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**THE NEXT GENERATION OF LABOR IN RURAL, RESOURCE-RICH PLACES:
EDUCATION NEEDS AND YOUTH ASPIRATIONS**

By

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A DISSERTATION

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

(in Forest Resources)

The Graduate School

The University of Maine

May 2020

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**THE NEXT GENERATION OF LABOR IN RURAL, RESOURCE-RICH PLACES:
EDUCATION NEEDS AND YOUTH ASPIRATIONS**

By Nicole R. Bernsen

Dissertation Advisor: Dr. Mindy Crandall

An Abstract of the Dissertation Presented
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Philosophy
(in Forest Resources)
May 2020

A combination of youth out-migration and lack of in-migration have led to an aging workforce and population decline in resource-dependent communities, while simultaneously declines in pulp and paper demand and biomass utilization have had negative impacts on the perceived future of the once-dominant forest products industry. These changes may increase uncertainty as to the availability and training of the next generation of workers and rural community residents. While many studies have explored the effects that these changes have on adult populations, little attention has been paid to how local labor markets and perceptions of future opportunities influence the next generation of workers, entrepreneurs, and community leaders. This research illuminates the relationships between employer educational needs, community characteristics, current student skills, and young people's aspirations in traditionally forest-dependent communities through the delivery of surveys to middle and high school students, college students, and forestry employers in northern Maine and coastal Oregon. Possible education gaps between employers and current students were assessed in soft skills, knowledge skills, technical skills, and work culture domains. To further our understanding of rural youth educational and residential aspirations, the potential impact of the educational system, local economy, and community were investigated.

DEDICATION

To my partner who has supported me, pushed me, cooked for me, and made me laugh since the day we met. We are a team. You never let me quit, even when I want to; I will return the favor.

To my family who love me unconditionally and always believe in me. Thank you for helping me become a smart, strong, and confident woman.

To my dear friends, you know how much you mean to me. You are part of my family and I do not need to say more.

To my players and students who have brought me more joy, satisfaction, and fulfillment than I could ever try to put into words.

To my amazing teachers from whom I have learned so much from. You serve as continual inspiration, thank you.

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My advisor, Dr. Mindy Crandall, thank you for your vision, leadership, advice and constant support. I consider myself lucky to have had the greatest advisor at UMaine. I have gained an inspiration, mentor, and friend.

My committee, Drs. Jessica Leahy, Jesse Abrams, Cat Biddle, and Chris Colocousis, thank you for your thoughtful insights, flexibility, and continued support.

My community partners, for whom this research serves and would not be possible without. Dawna Blackstone, thank you for your collaboration and outreach in Maine. Alexa Carleton, thank you for your immense outreach and organization in Oregon. Professional Logging Contractors of Maine, Forest Resources Association Northeast Region, Northern Forest Products Industry Cluster, Maine Career and Technical Education, Appalachian Mountain Club, Coos Watershed Association, University of Maine Cooperative Extension, Ecosystem Workforce Program at University of Oregon, Helping Hands with Heart, Piscataquis County Economic Development Council, Piscataquis Chamber of Commerce, Rural Aspirations Project, and Oregon State University Extension Service, thank you for your collaboration and support.

My undergraduate research assistants, it has been a pleasure collaborating with you. Angelina Buzzelli, thank you for your creative work on marketing and social media. Liz Capodilupo, thank you for your attention to detail and creativity in summarizing the data.

My funders, USDA Agricultural Research Service, USDA National Institute of Food and Agriculture, McIntire-Stennis, Maine Agricultural and Forest Experiment Station, and University of Maine System Research Reinvestment Fund, thank you for the resources to conduct and share this research while keeping me housed, fed, and insured.

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1. INTRODUCTION

Declining populations in many rural communities, often due to out-migration of young families, have forced communities to grapple with the potential loss of key community institutions like public schools that require a sustainable population level (Lyson 2002). Limited investment in human capital can suppress economic development in areas with changing economies (Domina 2006, Stockdale 2006, Martin and Sunley 2008, Olfert and Partridge 2010). The persistence of forest-based communities is essential to the future of rural economies (Nechodom et al. 2008). Healthy forests provide a multitude of ecosystem services including timber products, recreation opportunities, and cultural values. Sustaining the communities adjacent to forests supports rural and state economic development. This interdisciplinary social science research seeks to inform decision making and policy through investigation of students from middle school through post-secondary education institutions in order to inform and enhance rural communities by retaining and recruiting youth as the future labor supply.

Workforce Assessment

The forest products industry in Maine has faced many challenges as an industry in transition. Declines in demand and product utilization have had effects that ripple throughout the entire field of forestry and forest management. This has affected the financial feasibility of the timber supply chain and has led to numerous mill closures (Figure 1). Compounding economic challenges is an aging or aged population and workforce in Maine. There is a real need to identify what skills are needed in the industry,

what skills youth are seeking to develop or perceive as valuable, and what potential exists to better connect and match labor supply with labor demand in the forest industry.

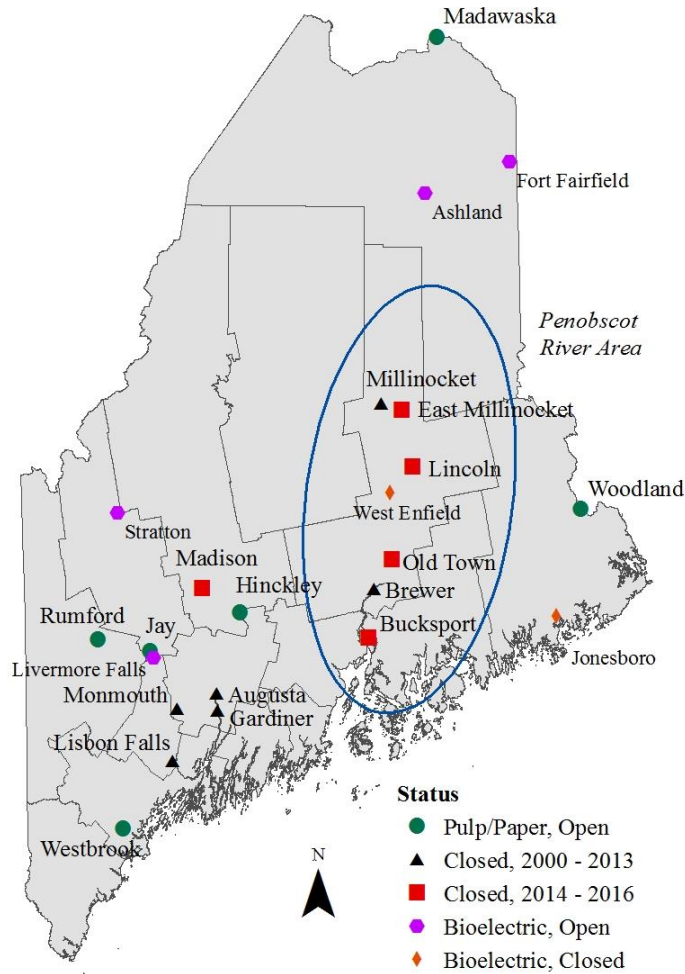


Figure 1. Map of Maine mills and closure status. Adapted from Crandall, Anderson, and Rubin (2017).

The goal of the first chapter of this dissertation was to investigate and make comparisons among three groups related to forestry and forest products: current students, early career professionals, and employers (Figure 2). This substantially broadens the scope of previous forest industry workforce assessments by incorporating student responses, categorizations

of skills and knowledge fields, investigation of work culture elements, and use of a gap analysis. Unfortunately, due to restrictions related to contacting alumni we were unable to reach out to graduates who were early career professionals. However, this study is the first of its kind to include comparisons between employers (labor demand) and current students (future labor supply).

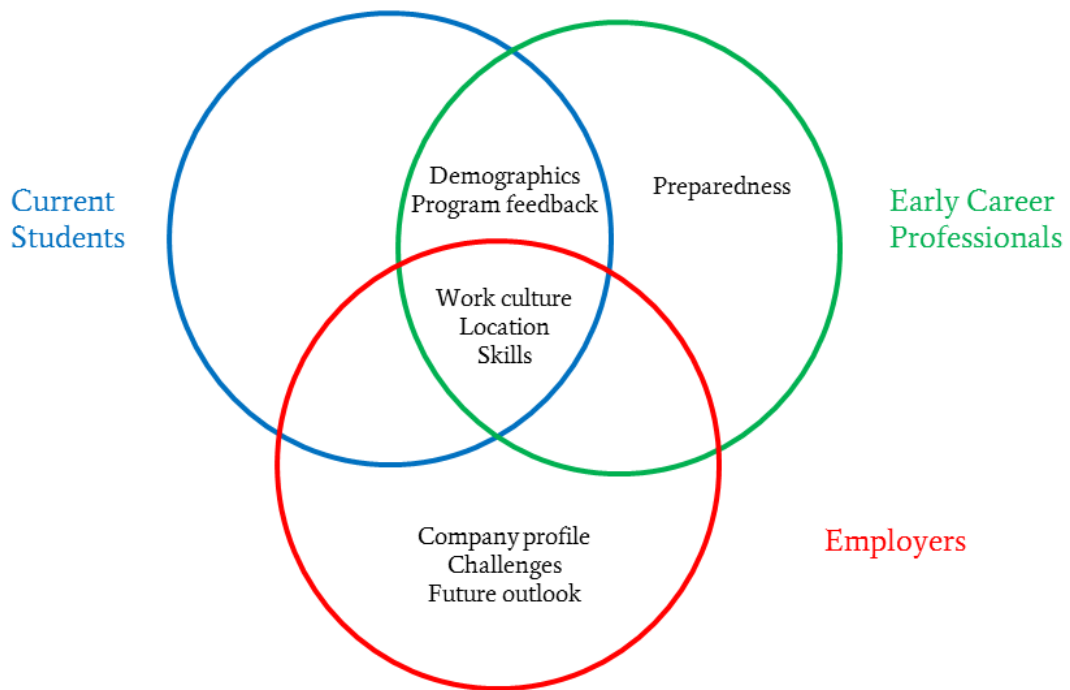


Figure 2. Venn diagram of question overlaps among desired participant groups.

Student respondents were enrolled in one of four forestry-related programs at Career and Technical Education high schools or two Society of American Foresters-accredited university programs (Figure 3). We had hoped to include students from a new logger training program at three community colleges, but the program start date was delayed and not included in this study.

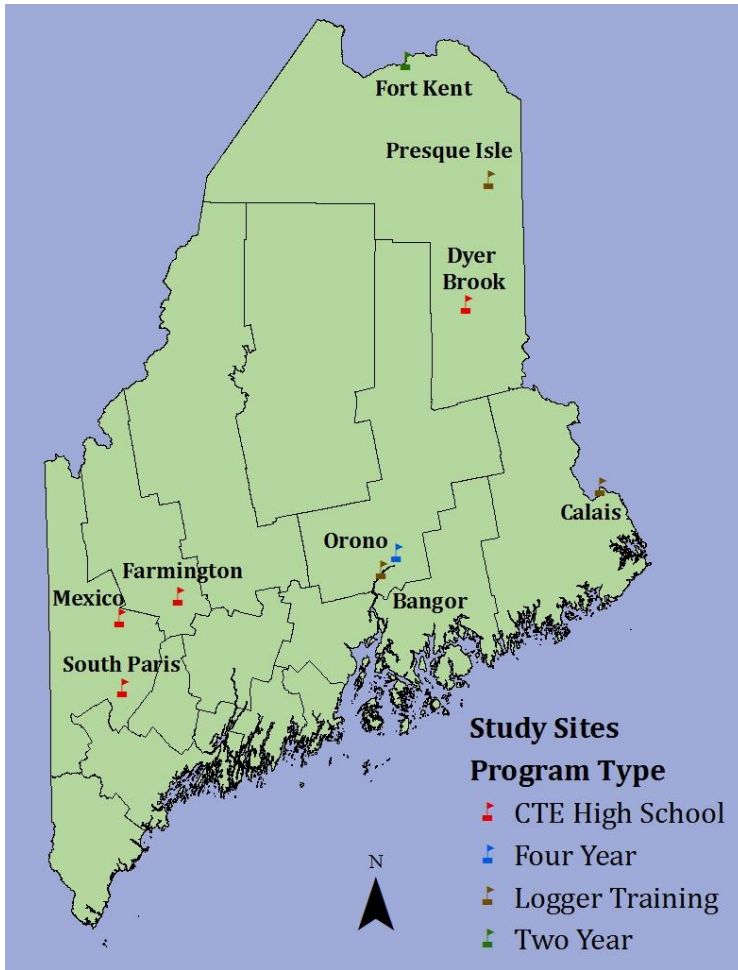


Figure 3. Map of Maine forestry-related educational programs.

Rural Youth Futures

Many rural communities struggle to promote development that is sustainable and preserves the forest and quality of life associated with it which can serve as an incentive for residents to remain nearby. Rural youth in particular often question the value of staying in their communities after high school. Chapters two and three of this dissertation center on investigating relationships among schools, communities, and the local economy with youth aspirations. Our conceptual model (Figure 4) illustrates how social, educational, economic influences influence youth aspirations. These influences are often institutionalized and are more solid, therefore represented by the square shaping. We illustrate social influence are

comprised of both those of families and then broader communities in which rural youth live. As publically funded institutions, educational structures are nested within the greater economic context. The arrows illustrate the interconnectedness of these spheres and the varying degrees of influence they may have on the development of youth aspirations for the future. These aspirations shown in a cloud-like form as they are still being developed by youth and are not actual attainment. It is our hope that the findings of this research will support improvements educational and training programming that better meets the needs of rural.

