S. Hoard. 2013. Understanding Informed Stakeholder Perceptions: Assessment Criteria for Biomass-to-Biojet Supply Chain Siting. Poster presentation at the Year 2, NARA Annual Meeting, Corvallis, OR. Sept. 10.

Moroney, Jillian L., Katie Gagnon, Tamara J. Laninga, Paul Smith, Michael Gaffney and Season Hoard. 2013. "Understanding Informed Stakeholder Perceptions: Assessment Criteria for Biomass-to-Biojet Supply Chain Siting." Forest Products Society and Society of Wood Science and Technology's Combined International Convention. Austin, TX. June.

# NARA OUTCOMES

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The informed stakeholder assessment survey was a tool for increasing awareness about the Northwest Advanced Renewables Alliance (NARA) project specifically and about wood-based biofuels in general. Between January and December 2013, the survey was administered to a total of 868 stakeholders in Washington, Oregon, Idaho, and Montana. The stakeholders, categorized into 4 broad groups included those in the forest/paper industries, conservation/tribal interests, local interests, and state/federal government. For those who responded (n=298), 46% had not heard of NARA, or did not know if they had. Furthermore, 35% of those who responded knew “very little” or “nothing” about converting woody biomass into biofuels.

Additionally, findings from the survey identified communication methods respondents most preferred for receiving information about biofuels, and which issues are of concern or are not well understood. This information is available by stakeholder group, state, and region. Findings are being disseminated through the *Journal of Extension*, the *Western Planner*, *Energy Research and Social Science*, *Biomass and Bioenergy* and other peer-reviewed forums where professionals in extension, planning, community economic development, and other fields relevant to promoting the emerging bioenergy and biofuels industry will read and could apply them.

# FUTURE DEVELOPMENT

Further quantitative analysis of the NARA PNW regional survey is complete. This analysis examines how opinions about biofuel feedstocks and woody biomass use vary by stakeholder group and region and how worries and perceived benefits vary by stakeholder group and region. It also examines the relationship between a perceived higher level of knowledge and fewer concerns, more perceived benefits, and more support for a biofuels supply chain. This analysis, which is being written up for publication in *Biomass and Bioenergy*, will shed light on how stakeholder concern and perceived benefits affect levels of support for an emerging biofuels industry in the PNW.

Additional research, started in the last year of the NARA project, and which will continue with funding from the Bioenergy Alliance Network of the Rockies (BANR) project and other funding sources, is focused on more fine-grained assessment of community support or rejection of biofuels facility site locations. This work is a collaboration between the NARA Outreach team (R. Brooks, University of Idaho (U of I)), Education team (T. Laninga, Western Washington University (WWU)), and EPP team (S. Horde and M. Gaffney, Washington State University (WSU)).

Two research projects were initiated: 1) a county-level survey of stakeholders on the Olympic Peninsula, and 2) identification of case study communities to ground truth findings of the Community Asset Assessment Model (CAAM; see NARA Final Report “Biogeophysical and Social Assets” for information)

## Olympic Peninsula Survey

During NARA’s fifth year, 2015/2016, Moroney and Laninga collaborated with the Integrated Design Experience (IDX), part of the NARA Education team, and the NARA Outreach team to conduct a county-level stakeholder survey on the Olympic Peninsula. This work coincided with IDX work looking at the feasibility of siting a biofuels facility on the Olympic Peninsula.

Preliminary findings from the county-level stakeholder survey (n = 46) administered in Jefferson and Clallam counties on Washington’s Olympic Peninsula show that respondents in Clallam County are more supportive of a wood-to-biofuels industry, on a range of items, than those in Jefferson County (Figure SA-1.7). If all other requirements are equal, including access to biomass, infrastructure, and land availability, the level of stakeholder support would suggest Clallam, rather than Jefferson county, for siting a bioenergy or biorefinery facility. These preliminary results suggest a need for further research to examine the role that community support plays in the success of siting biofuels facilities.

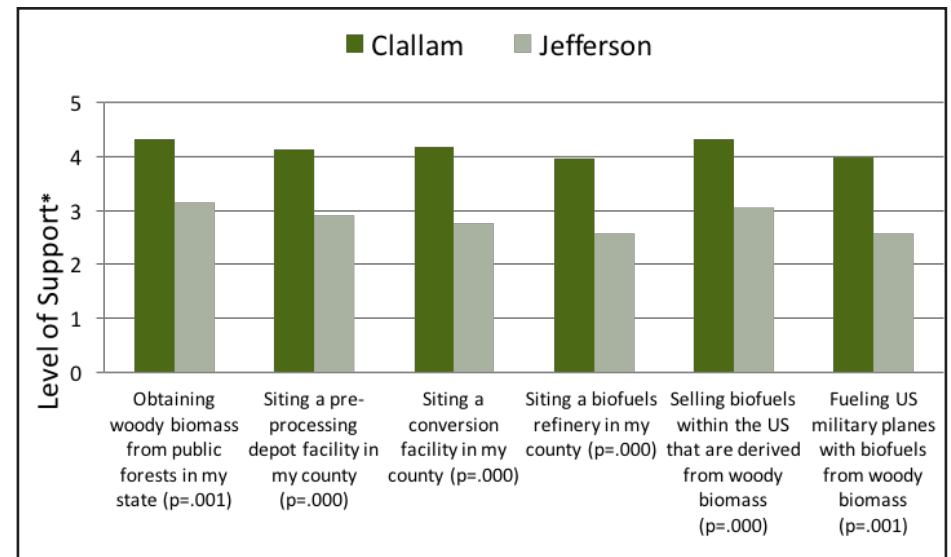


Figure SA-1.7. Survey results from Clallam and Jefferson county respondents (where 1 = strongly oppose and 5 = strongly support)

## Ground Truthing CAAM

During 2015/2016, researchers from the U of I, WWU, and WSU coordinated efforts to identify communities where bioenergy/biofuels facilities had been successful or rejected. Interviews will be conducted with key informants in several communities to examine the social factors, including human, social, cultural, and political capital that influenced the outcomes in the different communities. This research will ground-truth findings of the Community Asset Assessment Model (CAAM), further verifying the robustness of the model, which could be deployed nation-wide to assess siting potential for various bioenergy and biofuels facilities.