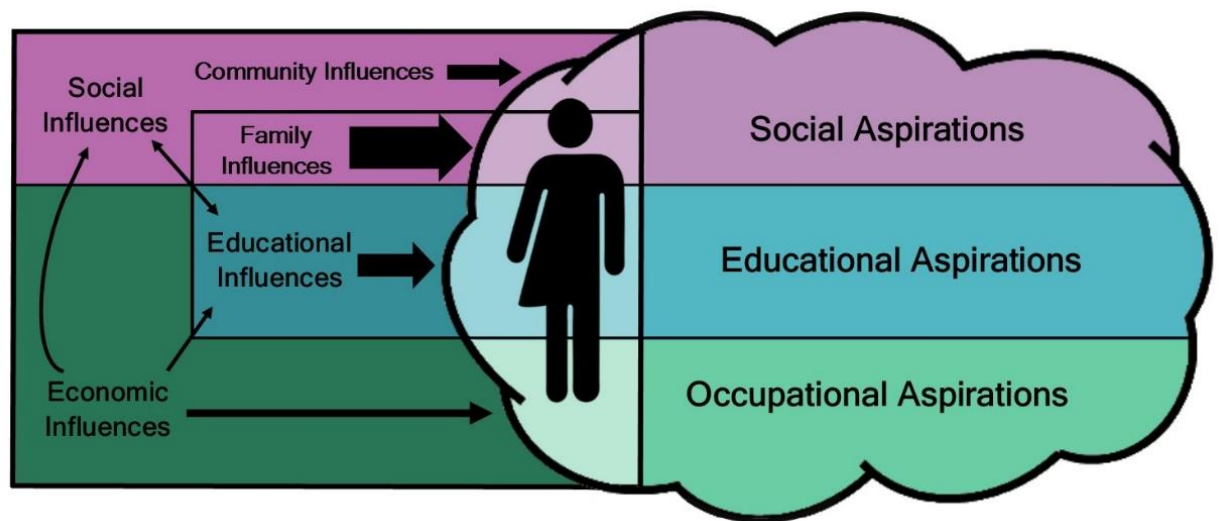


Figure 4. Conceptual Model

Our survey developed from the conceptual model where questions, often more than one, were used to measure each concept (Figure 5). This created a framework to guide the analysis. Our project utilized stakeholder involvement and community engagement through two steering committees. In Maine and Oregon steering committees provided direction and feedback on development of our survey. The survey was targeted for distribution to all middle and high schools in Piscataquis County, Maine and Coos County,

Oregon (Table 1). This feedback between stakeholders and the research team was a critical piece of the project that will increase practical applicability of our results.

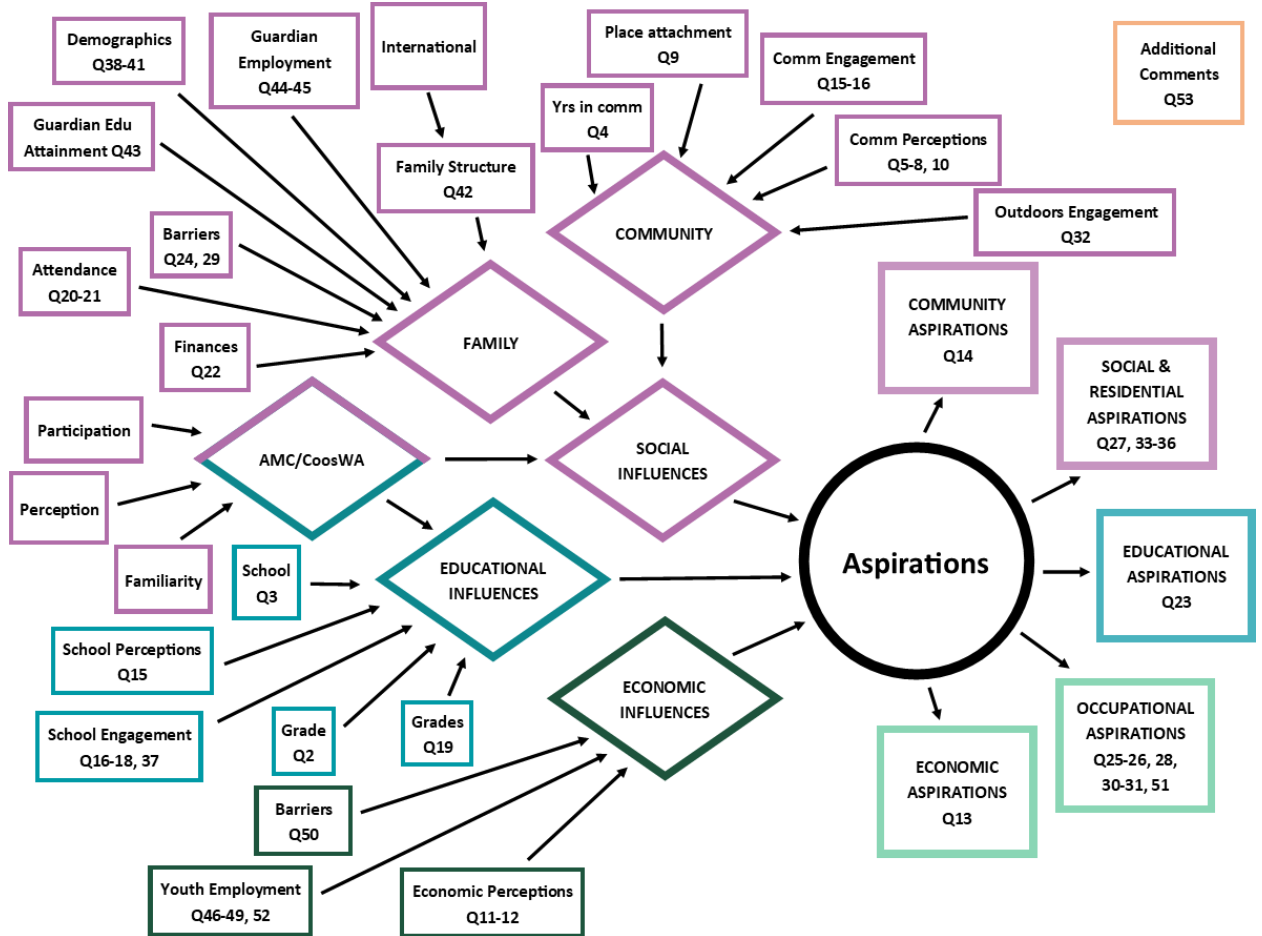


Figure 5. Survey Conceptual Model.

Table 1. Table of participating schools.

School	Grade Levels	Survey Date	Students Surveyed	Total Enrolled	% Surveyed
<i>Coos County, Oregon Schools</i>					
Alternative Youth Activities	9th - 12th	04/29/19	14	30	47%
Bandon High School	9th - 12th	01/18/19	160	215	74%
Coquille Jr/Sr High School	7th - 12th	02/13/19	311	350	89%
Marshfield High School	8th - 12th	04/15/19	400	1,000	40%
Myrtle Point Jr/Sr High School	7th - 12th	03/15/19	106	215	49%
North Bend High School	9th - 12th	05/07/19	260	772	34%
Powers Jr/Sr High School	7th - 12th	02/13/19	27	50	54%
Winter Lakes High School	6th - 12th	03/14/19	68	300	23%
<i>Piscataquis County Area, Maine Schools</i>					
Forest Hills Consolidated	6th - 12th	05/03/19	62	68	91%
Greenville Consolidated School	6th - 12th	02/06/19	94	106	88%
Penquis Valley School	6th - 12th	02/08/19	103	130	79%
Piscataquis Community School	9th - 12th	02/01/19	120	120	100%
SeDoMoCha Middle School	6th - 8th	02/01/19	199	242	82%

2. AN EDUCATIONAL NEEDS ASSESSMENT OF WORKFORCE SUPPLY AND READINESS IN MAINE’S FOREST PRODUCTS INDUSTRY¹

Abstract

A combination of youth out-migration and lack of in-migration have led to an aging workforce and population decline in Maine, while simultaneously declines in pulp and paper demand and biomass utilization have had negative impacts on the perceived future of the once-dominant forest products industry. These changes may increase uncertainty among employers as to the availability and training of the next generation of forest industry workers. This study reports our findings from an analysis of workforce supply and readiness in Maine’s forest products industry. To estimate possible gaps in skills and work culture, we administered a survey to current forestry students and employers in the forest products industry. Skills were assessed in three domains: soft skills, knowledge skills, and technical skills. Our gap analysis focused on the difference between the stated importance of skills to employers and the current level of skill knowledge in the workforce across all three domains. Employers identified dealing with change, motivating personnel, negotiating contracts, problem solving, and financial analysis as the top educational needs. In addition, we assessed the willingness of students to accept the culture of work within the forest products industry. Despite the anecdotes shared by employers, we did not find significant evidence of a work culture mismatch between current students and their

¹ This chapter has been accepted for publication in the *Forest Products Journal* and is formatted as such. The article will be included in the first issue released in 2020.

potential future employers. We recommend gaps related to regulations, certification standards, or log scaling could be addressed through workshops or on-the-job training while areas such as customer relations, marketing, or problem solving could be emphasized in academic curriculum.

Acknowledgements

This project was funded by the U.S. Department of Agriculture's Agricultural Research Service (USDA ARS Agreement No. 58-0202-4-003) and supported by the USDA National Institute of Food and Agriculture, McIntire-Stennis project number #ME0-41702 through the Maine Agricultural & Forest Experiment Station. The authors thank Dr. Eric Hansen of Oregon State University for sharing previous questionnaires used in other states and the Forest Products Journal's anonymous reviewers for their suggestions. Maine Agricultural and Forest Experiment Station Publication Number 3692.

Introduction

The forest products industry in the United States has been in a state of transition since the 1990s due to multiple factors, including global trade, shifts in demand, technological changes, and changing ownership structures (Woodall 2011). These industry adjustments are highly visible in Maine where the shift in private land ownership structures from vertically-integrated companies to timber investment management organizations (TIMOs) and real estate investment trusts (REITs) has transformed forest production and management (Jin and Sader 2006, Bliss et al. 2010). Furthermore, changes in pulp and paper markets have led to substantial mill closures. In the eight years between 2008-2016,

ten mills closed in Maine, half of which were along the Penobscot River which runs through the heart of the state (Lustig 2016).

Although the forest products industry has been impacted by these changes, Maine remains poised to support a thriving forest-based economy. Comprised of 17 million acres of land, forest covers 89% of the state (Butler 2018). Maine's forest products industry generated \$8.5 billion in sales and supported 33,538 jobs directly and indirectly in 2016 (Crandall et al. 2017). With 90% of forests privately owned and over half independently certified to sustainability standards, Maine has ample supply and close proximity to the eastern seaboard, one of the largest consumer demand markets in the world (FOR/Maine 2018). Recent upgrades and investments by Nine Dragons, Pleasant River Lumber, Sappi, and Verso have revitalized remaining mills and the historical legacy of the industry in the state, both pulp and paper and sawmilling, presents numerous opportunities for infrastructure re-use and co-location across the state. Maine has great potential as a location of emerging and advanced wood materials such as biofuels or nano-materials (FOR/Maine 2018, MCBER 2019).

These changes in product demand in forest industries have resulted in shifting employment opportunities. These shifts are both technological and geographic; technological changes may shift the skills needed in labor supply, while the concentration of mills lost in specific regions of the state (e.g., the loss of pulp and paper production in central Maine) may lead to geographic shifts in labor demand. These forces may result in a skills mismatch between what is needed in the workforce and what potential employees possess, or a spatial

mismatch between the current supply and demand for industry labor. These mismatches may be exacerbated in areas with a higher concentration of older workers, as in northern and central Maine, due to population stagnation and youth outmigration that leaves the state with an aging workforce (Vail 2019). Maine has the highest percentage of baby boomers of any U.S. state and young people continue to migrate out of state (GOPM 2016). With limited population growth as an economic driver, the state and the forest products industry need to ensure efficient allocation of labor, along with attracting younger workers and out-of-state skilled labor to join or stay in the workforce. This task is made more complicated by the recent shifts impacting the industry. In addition to Maine having one of the highest rates of economic contributions of the forest products industry in the country at 4.96% of Gross State Product (Crandall et al. 2017), it also exemplifies the challenges currently facing employers in the forest products industry nationally. This backdrop of shifting global demands and technologies, changing demographics, and the high spatial concentration of closures some areas are experiencing has led to complications in finding an equilibrium between workforce supply and demand.

In states with substantial forest products industries, researchers have used questionnaires to assess how well workforce skills match industry needs. The assessments can help guide both education and training programs by identifying current gaps between industry need and worker readiness. Previous workforce assessments have been conducted in Oregon, Virginia, Louisiana, Alaska, and Minnesota (Hansen and Smith 1997, Vlosky and Chance 2001, Thomas et al. 2005, Reeb et al. 2009, Espinoza et al. 2012), but not in Maine to our knowledge. Additionally, past studies have focused solely on labor demand responses from

employers, and have not considered student self-assessment of skills, nor looked at potential new areas of mismatch such as work culture. Stakeholders in Maine have expressed concern that gaps in work culture expectations may be a source of disconnect between labor supply and demand.

This study establishes a baseline of information on workforce needs and skills for Maine at a time of significant challenges and adds to the body of work on workforce assessments in the forest products industry by expanding the scope of the assessment. Rather than relying exclusively on industry needs, we incorporated forestry student responses in the analysis, categorized skills into domains, and added a section to assess work culture expectations for both employers and future employees. This study includes the following objectives: (1) evaluate the educational needs of the forest products industry in Maine, (2) identify gaps in soft skills, knowledge skills, and technical skills between labor supply and demand, (3) identify gaps in work culture between labor supply and demand, and (4) develop recommendations that will reduce mismatches among the forest products industry labor supply and demand.

Methods

Sampling

A questionnaire, similar to those assessing the needs of Oregon's forest products industry in 1995 and 2007 (Hansen and Smith 1997, Thomas et al. 2005) as well as Minnesota's forest products industry in 1997 (Bowe et al. 1999), was developed and administered in collaboration with industry partners from March to May of 2017. Distribution of paper

questionnaires took place at industry meetings and an electronic version created using Qualtrics software was shared through email lists. Organizations aiding in questionnaire distribution included the Maine Forest Products Council, Professional Logging Contractors of Maine, Forest Resources Association - Northeast, and Northern Forest Products Industry Cluster. To collect data from future employees, the electronic version of the questionnaire was also distributed in May 2017 to students 18 years of age and over in forestry-related education programs at multiple levels in Maine: four regional Career and Technical Education (CTE) high schools that have forestry or logging programs (Dyer Brook, Farmington, Mexico, and South Paris), the University of Maine at Fort Kent which offers a Society of American Foresters (SAF)-accredited associate's degree in applied forest management, and the University of Maine, which offers SAF-accredited bachelor's and master's degrees in forestry and a bachelor's in forest operations, bioproducts and bioenergy. The student version of the questionnaire mirrored the employer version.

The employer questionnaire was emailed to 925 individuals and paper versions were distributed to 100 people in-person regional meetings. We received a total of 177 responses for an employer response rate of 17%. The email distribution lists for this study included members spanning the entire northeast region. We anticipate our low response rate is due to many recipients operating outside of Maine's forest products industry. However, our response rate is comparable to that of Reeb et al. (2009) and our total number of respondents is consistent with previous workforce assessments (Brown & Niemiec 1997, Vlosky and Chance 2001, Thomas et al. 2005, and Espinoza et al. 2012). All student responses were collected electronically. High school students completed the questionnaire

at the annual Career and Technical Education Loggers' Meet while university students received the survey link via email from an instructor. We received responses from 35 of the 66 students invited to participate for a student response rate of 53%.

Questionnaire design

This questionnaire was based on the discrepancy method initiated by Borich (1980), later used by Bratkovich and Miller (1993), and advanced by Hansen and Smith (1997), establishing it as the standard method for measuring educational needs in the forest products industry. Forest products industry professionals were asked to rate, on a Likert scale of 1 to 5 where 1 is low and 5 is high, both the importance to their company and the current employee knowledge of various skills. From these scores, employer educational need was calculated as:

$$\text{Educational Need} = (\text{Importance Rating} - \text{Knowledge Rating}) \times \text{Mean Importance Rating}$$

Students were asked to rate, using the same scales and skill lists, how important each skill was to the forest products industry, and their current level of knowledge for each skill.

The 34 skills were grouped into three major domains: soft skills, knowledge skills, and technical skills. In addition, we explored five aspects of work culture relevant to the forest products industry that stakeholders felt might be an emerging area of mismatch between potential employees and employers: living remotely in the field, required extended absences from home, working in areas without cell phone coverage, living without internet, and working non-traditional hours (defined here as outside of 7am-6pm).

Data Analysis

Employer educational need was calculated for each of the skills using the previously described equation. To understand potential mismatches between employers and potential employees, a gap analysis assessed the difference between the stated importance to employers and stated student knowledge of skills or acceptance of work culture using an independent sample t-test with a p-value of 0.05. Analysis was conducted using IBM SPSS Statistics 25 software.

Results

Demographics

Employer respondents (n=177) were primarily from the logging and trucking industry (24%) followed by pulp and paper (18%), and softwood lumber (17%). The firm size of respondents was dominated by large companies with over 50 employees (46%). The next largest groups of respondents were from firms with less than 10 employees (27%) and 20-50 employees (23%) with just 4% of respondents employed at companies with 10-19 employees. Middle managers made up 35% of respondents followed closely by owners (32%) and upper management (21%); 5% of respondents identified as entry-level, and 7% other. The number of years respondents had worked for their current employer ranged from 1 to 40 with an average of 17 years.

Student respondents (n=35) were comprised of 47% from Maine and 41% from the remainder of the Northeast United States; 12% did not indicate their home state. Ninety-six percent of student respondents plan to look for a job in the forest products industry now

or in the future, demonstrating a high level of attachment to the industry. Students articulated a strong desire to remain in the state following completion of their educational programs. When asked why they chose to pursue a forest resources education one student respondent stated, “My love of the outdoors drove me to this education and learning about forests has kept me here.” Another student wrote, “I grew up in Maine and would like to be a part of keeping Maine's forests healthy.”

Educational Needs of the Maine Forest Products Industry

Based on employer-rated level of importance and current employee knowledge of 34 skills, we calculated the Maine forest products industry educational needs (Table 2). Of the three skill domains measured, employers ranked soft skills among the highest educational need, followed by knowledge areas. Technical skills dominated the bottom of the list in terms of ranking of employer needs. The top five skills with the highest educational need as indicated by employers were dealing with change, motivating personnel, negotiating contracts, problem solving, and financial analysis.

Table 2. Ranked mean educational need of 34 subject areas.

Skill	Educational Need	Domain	Rank
Dealing with change	4.71	Soft Skills	1
Motivating personnel	4.33	Soft Skills	2
Negotiating contracts	3.93	Soft Skills	3
Problem solving	3.52	Soft Skills	4
Financial analysis	3.46	Technical Skills	5
Customer relations	3.17	Soft Skills	6
Marketing	2.96	Knowledge	7
Presentation and public communication	2.88	Soft Skills	8
Public relations	2.55	Soft Skills	9
Finding market information	2.45	Knowledge	10
Product pricing and distribution	2.16	Knowledge	11
Inventory, quality, and process control	2.09	Knowledge	12
GIS/mapping	2.07	Technical Skills	13
Sales	2.06	Soft Skills	14
Safety	1.98	Knowledge	15
Regulations	1.97	Knowledge	16
Remote sensing/LiDAR	1.78	Technical Skills	17
Using growth and yield models	1.78	Technical Skills	18
Developing business plans	1.60	Knowledge	19
Office programs	1.52	Technical Skills	20
Technical writing	1.50	Technical Skills	21
Log scaling and tree quality	1.42	Technical Skills	22
Wood properties and quality	1.37	Knowledge	23
Promotion	1.35	Soft Skills	24
New product development	1.32	Technical Skills	25
Certification standards	1.27	Knowledge	26
Creating harvest plans/silviculture	0.46	Technical Skills	27
Implementing harvest plans/silviculture	0.45	Technical Skills	28
Harvesting equipment operation	0.44	Technical Skills	29
CAD/CAM/CNC ^b	0.30	Technical Skills	30
Sawing technology	0.16	Technical Skills	31
Recreation use management	0.13	Soft Skills	32
Lumber grading	-0.04	Technical Skills	33
Treefelling	-0.74	Technical Skills	34

Gap Analysis of Skills and Knowledge

In examining potential gaps between the stated importance to employers and student's self-assessment of current knowledge, 15 of the 34 skills (44%) were found to have no gap between employer importance and student knowledge, or were ranked lower by employers than students (Table 3). Just over a half of the skills assessed, 19 or 56%, showed a significant gap between employer need and student competence with 16 having medium (> 0.5) or large (> 0.8) effect sizes. Mismatched skills were found primarily among the soft skill and knowledge domains. However, of these 19 mismatch skills (Table 4), students only indicated an average knowledge level of less than 3 on a 5-point scale for 8 of the skills: sales, promotion, negotiating contracts, customer relations, finding market information, marketing, product pricing, and financial analysis. For the remaining 10 mismatched skills, the mean student response was above 3, which was interpreted as indicative of an emerging skill or knowledge.

Table 3. Skill gap analysis of 34 skills using independent sample t-tests.

Domaine	Skill	Mean Employer Importance	Mean Student Knowledge	Mean Difference		Effect Size
Soft Skills	Negotiating contracts	4.28	2.44	1.839	***	1.78
	Customer relations	4.32	2.97	1.354	***	1.37
	Sales	3.70	2.71	0.991	***	0.86
	Promotion	3.22	2.53	0.691	***	0.65
	Problem solving	4.65	3.97	0.680	***	0.87
	Motivating personnel	4.22	3.56	0.662	**	0.65
	Recreation use management	2.80	3.48	0.686	**	0.59
	Dealing with change	4.38	3.85	0.535	*	0.53
	Public relations	4.07	3.82	0.247		0.24
	Presenting	3.84	3.74	0.101		0.10
Knowledge	Marketing	3.86	2.30	1.556	***	1.34
	Finding market information	4.13	2.61	1.528	***	0.01
	Regulations	4.54	3.21	1.326	***	1.50
	Product pricing and distribution	3.71	2.67	1.042	***	0.87
	Inventory and quality control	3.89	3.03	0.863	***	0.72
	Certification standards	3.92	3.12	0.801	***	0.73
	Wood properties and quality	3.96	3.45	0.509	*	0.46
	Developing business plans	3.35	3.09	0.263		0.22
	Safety	4.62	4.38	0.249		0.30
	Technical Skills	Creating harvest plans	4.07	3.61	0.460	*
Financial analysis		4.08	2.73	1.351	***	1.17
Implementing harvest plans		4.07	3.21	0.860	***	0.67
Log scaling and tree quality		3.97	3.33	0.635	***	0.55
Office programs		3.87	3.42	0.442		0.39
GIS/mapping		3.91	3.48	0.429		0.36
Using growth and yield models		3.28	2.94	0.338		0.25
Technical writing		3.57	3.27	0.293		0.24
Remote sensing/LiDAR		3.00	2.75	0.250		0.19
New product development		2.88	2.70	0.182		0.14
CAD/CAM/CNC		2.14	2.18	0.042		0.03
Lumber grading		2.63	2.88	0.248		0.19
Harvesting equipment operation		3.21	3.52	0.303		0.21
Sawing technology		2.31	2.85	0.537		0.37
Treefelling	2.63	3.97	-1.339		0.97	

*p<0.05, **p<0.01, ***p<0.001

Table 4. Mismatched skills from a gap analysis using independent sample t-tests comparing the stated importance of 34 skills.

Domain	Emerging student knowledge (mean response > 3)	Limited student knowledge (mean response < 3)
Soft Skills	Problem solving Motivating personnel Dealing with change	Negotiating contracts Customer relations Sales Promotion
Knowledge	Regulations Inventory and quality control Certification standards Wood properties and quality	Marketing Finding market information Product pricing and distribution
Technical Skills	Creating harvest plans Implementing harvest plans Log scaling and tree quality	Financial analysis

Gap Analysis of Work Culture

Despite perceptions that younger generations are less willing to accept conditions required in many natural resource jobs, we did not find evidence of a work culture mismatch in our gap analysis (Figure 6). In fact, students indicated an overall high willingness to accept characteristics of forestry-related work culture we assessed, while many of the “traditional” features of woods or forest products industry work were rated as low in importance by employers, including extended absences from home, living remotely, and living without internet. There was no statistical difference between employer importance and student acceptability responses to working in areas without cell phone coverage.

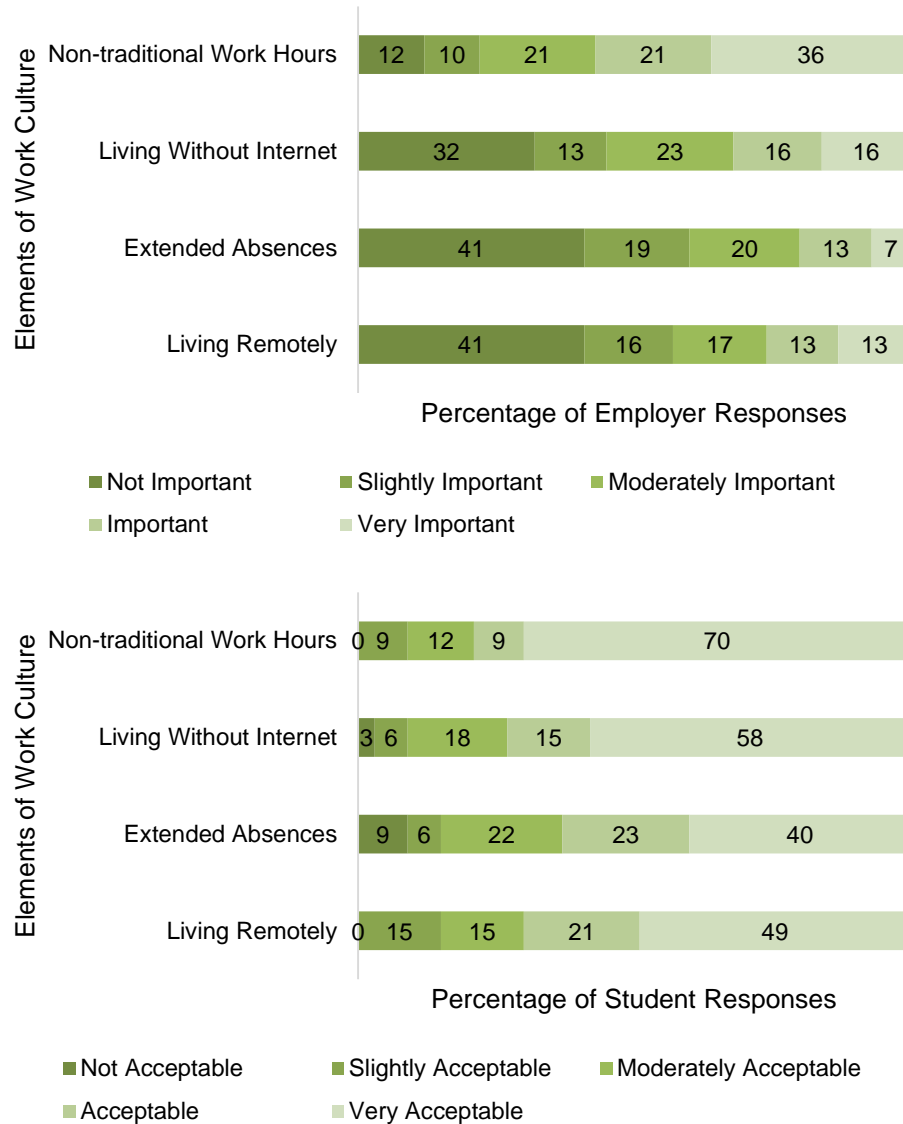


Figure 6. Comparison of work culture elements stated importance to forest products industry employers and acceptability to forestry students in Maine.

Discussion

The forest industry across the country is struggling with an aging workforce and difficulties filling jobs and attracting young workers (MCBER 2019); Maine is not unique in experiencing this. While previous workforce assessment of the forest products industry identified high educational needs in specific forestry-related technical skills in Oregon, Alaska, and Virginia (Thomas et al. 2005, Reeb et al. 2009, Espinoza et al. 2012), our

results indicated that soft skills and knowledge domains dominate the highest areas of educational need as indicated by employers. This may indicate that natural-resource based fields have become less specialized than in the past, that Maine's industry has fewer specific needs for particular technological skills than other states, or that forestry-related programs are successfully equipping students with the appropriate technical skills needed in the field. One student respondent wrote the most useful aspect of their program was "all of the knowledge geared towards the industry, networking, [and] internship opportunities."

While a little more than half of the 34 skills assessed in the gap analysis that were found to have mismatches, students already have an emerging knowledge base (rated a three or higher for mean knowledge level) in 10 of the skills. We suggest that these gaps between worker level of knowledge and employer need may be closed through formal or informal training. For example, skill development in regulations, certification standards, or log scaling could be broadened through participation in workshops or targeted on-the-job training specifically addressing these important (and changing) topics. The most pressing areas for focus among educational institutions are those in which students rated below 3 for mean knowledge level and employers rated as a high importance. These are areas where the future labor supply may be least prepared to meet the needs of employers in the forest products industry. Bolstering coursework to include additional aspects of customer relations, marketing, or financial analysis could strengthen the skillsets of students and improve their readiness to enter the labor market. Determining how to offer these types of skills in a hands-on way is likely to be welcomed by students. One student respondent

indicated the least favorite aspect of their program was “classes that should have a lab not having one.”

Perceptions that youth are unwilling to accept conditions traditionally associated with forest-related jobs were not supported by this study. This, in combination with the surprising lack of importance placed on traditional work conditions by employers, refutes the idea expressed by stakeholders that a work culture mismatch may be driving some of the difficulty in attracting and retaining labor in the industry. On the contrary, conditions associated with the forest products industry appear to be attracting students. A student respondent stated their favorite aspect of their program was “working outside and being able to see first-hand accounts from professionals in the industry.” Another student wrote the most useful aspect of their program was “the hands on experience, being able to have multiple classes out in the field.”

Although many resource-dependent counties are experiencing population decline, our student respondents indicated a high level of acceptance to live in remote, forested places. Additionally, students had a high level of acceptability of living in areas without cell phone coverage--which perhaps is not surprising since large swaths of Maine are not generally covered by wireless providers. Connecting young workers to the rural places where much forest industry work takes place could have a cascading series of benefits. The pool of potential new in-migrants could be a boom to many communities struggling with population decline. They could also provide a continuity of labor that is needed in the industry, and the skills needed to adapt to a possible future industry that incorporates new

technologies or processes. Sense of community is a draw for young workers as one student respondent wrote their favorite aspect of their program was “the community - if something isn't going well, somebody will notice and help you out. On the flip side, if you're struggling, you can find help easily by asking almost anyone.”

Although our assessment was targeted towards the skills and workforce within the forest products industry, one interesting finding was the consistent importance of soft skills not specific to forestry or forest products manufacturing, such as dealing with change or problem solving. Developing these soft skills in current students and young workers would have the benefit of better meeting the needs of the current industry, while also increasing competencies that would serve students well in the broader economy that is dynamic and susceptible to change. These skills, some of which reach beyond the scope of the forest products industry, could also be utilized in other sectors, leading to more resilient populations and economies in rural communities.

Limitations and Future Research

Overall, our results provide both some refutation and some confirmation of the difficulties of matching labor supply to labor demand in resource-dependent industries, particularly those in remote or rural areas or places with declining population. However, the findings of this study should be considered in light of some limitations. Our low response rate may be explained by the fact that we distributed our questionnaire through professional organizations with a broad geographical reach. We likely encountered recipients beyond our target population of Maine's forest products industry. The second limitation is our analysis of high school and college students as a single population. Though the high school

programs are certified as CTE and designed to prepare students for the workforce similar to college coursework, schools would garner more insight to their specific population needs if analyzed uniquely. Unfortunately, this may not be statistically possible due to the low numbers of high school students enrolled in forestry-related programs. Third, these data are limited in that the information is self-reported by employers and students and based on their perceptions rather than observation, testing, or other means of assessing proficiency. Finally, one potential source of the difficulty in linking young workers with the forest industry might not be with mismatches in skills and expectations of current students but rather that the pool is too small. It may be that not enough students are entering the forestry education pipeline. Students appear aware of this anomaly as well. One student respondent wrote they are pursuing a career in forest resources “to make a difference in a field of work that is interesting and seems to be declining in interest.” Our assessment focused on current forestry students, who have to some extent self-selected into the field. While enrollment in the forestry program at the University of Maine steadily increased from 2009 to 2016, it is possible that we are missing the perspectives of students not attracted to the industry, and that the total number of students is still inadequate to meet current labor demand.

Our study has established a baseline for workforce needs and skills in Maine. While our results are somewhat different than previous assessments in other states in finding more gaps in soft skills than technical skills, they also point to areas where educational programs can improve the workforce readiness of current forestry students. We did not find evidence of a work culture mismatch, a concern of many stakeholders. This study lays the ground work for future development of the gap analysis and investigation into other potential

sources of mismatch, such as work culture, and continuing assessment of the success of the industry at efficiently matching labor supply and demand in a changing world.

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3. COMMUNITY INFLUENCES ON YOUTH EDUCATIONAL ASPIRATIONS IN RURAL, RESOURCE-RICH AREAS²

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Introduction

In rural communities, schools often serve as the epicenter of local activity. While these public schools are mandated and funded by the state and federal governments, school boards are locally elected and operate within the bounds of rural communities, fostering

² This chapter has been accepted as a potential article in a forthcoming special issue of the *Russell Sage Foundation Journal* titled “Growing Up in Rural America: How Place Shapes Education, Health, Family, and Economic Outcomes”, and is formatted as such. The issue has a tentative release date of Spring 2021.

identity, purpose and engagement (Bauch 2001, Schafft and Jackson 2010, Schafft and Biddle 2013, Schafft 2016). In the United States, 24% of students (12.4 million) attend rural public schools while 32,000 schools (32%) and 57% of school districts are considered rural (Aud et al. 2013). However, rural students are isolated geographically, with scarce rural opportunities for post-secondary educational, higher rates of poverty, and constricted employment opportunities (Byun et al. 2012). Despite these substantial numbers of rural students and the limited opportunities they face, “educational research and training focused on the people and places at the spatial peripheries remains very much at the scholarly and disciplinary peripheries as well” (Schafft 2016 p. 138).

Many rural places in the U.S. are characterized by a cultural and economic reliance on natural resources. Past research of rural youth has primarily focused on agricultural communities, often in the nation’s “bread basket” (Kirkpatrick Johnson et al. 2005, Carr and Kefalas 2009). While studies have explored the relationship between labor market outcomes among adults in forest-dependent communities, little attention has been paid to the effects of these contexts on rural youth and their aspirations for the future. The forest products industry has been in a state of transition nationally since the 1990s due to multiple factors, including changing patterns of global trade, shifts in demand, technological changes, and changing ownership structures (Woodall 2011). The shift in private land ownership structures from vertically-integrated companies to timber investment management organizations (TIMOs) and real estate investment trusts (REITs) has transformed forest production and management (Jin and Sader 2006, Bliss et al. 2010). Furthermore, changes in pulp and paper markets have led to a substantial number of mill

closures. These economic changes have left many communities at the edge of viability for maintaining critical institutions like schools. As a result of global economic forces, some communities have responded to decreasing availability of jobs in traditional manufacturing industries due to both technology and demand changes, by targeting increases in nature-based tourism, amenity migration and second-home ownership, leading to the rise of amenity-oriented rural economies (Deller 2001, Reeder and Brown 2005, Gosnell and Abrams 2011). This study focuses on resource-rich rural communities that are forest-placed that are facing similar transitions and have had little prior research focused on youth aspirations.

Recruiting and retaining skilled workers is a challenge for many rural places and this holds true for schools eager to find and keep effective teachers and educational leaders (Monk 2007, Provasnik et al. 2007). Rural parents have lower post-secondary attainment rates and lower educational expectations for their children on average than parents in suburban and urban areas (Roscigno and Crowley 2001, Roscigno et al. 2006, Provasnik et al. 2007). Compounded by the socioeconomics of rural communities, these challenges may have adverse effects on rural youth educational aspirations which are an important predictor of attainment (Howley 2006, Byun et al. 2012). This study investigates how local context may influence the educational aspirations of our next generation of workers and entrepreneurs: middle and high school students, by utilizing measures in novel ways and creating a broader picture of these influences.

Objectives

This goal of this research is to investigate how local context influences rural youth educational aspirations. This study is unique in that it assesses the impacts of local schools, communities, and economies on educational aspirations of rural youth. This study intends to:

1. Assess variation in rural youth educational aspirations among two forest-placed communities.
2. Evaluate if rural youth educational aspirations are related to local educational institutions, perceptions of their community, engagement in school and community activities, and perceived economic trajectories.
3. Determine barriers that inhibit youth engagement in school and community activities.
4. Determine barriers that may prevent youth from realizing their educational aspirations.

Literature Review

Youth Aspirations

MacBrayne (1987) characterizes a profusion of research on youth aspirations from the 1960s through the early 1970s followed by a period of scarcity in the late 1970s and 1980s. The accepted definition of aspirations at this time was “an individual’s desire to obtain a status object or goal such as a particular occupation or level of education” (p.135). Consistently, aspirations commonly exceed expectations and while expectations tend to decline with age, aspirations continue to remain high. Common influences on aspiration

include socioeconomic status, race, economic class, community size, parents and their academic achievement level, peers, teachers, and counselors.

With a foundation in achievement motivation theory and social comparison theory, Quaglia and Cobb (1996) put forth a theory of student aspirations composed of both inspiration and ambition. They define aspirations as “a student’s ability to identify and set goals for the future, while being inspired in the present to work towards these goals” (p. 130). Conceptualizing aspirations in this way takes into account the role of schools and their influence on youth aspirations. The drive to achieve is subject to influence (achievement motivation theory); schools can foster a culture where achievement is celebrated. While assimilation pressure can intrinsically exist in groups (social comparison theory) which may discourage achievement beyond one’s peers, schools can counter this tendency by encouraging student risk-taking and diversity (McClelland 1961, Quaglia 1996, Quaglia and Cobb 1996).

Due to a lack of post-secondary educational institutions in or near many rural areas, educational aspirations for youth are often associated with needing to leave their communities (Corbett 2007, Carr and Kefalas 2009, Turley 2009). If youth aspirations are incompatible with opportunities in their community, they are forced to prioritize long-term goals and aspirations that may be in conflict with one another (McLaughlin et al. 2014). The lower educational aspirations found in rural youth when compared to their suburban and urban counterparts may be derived both from reliance on lower skilled jobs present in their communities as well as emotional attachments to family and rural life (Elder, King,

and Conger 1996, Elder and Conger 2000, Johnson, Elder, and Stern 2005). Youth perceptions of support and barriers to achieving goals have also been shown to influence educational aspirations (Bajema et al. 2002).

Local Schools, Communities, and Economies

In exploring the relationship between schools and community, Schafft et al. (2014 p. 390) argued the “school district provides a sociologically meaningful unit of analysis for understanding community change.” Schools in rural communities serve as a critical locale for bringing together families of varied backgrounds, supporting civic interaction, and fostering workforce development which influence youth educational and residential aspirations (Irvin et al. 2011, Schafft and Biddle 2014). Participation in school and community activities such as athletics or clubs, earning good grades, and planning for the future strengthen youth attachment to their community, family, and peers (Fredricks and Eccles 2006; Massoni 2011). Due to the small size of schools in rural locations, this relationship between schools and communities is magnified (Schafft and Biddle, 2014).

Local schools and economies are inherently connected and local economic activity has a large impact on the schools themselves. As local populations decrease due to economic decline or increase as a result of community development, schools experience enrollment fluctuations that affect school capacity and effectiveness in meeting the needs of students (Schafft et al. 2014). Rural schools are also the largest employers in many rural communities. Beyond sustaining local jobs, they have also been shown to contribute to lower unemployment rates, increased housing values, and income equality (Sell and Leistritz 1997, Lyson, 2002, Brasington 2004). An essential function of schools is to

develop future workers who can operate in a globalized economy where adaptability and mobility are valued, though this also fosters the continued outmigration of rural youth, thus weakening the communities in which said schools reside (Carr and Kefalas 2009, Budge 2010, Peters 2012, Petrin et al. 2014).

Research has begun to explore the complex processes in rural communities that may shape youth educational aspirations, although past rural youth studies have primarily explored comparisons with urban counterparts or examined populations in the context of farms or agriculture (Bajema et al. 2002, Kirkpatrick Johnson et al. 2005, Carr and Kefalas 2009). Howley (2006) challenged the notion that rural youth have lower educational aspirations than their urban counterparts as a result of handicaps associated with rural life such as under-funded counseling, lack of research on rural school challenges, and limited leadership capacity (Breen 1989). They argue that attachment to communities and families may be driving youth decision-making. However, Howley (2006) examined community attachment measures from parents and guardians of students rather than the youth themselves. Schaefer and Meece (2009) investigated the impact of socioeconomic status, mathematics achievement, and school perceptions on rural youth aspirations but did not account for community perceptions. In addition, Byun et al. (2012) explored the relationship between social capital and educational aspirations, accounting for family and school variables but did not include geographic or community context. There remains the need to test a comprehensive model of educational aspirations – one that incorporates all of these variables.

Methods

Study Area

Maine and Oregon are both heavily forested states with a natural economic and cultural reliance on the forest products industry. As is characteristic of landownership patterns throughout the West, more than half of Oregon’s forests are federally owned by the United States Forest Service or Bureau of Land Management, while Maine’s forests are primarily privately owned. As the forest industry transitions, communities in both states have seen mixed socio-economic outcomes (Lewis et al. 2002, Eichman et al. 2010, Vail 2010, Chen et al. 2016). Communities in these areas have been focused on strategies to support local residents and improve overall economic conditions. This study focuses on Piscataquis County, Maine, and Coos County, Oregon as representative of a wide spectrum of these conditions and histories. As is common in rural, resource-rich areas, the populations of both counties are older, slower-growing, and poorer than the United States as whole (Table 5).

Table 5. Study area basic demographic information. Adapted from Crandall (2016), data from 2010 U.S. Census.

	Piscataquis County, ME	Coos County, OR	United States
Population in 2010	17,535	63,043	308 m
Population change from 2000 to 2010	1.70%	0.40%	9.70%
Population density in 2010 (persons/mi ²)	4	35	81
Median age	42.3	47.3	37.2
Median household income	\$34,016	\$37,494	\$51,914
Median earnings for workers	\$23,167	\$21,896	\$29,701
% Employed in Ag/Forestry/Fishing/Mining	4.30%	6.60%	1.90%
% Household with SNAP/Food Stamps	19.30%	16.50%	9.30%
% Population in poverty	16.20%	16.40%	13.80%
% Forested	95%	85%	33%

Piscataquis County is a large, landlocked rural county in northern Maine dominated by forestland (Figure 7). Recent decades have seen a large increase in conservation easements and investments in recreation and amenity infrastructure in the county, building on the popularity of outdoor tourism draws such as the 100-Mile Wilderness along the Appalachian Trail, Moosehead Lake, and the 209,000-acre Baxter State Park, which includes Katahdin and the terminus of the Appalachian Trail. The county seat, Dover-Foxcroft, is the nearest service center for the majority of the county, and Piscataquis County is adjacent to the county containing the newly established (2016) Katahdin Woods and Waters National Monument.

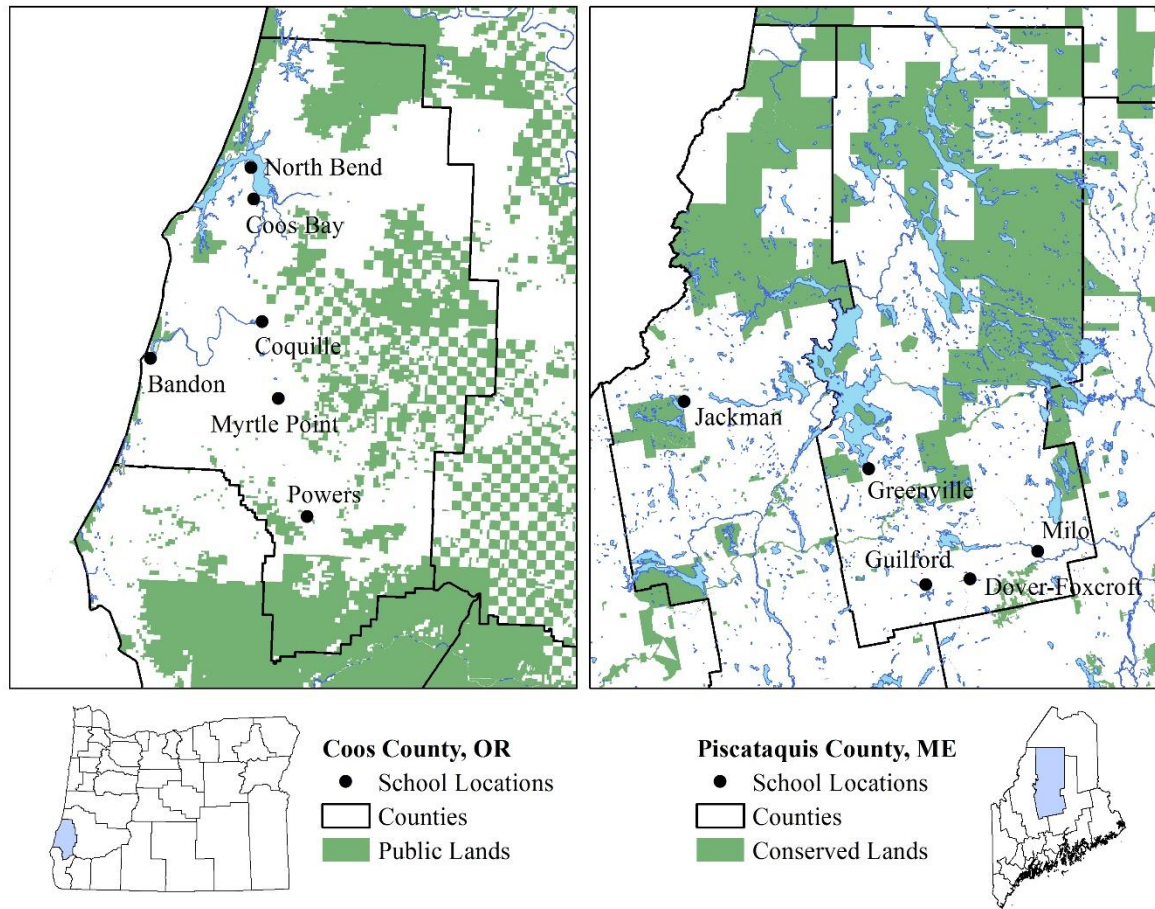


Figure 7. Location of study counties and locations of schools. Adapted from Crandall (2016).

Coos County is located on the Pacific coast in south-central Oregon (Figure 7). The northern area includes part of the Oregon Dunes National Recreation Area, while much of the remainder of the county is in public ownership under the Oregon Department of Forestry, USDA Forest Service, and Bureau of Land Management. The deep-water port of Coos Bay has long been a significant advantage for shipping logs and wood products from a large forested area, and Coos Bay remains the largest population concentration as well as main service center. Smaller towns are spread along the coast and interior river valleys, including the county seat of Coquille.

Sampling

This research was focused on middle and high school youth. In partnership with the University of Maine Cooperative Extension, Appalachian Mountain Club, and Coos Watershed Association, local steering committees were established in Piscataquis and Coos County Counties using Flora et al.'s (2016) Community Capitals Framework. Steering committee members were invited from each of the study communities within the counties and to represent each of the community capitals (natural, cultural, human, social, political, financial, and built). Survey development was guided by stakeholder involvement and engagement, with steering committees providing feedback about areas of concern related to youth in their communities as well as direct survey question development.

With outreach support from the Appalachian Mountain Club and Coos Watershed Association, who had developed relationships with local schools, the questionnaire was administered electronically at most public secondary schools in Piscataquis and Coos County Counties during the 2018-2019 academic school year. In addition to being anonymous, personal and sensitive information was requested sparingly; only gender, age, race, and general questions about perceived family economic status were asked. Participants were able skip any question they did not wish to answer. For survey administration, we provided the electronic Qualtrics survey link to the principal or technology specialist. The link was then sent to students by a school official during a designated period during the day (which varied by school) such as homeroom, a multi-use period, or science class. Students completed the survey on iPads, cell phones, and computers. Many schools had one-to-one technology where each student had access to an

iPad or laptop. Others used computer labs. This research was approved by the University of Maine Institutional Review Board (Application # 2017-07-18).

Measures

Educational Aspirations

Educational aspirations were measured by asking students how far they wanted to go in school: (a) Graduate from high school, (b) Graduate from a 2-year community college or trade school, (c) Graduate from a 4-year college or university, (d) Graduate from a graduate, master's, or law program, or (e) Graduate from a Ph.D. or medical school. Based on the method by Irvin et al. (2011) and Byun et al. (2012), the original responses were transformed into years of schooling: 12 = graduate from high school, 14 = graduate from a 2-year community college or trade school, 16 = graduate from a 4-year college or university, 18 = graduate from a graduate, master's, or law program, and 22 = graduate from a Ph.D. or medical school. This allowed educational aspirations to be treated as a continuous variable.

Economic Perceptions

In order to understand youth perceptions of local economic trajectories, students were asked "Where do you see your community in the future in terms of jobs and the economy?" Respondents had the options of: (a) There will be more jobs and an improving economy, (b) There will be the same number of jobs and the same economy, (c) There will be less jobs and a declining economy, (d) Don't know.

School and Community Engagement

Fredricks and Eccles (2006) measured engagement in athletics and clubs as a simple yes-no response to asking students if they participate; our measures use a more nuanced approach to provide richer data. Students were asked to check all that apply “Which of the following activities have you participated in the last year?” (a) After-school or summer program, (b) Art or dance, (c) Attend community events, (d) Band or orchestra, (e) Community service or volunteering, (f) FFA or agricultural club, (g) Sports team, (h) Student council or government, (i) Student newspaper or yearbook, (j) Other school clubs (science/math, computer, debate, foreign language, etc.), (k) YMCA, Boy or Girl Scouts, (l) 4-H, (m) Other (please specify), and (n) I don’t participate in activities. Students were then asked, “On average, how many hours per week do you spend participating in all the above activities combined?” Response categories ranged from 0 hours to 10 or more hours in increments of 2 hours. This provides a measure of engagement strength rather than a simple yes/no.

Scale Development

Multiple belief statements were used in the survey to measure two concepts: school perceptions and community perceptions. Respondents were asked how much they agreed or disagreed with statements using a Likert scale that included the following categories: (a) Strongly agree, (b) Agree, (c) Neither agree nor disagree, (d) Disagree, (e) Strongly disagree, and (f) I don’t know. Responses were coded from 2 to -2 to show positive and negative responses where 2 = strongly agree, 1 = agree, 0 = neither agree nor disagree, -1

= disagree, and -2 = strongly disagree. Questions posed in the negative form were reverse coded.

Confirmatory factor analysis was used to verify if the multiple belief statements taken together accurately measured a single concept for both perceptions of school and perceptions of community. Cronbach's Alpha was used to measure reliability of each index, or group of questions prior to creating the scale. The extraction method employed was principal component analysis utilizing a varimax rotation with Kaiser normalization. After the confirmatory factor analysis, an additive method used the mean rating of responses to multiple questions to create an index (or scale) variable representing each concept. For both concepts, the mean score was computed for respondents who answered at least 3 corresponding belief statement questions.

School Perceptions

To measure school perceptions, 13 belief questions were asked based on Stracuzzi (2009). Respondents indicated their level of agreement with the following statements about their school: (a) I feel accepted at school, (b) Discipline and rules are fair, (c) Parents are involved in school, (d) Disruptive students get in the way of learning, (e) Most of my teachers care about me, (f) I get bullied by other students at school, (g) I like school, (h) I am usually bored at school, (i) I feel safe at school, (j) Teachers believe I can do well, (k) I have a teacher that is a role model, (l) Students get along with teachers, and (m) I feel prepared for college or trade school.

Reliability testing of all 13 statements taken together had a Cronbach's Alpha of 0.823. The principal component analysis for school perceptions converged in four iterations and yielded three components (Table 6). Component one was comprised of a majority of the belief statements related to schools, nine in total. The statement "I like school" fell into components one and three but was grouped in component one for the final analysis due to its stronger association. Component two included "I get bullied by other students at school" and "Disruptive students get in the way of learning." The reliability of these belief statements was tested resulting in a Cronbach's Alpha of 0.204 which was not high enough to justify treating these statements as a second variable. The statement "I am usually bored at school" was the only other item in component three. The three belief statements not in component one were not included in the final school perceptions scale variable. It is worth noting responses related to teachers did not fall into a component outside overall school questions and were kept in the composite scale. Reliability of the 10 statements used in the final scale variable had a Cronbach's Alpha of 0.880. The mean re-coded (-2 to 2) response for school perceptions was 0.2542.

Table 6. Confirmatory factor analysis rotated component matrix for school perceptions based on 13 belief statements.

School belief statements	Factor Loading		
	1	2	3
Most of my teachers care about me	0.804		
I feel accepted at school	0.794		
Teachers believe I can do well	0.781		
I feel safe at school	0.774		
Students get along with teachers	0.712		
Discipline and rules are fair	0.632		
I feel prepared for college or trade school	0.595		
Parents are involved in school	0.587		
I like school	0.572		0.515
I have a teacher that is a role model	0.551		
I get bullied by other students at school		0.749	
Disruptive students get in the way of learning		0.668	
I am usually bored at school			0.934
N	1279		

Community Perceptions

In measuring community perceptions, 10 belief questions were asked based on Stracuzzi (2009). Respondents indicated their level of agreement with the following statements about their community: (a) This is a close-knit community, (b) I like this community, (c) People can be trusted, (d) This community is safe, (e) People are willing to help others, (f) People get along with one another, (g) Community leaders listen to youth, (h) This is a good place to grow up, (i) I care about my community, and (j) I feel like I am part of my community.

The reliability testing of the community perception belief statements had a Cronbach's Alpha of 0.889. The principal component analysis for this measure extracted one component, therefore, the solution could not be rotated (Table 7). This indicated the 10

belief statements encompassed a single construct related to community. The mean re-coded response (-2 to 2) for community perceptions was 0.4621.

Table 7. Confirmatory factor analysis component matrix for community perceptions based on 10 belief statements.

Community belief statements	Factor Loading 1
I like this community	0.780
This is a good place to grow up	0.780
This community is safe	0.747
People can be trusted	0.731
People get along with one another	0.720
I feel like I am part of my community	0.718
I care about my community	0.711
People are willing to help others	0.691
Community leaders listen to youth	0.619
This is a close-knit community	0.579
N	1361

Controls

Students were asked “What kind of grades did you get last year?” with the following options: a) Mostly A’s or 4’s, (b) A’s and B’s or 4’s and 3’s, (c) Mostly B’s or 3’s, (d) B’s and C’s or 3’s and 2’s, (e) Mostly C’s or 2’s, (f) C’s and D’s or 2’s and 1’s, (g) Mostly D’s or 1’s, or (h) D’s and F’s.

To determine perceived family income, students were given the prompt, “Families are different in the amount of money they have. How would you describe your family’s finances?” followed by these answers: (a) Not enough money for food and bills, (b) Enough money for food and bills, (c) More than enough money for food and bills, (d) Don’t know, or (e) Choose not to answer.

Students were asked which gender they identified as: (a) Male, (b) Female, (c) Trans, (d) Non-binary, (e) None of these, (f) Choose not to respond.

To measure race and ethnicity, students were given the following categories and asked which best described them: (a) Asian, (b) Black/African American, (c) Latino/Hispanic, (d) Native American, (e) White/Caucasian, (f) Two or more races or ethnicities.

Barriers

Two questions were posed relating to perceived barriers youth may experience with answers adapted from Bajema (2002) and with input from the local steering committees.

Students were asked “What could prevent you from going as far in school as you would like? (Select all that apply)” with the following answers: (a) Nothing, (b) It costs too much, (c) My parents aren’t sure about me going to school, (d) My parents don’t want me to go far in school, (e) I need to work after high school, (f) I’m not smart enough, (g) I don’t have good enough grades, (h) I don’t want to work hard enough, (i) I have to take care of family members, (j) I need to work at the family farm or business, (k) I have health problems, (l) I would have to move away to go to school, and (m) Other (please specify).

When asked why respondents are not involved in school or community activities they were asked to select all of the following answers that applied: (a) I am involved in activities, (b) I’m not interested, (c) It’s hard to get transportation, (d) Activities cost too much money, (e) My parents or guardians won’t let me participate, (f) I don’t have time, (g) There are few or no activities available, and (h) Other (please specify). Responses for each question were tabulated.

Analysis

Statistical analysis was conducted using IBM SPSS Statistics 25 software with a p-value threshold of 0.05. To assess variation of rural youth educational aspirations (Objective 1), independent sample t-tests were used to compare differences between middle and high school students and differences between Maine and Oregon. Significant factors influencing educational aspirations (Objective 2) were modeled using OLS regression consistent with Irvin et al. (2011) and Byun et al. (2012). Barriers to youth school and community engagement (Objective 3) and educational aspirations (Objective 4) were tabulated.

Results

Descriptive Statistics

Our sample has 2,027 responses with an estimated response rate of 87%. Seventy percent of respondents were from Oregon and 30% from Maine (Table 8). Fifty percent of respondents identified as female, 45% identified as male, and 5% identified as non-binary, trans, none of these, or chose not to respond. Middle school students in grades 6-8 constituted 31% of the sample while high school students in grades 9-12 comprised 69% of the sample. The mean level of educational aspiration was 16.41 years, or slightly higher than a bachelor's degree. Eighty-three percent of students plan to pursue post-secondary education beyond high school, 67% plan to earn a bachelor's degree or higher, and 35% aspire to earn a master's degree or higher.

Table 8. Descriptive statistics for total sample.

	N	%
<i>State</i>		
Maine	591	29.6
Oregon	1406	70.4
<i>Grade</i>		
Middle School: 6-8	478	29.4
High School: 9-12	1149	70.6
<i>Gender</i>		
Girls	778	49.7
Boys	702	44.8
Non-binary	21	1.3
Trans	16	1.0
None of these	11	0.7
Choose not to respond	38	2.4
<i>Race or Ethnicity</i>		
Asian	22	1.4
Black/African American	25	1.6
Latino/Hispanic	102	6.6
Native American	93	6.0
White/Caucasian	1099	71.3
Two or more	201	13.0
<i>Academic grades</i>		
A's and B's	1229	72.0
C's, D's, and F's	477	28.0
<i>Finances (for food and bills)</i>		
More than enough money	459	27.0
Enough money	608	35.8
Not enough money	127	7.5
Don't know	211	12.4
Choose not to respond	292	17.2
<i>Extracurricular engagement</i>		
0 hours per week	281	16.5
1-2 hours per week	307	18.0
3-4 hours per week	309	18.1
5-6 hours per week	240	14.1
7-8 hours per week	193	11.3
9-10+ hours per week	375	22.0
<i>Economic perceptions (only high school)</i>		
More jobs and an improving economy	180	26.9
Same number of jobs and economy	266	39.8
Less jobs and declining economy	222	33.2
N	2027	

Variation of Rural Youth Educational Aspirations

We assessed variation of rural youth aspirations by school level and state. There was a significant difference in level of educational aspirations for middle school ($M = 16.1$, $SD = 3.1$) and high school ($M = 16.6$, $SD = 3.2$) students; $t(825) = 2.67$, $p = 0.008$. Significant differences were also found when comparing Maine ($M = 16.2$, $SD = 3.1$) and Oregon ($M = 16.5$, $SD = 3.2$) students; $t(908) = 2.00$, $p = 0.046$. Examining students in Maine specifically, there was no significant difference in the educational aspiration of middle and high school youth. In Oregon there was a significant difference in level of educational aspirations for middle school ($M = 16.1$, $SD = 3.1$) and high school ($M = 16.6$, $SD = 3.2$) students; $t(372) = 2.10$, $p = 0.036$.

Community Influences on Rural Youth Educational Aspirations

In our first model, perceptions of school were not significant while perceptions of community had a significant negative effect on rural youth aspirations (Table 9). Students who have positive views of their community are more likely to have lower educational aspirations. Student engagement in activities related to their school or community and student academic grades were both significant and positive. Students with more hours engaged in school and community activities and students who earn better academic grades were more likely to have higher educational aspirations. Of the control variables, income and race or ethnicity were not significant though gender was significant and positive. Girls were more likely than boys to have higher educational aspirations. The distribution of model residuals was normal with constant variance and the absence of multicollinearity was supported by variance inflation factor (VIF) values ranging from 1.020 to 1.646.

Table 9. Unstandardized coefficients from OLS regression predicating rural youth educational aspirations.

	B		SE
Perceptions			
School	0.382		0.202
Community	-0.418	*	0.182
Engagement			
Engagement Hours	0.254	***	0.056
Academic Grades	1.280	***	0.238
Controls			
Income	0.442		0.323
Girls	1.055	***	0.197
Race/Ethnicity	0.225		0.219
N	949		

*p<0.05, **p<0.01, ***p<0.001

Questions related to the economy and employment were only asked of high school students. In our second model, utilizing a subset of the data comprised of students who indicated they were in grades 9-12, we incorporated student perceptions of the local economy, which was not significant (Table 10). Students who perceive their local economy as staying the same or improving did not have statistically significant differences in educational aspirations than those who perceive the economy as getting worse. Both perceptions of school and community had a significant effect on high school youth educational aspirations with school perceptions positive and community perceptions negative. Students who have positive views of their school are more likely to have higher educational aspirations while students who have positive views of their community are more likely to have lower educational aspirations. Student engagement variables of hours of extracurricular activities and academic grades were both significant and positive. Students who spend more time involved in activities and those who earn higher academic grades were more likely to have higher educational aspirations. In accounting for control

variables, the model showed income and race or ethnicity were not significant while gender was significant and positive. Girls were more likely than boys to have higher post-secondary educational aspirations.

Table 10. Unstandardized coefficients from OLS regression predicating rural high school youth educational aspirations.

	B		SE
Perceptions			
School	0.957	**	0.339
Community	-0.866	**	0.298
Economic	-0.116		0.346
Engagement			
Extracurricular Hours	0.249	**	0.090
Academic Grades	1.450	***	0.396
Controls			
Income	0.645		0.520
Gender	1.130	***	0.314
Race/Ethnicity	0.035		0.361
N	383		

*p<0.05, **p<0.01, ***p<0.001

Barriers to Rural Youth Engagement in School and Community Activities

The rankings of most common barriers to engagement in school and community activities perceived by students was the same in Maine and Oregon (Table 11). The most common reasons youth were not engaged in activities were lack of interest, lack of time, and difficulty finding transportation. The availability of few or no activities and cost, followed by parents, were the most infrequently reported barriers.

Table 11. Tabulation of rural youth perceived barriers to engaging in school and community activities.

	All Students	%	Maine	%	Oregon	%
I'm not interested	431	30.8	144	36.4	286	28.7
I don't have time	364	26.0	101	25.5	262	26.3
It's hard to get transportation	197	14.1	55	13.9	141	14.1
There are few or no activities available	182	13.0	45	11.4	137	13.7
Activities cost too much money	164	11.7	34	8.6	129	12.9
My parents or guardians won't let me participate	60	4.3	17	4.3	42	4.2

Barriers to Rural Youth Educational Aspirations

While there was slight variability in the order, youth in Maine and Oregon indicated the same top five perceived barriers to achieving their educational aspirations: cost, not having good enough grades, not being smart enough, needing to work after high school, and having to move away (Table 12). Having to take care of family members, not wanting to work hard enough, health problems, and needing to work on a farm or in the family business were ranked moderately. The perceived barriers with fewest responses were parents not being sure about students going to school and parents not wanting them to go far in school.

Table 12. Tabulation of rural youth perceived barriers to achieving their educational aspirations.

	All Students	%	Maine	%	Oregon	%
It costs too much	820	29.0	206	28.6	614	29.2
I don't have good enough grades	435	15.4	97	13.5	338	16.1
I'm not smart enough	398	14.1	114	15.8	284	13.5
I need to work after high school	395	14.0	97	13.5	297	14.1
I would have to move away to go to school	249	8.8	71	9.9	178	8.5
I have to take care of family members	151	5.3	35	4.9	115	5.5
I don't want to work hard enough	150	5.3	39	5.4	110	5.2
I have health problems	85	3.0	22	3.1	63	3.0
I need to work on the farm/family business	70	2.5	23	3.2	47	2.2
My parents aren't sure about me going to school	36	1.3	6	0.8	29	1.4
My parents don't want me to go far in school	36	1.3	10	1.4	26	1.2

Discussion

Our findings indicate rural youth in our sample plan to pursue post-secondary education at high rates (83%), consistent with previous studies (Bajema et al. 2002, Schaefer and Meece 2009). In assessing variation of rural youth aspirations, we found significant differences when comparing students in middle and high school, Maine and Oregon, and middle and high school within Oregon. However, in all three instances the difference in means was 0.5 or less, the equivalent of one semester of school or less post-bachelor's degree.

Based on the findings above we compared students by state but found no difference in variables of significance between Maine and Oregon. Additionally, testing grade in school and middle versus high school status were not significant so we proceeded with testing the full sample. In the full model, school perceptions did not have a significant relationship with educational aspirations. These findings run counter to previous work examining the role of school climate with students from schools characterized as rural/suburban and urban (Plucker 1998). However, our results are in line with more recent work focused on focused on the relationship between school context and aspirations of rural youth in particular (Schaefer and Meece 2009).

Our measure of community perceptions was found to have a significant negative relationship, similar to a study concluding community attachment decreases educational aspirations among rural youth (Howley 2006). As previously described, the relationship between school and community is amplified in rural places. This may lead rural youth to have stronger ties to their communities where rather than pursuing individual financial

success, often through continued educational attainment, rural youth may have higher communal aspirations to reside near their family in rural communities (Howley 2006).

In assessing the potential influence youth perceptions of their local economies may have on their educational aspirations, we analyzed a smaller sub-set of our data comprised of students who identified themselves as in high school. Similar to the full model, community perceptions had a significant negative relationship while extracurricular hours, academic grades, and gender (girls) had a significant positive relationship with educational aspirations. Contrary to expectations, youth perceptions of the economy were insignificant. However, school perceptions were significant in this model. By fostering school environments where youth feel accepted, safe, and have positive relationships with teachers, rural schools are likely to increase the educational aspirations of their students.

Student engagement, as measured in the number of hours per week students spend participating in school and community activities, was a significant positive predictor of educational aspirations. Respondents who spent higher numbers of hours per week engaged in school or community activities had higher aspirations for educational attainment in the future. Students spent, on average, 5 hours per week engaged in activities. This measure is novel in that we captured the intensity of student engagement while other work simply measured if participation was present in respondents (Fredricks and Eccles 2006).

If students do well in school academically, it follows that they would be more likely to aspire to higher educational aspirations. As such, we expected to find that higher academic

grades were associated with higher educational aspirations. Additionally, students who identified as girls were more likely to have higher educational aspirations than those identifying as boys, a finding that is also consistent with previous literature.

As hours of engagement in activities had a significant effect on rural youth educational aspirations, schools and communities may be interested in reducing barriers to such engagement. In addition to a lack of interest, the top barriers to youth engagement were lack of time and transportation. In order to combat these barriers, schools could teach or highlight effective time management strategies while communities may pursue alternative models around transportation such as ride shares or soliciting public transportation expansion. Cost and parents or guardians not allowing participation were the lowest-rated barriers to engagement.

Students perceive the primary barriers to achieving their educational aspirations as financial and academic. Students reported concerns about pursuing college as costing too much or they expressed a need to work after high school. Additionally, they identified a lack of good grades or not being smart enough as barriers to achieving their educational aspirations. Do rural youth feel unable to compete successfully with their urban counterparts in terms of post-secondary educational attainment? While student loan debt continues to increase to exorbitant amounts, there are forms of affordable secondary education. By providing personal financial training to students and parents, the process of funding college could be demystified. Additionally, destigmatizing community colleges would benefit rural students as these institutions often have satellite campus located closer

to rural areas and offer lower tuition rates than larger colleges or universities. Rural schools often struggle to recruit and retain skilled staff (Monk 2007, Provasnik et al. 2007). Students not feeling smart enough is likely a combination of multiple forces at play, including but not limited to a lack of college role models, imposter syndrome, or a lack of understanding the rigors of college. Again, parental factors ranked the lowest in term of barriers, illustrating parental support for post-high school educational pursuits.

Limitations and Future Research

While this study contributes to the scholarship investigating rural youth aspirations by creating scale variables for perceptions of school and community as well as taking into account student engagement hours, it does have its limitations. We investigate youth aspirations at a given point in time and do not have a measure for their actual attainment or their change over time. Our measure of student family income is reliant on students' perceptions of family finances. Additionally, we did not measure the degree to which perceived barriers are actual limitations to youth achieving their educational aspirations. Finally, students had the ability to skip any question they did not wish to answer, lowering the number of observations in some models. Future investigation in this area could explore the replicability of this study exploring the role of community influences on youth in other resource-rich regions beyond Oregon and Maine. Additional studies could focus on specific student populations or incorporate additional aspects of school or community influence.

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4. COMMUNITY INFLUENCES ON RURAL YOUTH RESIDENTIAL ASPIRATIONS IN RESOURCE-RICH AREAS³

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Introduction

Rural communities in forested regions across the US continue to undergo transformations driven by dynamic economic, policy, and demographic changes (Robbins 2006, Donoghue and Sturtevant 2008). Global competition, coupled with the decline of print media, have resulted in large swings in demand for traditional paper and lumber products (Woodall et al. 2011). In conjunction with these changes in supply and demand, societal preferences for use and value of forests are also evolving. Though some rural communities have experienced a decrease in traditional manufacturing industries, many natural-resource rich

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communities have encountered increases in nature-based tourism, amenity migration and second-home ownership, leading to a rise of rural economies that are amenity-based (Deller 2001, Reeder and Brown 2005, Gosnell and Abrams 2011).

Rural communities may struggle to promote sustainable development that preserves forest landscapes and quality of life for local residents, while providing incentives for community members to stay. In particular, rural youth often question the value of remaining in their communities after high school, and those that wish to stay commonly struggle to find the financial means to do so (Howley et al. 1996, Corbett 2007). While previous studies of rural youth have focused largely on agricultural communities (Kirkpatrick Johnson et al. 2005, Carr and Kefalas 2009) we seek to contribute to existing scholarship by focusing on forest-placed rural communities. Previous research has explored the relationship among adult labor market outcomes in forest-placed communities, but little attention has been paid to the effects of these changes on rural youth as the future labor supply. We investigate the relationship between elements of local context and youth residential aspirations in rural, resource-rich areas.

Youth Residential and Educational Aspirations

Residential aspirations of rural youth can be grouped by three influential factors: perception of lifestyle and opportunity, influence of family and peers, and individual youth attributes and aspiration (McLaughlin et al. 2014). Perceived local opportunities, coupled with belief that educational and occupational aspirations can be attained in local communities, are tied to residential aspirations. Leaving a community to pursue college may be more appealing to rural youth perceiving it as temporary. However, after the initial

departure from one's local community, consecutive moves may be easier. Additionally, youth may alter their educational aspirations to fall in line with their residential aspirations (Rudkin et al. 1994, Hektner 1995, Sherman and Sage 2011). Rather than pursuing individual financial success, often through continued educational attainment, rural youth may have higher communal aspirations to reside near their family in rural communities (Howley 2006).

Local Communities and Economies

Labor market stagnation, unemployment, and lack of local job opportunities are seen as primary drivers of rural outmigration; however, natural amenities, access to urban areas, and attachment to community are shown to be more influential on rural in-migration (Brown 2002, McGranahan and Beale 2002, Molloy et al. 2011). While non-rural young people associate rural communities with undesirable aesthetic attributes, socially isolating, and lacking in career opportunities, those who live or have lived in rural areas have more positive perceptions of these spaces and are more likely to move to a rural community (Davies 2007). Schafft (2016) found that rural youth, in particular those who are high achieving academically, have community attachments. Jacquet (2017) found community satisfaction and attachments had the strongest relationship with migration intention among rural respondents. When Petrin et al. (2014) modeled Carr and Kefalas' (2009) youth types of Stayers, Seekers, Achievers, and Returners, the strongest predictor of residential aspirations to stay in their communities was youth perception of local economic activity.

Place Attachment

The inherently emotional positive bond between individuals (or groups) and their environment involving beliefs and actions constitutes place attachment (Altman and Low 1992, Williams et al. 1992, Jorgensen and Stedman 2001). While sense of place can be characterized as multi-dimensional comprised of identity, attachment, and dependence, place attachment underscores the potential role of natural resources (Jorgensen and Stedman 2001, Stedman 2002, 2003, 2006). In this study, we utilize place attachment in the socio-ecological context applied by Stedman (2003). Howley (2006) found rural parents' place attachment was strong enough to warrant turning down jobs located other places and argued these decisions would have likely impacts on rural youth place attachment and aspirations. While place attachment may be portrayed as an impediment to youth aspirations, Evans (2016 p. 514) emphasized that youth had "relationships with place that were often complex, multifaceted and contradictory" characterized by conflicting aspirations that did not fit into simple leaver and stayer categories.

Objectives

This goal of this research is to investigate how local context influences rural youth residential aspirations. This study is unique in that it assesses the impacts of: 1) local schools, communities, and economies; 2) youth engagement in school and community activities; and 3) place attachment on the residential aspirations of rural youth. This study intends to:

1. Assess variation in rural youth residential aspirations among two forest-placed communities.

2. Evaluate if rural youth residential aspirations are related to the local educational institutions, perceptions of their community, place attachment, engagement in school and community activities, educational aspirations, and perceived economic trajectories.

Methods

Study Area

Though some rural communities have flourished through amenity-derived economic transitions, others have stagnated. Maine and Oregon are two states reliant on forest industries that have undergone changes. Across Maine, the decline in pulp and paper have led to mill closures and job loss in numerous communities (Anderson and Crandall 2016, Lustig 2016). In Oregon, federal policy shifts have led to a decline in timber production often disproportionately affecting towns adjacent to federal lands (Charnley et al. 2008, Eichman et al. 2010). In both states, increasing conservation, amenity migration, and residential development have fostered some natural-resource rich communities while causing debates over development strategies in others (Cottle and Howard 2012, Chen et al. 2016). This study focuses on rural youth in Piscataquis County, Maine and Coos County, Oregon.

Sampling

Local steering committees were established in Piscataquis and Coos Counties using Flora et al.'s (2016) Community Capitals Framework where members were targeted to represent each study community in the counties and the various community capitals: natural, cultural,

human, social, political, financial, and built. The survey was developed with stakeholder involvement and steering committee feedback focused on areas of youth concern in their communities.

In partnership with the Appalachian Mountain Club and Coos Watershed Association, our survey was administered to all public secondary school districts in Piscataquis and Coos Counties during the 2018-2019 academic school year. The survey was disseminated electronically using the Qualtrics survey program where participants had the ability to skip any question they did not wish to answer. To administer the survey, we provided the Qualtrics survey link to the principal or technology specialist at each campus. The survey link was sent to students during a designated period during the day such as homeroom, a multi-use period, or specific subject-area class. Students completed the survey using computers, iPads, or smart phones. In addition to being anonymous, personal and sensitive information was requested sparingly; only gender, age, race, and general questions about perceived family economic status were asked. This research was approved by the University of Maine Institutional Review Board (Application # 2017-07-18).

Measures

Residential Aspirations

Residential aspirations mirrored McLaughlin et al. (2014) and were measured by responses to the question “Where do you want to live when you are 30 years old?” with the following answers: (a) Same town or nearby town as now, (b) Somewhere in rural (not in a city) Maine (or Oregon), (c) City in Maine (or Oregon), (d) Rural area in another state, (e) City in another state, or (f) Another country. These responses were collapsed into categories

three categories: “rural in-state” consisting of same or nearby town and somewhere in rural in-state, “rural out-of-state” referred to rural area in another state, and “non-rural” was comprised of city in another state and another country.

Economic Perceptions

A dichotomous variable of economic perception was generated with 0 = Less jobs and a declining economy and 1 = Same or more jobs and the same or an improving economy.

School and Community Engagement

Students were asked to indicate all extracurricular activities they participated in during the last year. Students were then asked, “On average, how many hours per week do you spend participating in all the above activities combined?” This provided a measure of engagement strength rather than the simple yes/no answer Fredricks and Eccles (2006) used.

Educational Aspirations

Educational aspirations were measured by asking students them what level of school they want to graduate from: (a) High school, (b) Two-year community college or trade school, (c) Four-year college or university, (d) Graduate, master’s, or law program, or (e) Ph.D. or medical school. Based on the method by Irvin et al. (2011) and Byun et al. (2012), the original responses were transformed into years of schooling which allowed the variable to be treated as continuous: 12 = graduate from high school, 14 = graduate from a 2-year community college or trade school, 16 = graduate from a 4-year college or university, 18

= graduate from a graduate, master's, or law program, and 22 = graduate from a Ph.D. or medical school.

Scale Development

Multiple belief statements were used in the survey to measure three concepts: school perceptions, community perceptions and place attachment. Respondents were asked how much they agreed or disagreed with statements using a Likert scale. Responses were coded 2 (strongly agree) to -2 (strongly disagree) to show positive and negative responses. Questions posed in the negative form were reverse-coded.

Confirmatory factor analysis was used to verify if the multiple belief statements taken together accurately measured a single concept for both perceptions of school and perceptions of community. Cronbach's Alpha was used to measure reliability of each index, or group of questions prior to creating the scale. The extraction method employed was principal component analysis utilizing a varimax rotation with Kaiser normalization. After the confirmatory factor analysis, an additive method used the mean rating of responses to multiple questions to create an index (or scale) variable representing each concept. For all three concepts, the mean score was computed for respondents who answered at least 3 corresponding belief statement questions.

School Perceptions

To measure school perceptions, respondents indicated their level of agreement with 10 belief questions based on Stracuzzi (2009). Reliability of these belief statements had a

Cronbach's Alpha of 0.880. The mean re-coded (-2 to 2) response for school perceptions was 0.2542.

Community Perceptions

Respondents indicated their level of agreement with 10 belief questions about their community based on Stracuzzi (2009). The reliability testing of the community perception belief statements had a Cronbach's Alpha of 0.889. The mean re-coded response (-2 to 2) for community perceptions was 0.4621.

Place Attachment

The natural environment can be a key component of rural communities, in particular those that may be dependent on the forest. Nine variables used measure to place attachment as a single dimension of sense of place due to the high reliability of the scale (Stedman 2003). This measure centers on the role of the physical landscape in with regard to youth attachment. Respondents indicated their level of agreement with the following statements about the outdoors: (a) In the outdoors here I feel that I can be myself, (b) I really miss the outdoors when I am away for too long, (c) I feel the happiest when I am outdoors here, (d) The outdoors here is the best place to do the things I enjoy, (e) The outdoors here is my favorite place to be, (f) The outdoors here reflect the type of person I am, (g) For the things I enjoy most, nothing can compare to the outdoors here, (h) Everything about the outdoors here is a reflection of me, and (i) As far as I am concerned, there are no better places to be than the outdoors here.

Reliability testing of this measure indicated a Cronbach's Alpha of 0.946. The principal component analysis for place attachment extracted one component and could not be rotated (Table 13). These belief statements about the role of the outdoors measure similar dimensions and can be used as a measure of youth attachment to place. The mean re-coded response (-2 to 2) for place attachment was 0.3062.

Table 13. Confirmatory factor analysis component matrix for place attachment based on 9 belief statements.

School belief statements	Factor Loading 1
The outdoors here is my favorite place to be	0.895
The outdoors here is the best place to do the things I enjoy	0.874
For the things I enjoy most, nothing can compare to the outdoors here	0.869
I feel happiest when I am outdoors here	0.859
The outdoors here reflect the type of person I am	0.858
As far as I am concerned, there are no better places to be than outdoors here	0.853
Everything about the outdoors here is a reflection of me	0.840
I really miss the outdoors when I am away for too long	0.788
In the outdoors here I felt that I can be myself	0.662
N	1551

Controls

Students indicated what their general academic grades were. Family income was measured through a survey question that was coded to create a dichotomous variable with 0 = Not enough money for food and bills and 1 = Enough or more than enough money for food and bills. Students were asked which gender they identified as. To measure race and ethnicity, students were asked which category best described them.

Analysis

To assess variation of rural youth residential aspirations (Objective 1) chi-square tests were used to compare differences between middle and high school students and differences between students in Maine and Oregon. Significant factors related to residential aspirations (Objective 2) were modeled using multinomial logistic regression. Statistical analysis was conducted using IBM SPSS Statistics 25 software with a p-value threshold of 0.05.

Results

Descriptive Statistics

Our sample has 2,027 responses with an estimated response rate of 87%. Seventy percent of responses are from Oregon and 30% from Maine. Fifty percent of respondents identified as female, 45% identified as male, and 5% identified as non-binary, trans, none of these, or chose not to respond. Middle school students in grades 6-8 constituted 31% of the sample while high school students in grades 9-12 comprised 69%. Thirty-three percent of students want to complete a high school diploma or two-year post-secondary degree while 67% aspire to earn a bachelor's degree or higher. In our sample, 46% of youth desire to live in a rural place when they are 30 years old compared with 54% who want to live in a non-rural place when they are 30 years old.

Variation of Rural Youth Residential

We assessed variation of rural youth residential aspirations by school level and state. A chi-square test was performed to examine the relationship between grade level and residential aspirations. The relationship between these variables was significant, χ^2 (2, N =

1253) = 6.86, $p = .032$. Middle school students (grades 6-8) were more likely to aspire to live rurally in-state than students in high school (grades 9-12). High school students were more likely to want to live in a rural place out-of-state or a non-rural place than students in middle school. When examining the relationship between state and residential aspiration, the relationship was significant, $\chi^2 (2, N = 1490) = 29.33, p < .001$. Students in Maine were more likely to aspire to live in a rural place (in or out-of-state) than students in Oregon. However, middle and high school students had no statistically significant within-state difference in residential aspirations.

Community Influences on Rural Youth Residential Aspirations

In our first model of all students, community perceptions, place attachment, and educational aspirations all have a statically significant relationship with rural youth residential aspirations (Table 14). Youth with higher perceptions of their communities were less likely to want to live in a rural place out-of-state or a non-rural place (compared to living in a rural area of their home state). Additionally, students with stronger place attachment were less likely to aspire to live in a non-rural place. Higher educational aspirations were associated with students being more likely to want to live in a non-rural place.

Table 14. Multinomial logistic regression of rural youth residential aspirations (odds ratios).

Reference category is Rural In-State	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	0.951	0.295	1.257	0.191
Community Perceptions	0.423 **	0.288	0.503 ***	0.189
Place Attachment	0.913	0.170	0.587 ***	0.109
Educational Aspirations	1.085	0.050	1.149 ***	0.031
Engagement Hours	1.108	0.084	1.025	0.052
Academic Grades	0.788	0.351	0.961	0.226
Income	2.547	0.568	1.444	0.286
Girls	0.862	0.297	1.237	0.182
Race or Ethnicity	1.099	0.344	1.073	0.212
State	1.592	0.325	0.732	0.208
Grade In School	1.100	0.090	0.990	0.055
N	706			

*p<0.05, **p<0.01, ***p<0.001

We then investigated relationships among students in each state. Youth in Maine did not display any significant relationships between aspirations to reside rurally in Maine versus a rural place out-of-state (Table 15). Students with greater place attachment were less likely to aspire to reside in non-rural place (than in rural Maine). Respondents with higher educational aspirations were more likely to want to live in a non-rural place. In Oregon, findings mirror the larger model (Table 16). Youth with higher community perceptions were less likely to want to live in rural place out-of-state or a non-rural place (compared to living in rural Oregon). Students with more place attachment were less likely to aspire to live in a non-rural place. Higher educational aspirations were associated with students being more likely to want to live in a non-rural place. In all three models school perceptions, engagement hours, academic grades, income, gender, race or ethnicity, and grade do not have a statistically significant relationship with youth residential aspirations.

Table 15. Multinomial logistic regression of rural youth residential aspirations in Maine (odds ratios).

Reference category is Rural Maine	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	0.942	0.501	1.969	0.368
Community Perceptions	0.707	0.582	0.550	0.394
Place Attachment	0.621	0.304	0.408 ***	0.216
Educational Aspirations	1.050	0.082	1.128 *	0.058
Engagement Hours	1.067	0.146	1.128	0.100
Academic Grades	3.445	0.836	1.003	0.445
Income	3.580	1.112	1.745	0.582
Girls	0.888	0.506	1.287	0.348
Race or Ethnicity	2.535	0.717	2.092	0.544
Grade In School	1.095	0.130	0.932	0.089
N	210			

*p<0.05, **p<0.01, ***p<0.001

Table 16. Multinomial logistic regression of rural youth residential aspirations in Oregon (odds ratios).

Reference category is Rural Oregon	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	0.839	0.387	0.931	0.339
Community Perceptions	0.363 **	0.351	0.498 **	0.394
Place Attachment	1.023	0.217	0.675 **	0.216
Educational Aspirations	1.110	0.065	1.159 ***	0.058
Engagement Hours	1.141	0.106	0.985	0.100
Academic Grades	0.480	0.422	0.981	0.445
Income	2.241	0.674	1.309	0.582
Girls	0.885	0.371	1.258	0.348
Race or Ethnicity	0.842	0.396	0.947	0.544
Grade In School	1.165	0.131	1.075	0.089
N	496			

*p<0.05, **p<0.01, ***p<0.001

Only high school students were asked questions related to the economy and employment.

In the following models we examine a subset of the data composed of respondents who

indicated they were in 9th-12th grade. We incorporated student perceptions of the local economy, which was not significant (Table 17). Students who perceive their local economy as getting worse did not have statistically significant differences in residential aspirations than those who perceive the economy as staying the same or improving. Additionally, there were no statistical differences among youth who want to live in a rural place be that in-state or out-of-state. Students with higher perceptions of their communities were less likely to aspire to live in a non-rural place (compared to living in a rural area of their home state). Youth with stronger place attachment were also less likely to want to live in a non-rural place. Students with higher educational aspirations were more likely to want to live in a non-rural place.

Table 17. Multinomial logistic regression of rural high school youth residential aspirations (odds ratios).

Reference category is Rural In-State	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	0.901	0.425	0.941	0.286
Community Perceptions	0.480	0.404	0.542 **	0.272
Economic Perceptions	1.206	0.437	1.340	0.297
Place Attachment	0.706	0.231	0.542 ***	0.157
Educational Aspirations	1.052	0.066	1.110 *	0.043
Engagement Hours	1.096	0.113	1.070	0.074
Academic Grades	1.016	0.500	1.099	0.334
Income	1.915	0.722	1.285	0.443
Girls	1.502	0.404	1.492	0.264
Race or Ethnicity	0.982	0.490	1.390	0.316
State	1.206	0.458	0.630	0.326
Grade In School	1.112	0.191	0.856	0.125
N	368			

*p<0.05, **p<0.01, ***p<0.001

Relationships among students within Maine and Oregon were also investigated. Youth in both states had no statistically significant differences between wanting to live in rural place

in-state versus out-of-state (Tables 18 and 19). In both states respondents with higher place attachment were less likely to aspire to live in another place (compared to a rural place in-state). In Oregon, students with educational aspirations were more likely to want to live in a non-rural place. In all three models school perceptions, economic perceptions, engagement hours, academic grades, income, gender, race or ethnicity, and grade do not have a statistically significant relationship with high school youth residential aspirations.

Table 18. Multinomial logistic regression of rural high school youth residential aspirations in Maine (odds ratios).

Reference category is Rural Maine	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	1.837	1.174	1.455	
Community Perceptions	0.067	1.482	0.321	
Economic Perceptions	0.238	0.935	0.497	
Place Attachment	0.331	0.700	0.260	**
Educational Aspirations	0.988	0.162	1.082	
Engagement Hours	1.316	0.308	1.421	
Academic Grades		0.000	3.479	
Income	24.947	1.935	7.166	
Girls	2.091	1.007	0.739	
Race or Ethnicity	0.622	2.304	4.186	
Grade In School	0.886	0.422	0.921	
N	79			

*p<0.05, **p<0.01, ***p<0.001

Table 19. Multinomial logistic regression of rural high school youth residential aspirations in Oregon (odds ratios).

Reference category is Rural Oregon	Rural Out-of-State		Non-Rural	
	Exp(B)	SE	Exp(B)	SE
School Perceptions	0.903	0.497	0.757	0.323
Community Perceptions	0.559	0.449	0.578	0.296
Economic Perceptions	1.573	0.535	1.881	0.346
Place Attachment	0.784	0.275	0.610	** 0.180
Educational Aspirations	1.078	0.078	1.113	* 0.049
Engagement Hours	1.079	0.131	1.013	0.084
Academic Grades	0.630	0.553	1.155	0.378
Income	1.505	0.871	0.928	0.523
Girls	1.464	0.465	1.626	0.297
Race or Ethnicity	0.905	0.518	1.330	0.327
Grade In School	1.006	0.227	0.782	0.145
N	289			

*p<0.05, **p<0.01, ***p<0.001

Discussion

Due to significant differences present in youth aspirations by state and grade level, we explored our initial model further by examining the students in Maine and Oregon separately. In both states we found youth with higher responses of place attachment are less likely to want to live in a non-rural place (compared to living in a rural place in their respective states). These relationships highlight the strong connection rural youth have with the location of their communities. Also consistent across both states is a relationship between youth educational and residential aspirations. In Maine and Oregon, students with higher educational aspirations are more likely to want to live in a non-rural place. These findings support previous research that higher educational aspirations are often associated with students leaving their communities (Corbett 2007, Carr and Kefalas 2009, Turley

2009). Unique to Oregon was the relationship between residential aspirations and youth perceptions of their communities. Students with higher community perceptions were less likely to aspire to live in a rural place out-of-state or a non-rural place. In Maine community percepts had no significant relationship with youth residential aspirations.

These findings contribute to the research on the complex relationships that exist in determining rural youth desires to reside in their rural communities or live in another location when they are adults. Our use of place attachment in this context is unique and shown to be of significance to youth. With this strong attachment to the outdoors, rural places may be seen as an amenity-rich destination to young adults from other places providing needed in-migration. However, many resource-rich areas can be characterized as extractive which could lead to competing development priorities of supporting industries versus maintaining natural amenities that appeal to residents and tourists. This may challenge decisions of local residents to stay or discourage in-migration (Kasserman 2012).

The lack of educational opportunities in many rural areas presents a challenge in retaining or recruiting young adults. Many universities have increased their offerings of online degree programs, providing viable options for rural residents to remain in their communities while pursuing their educational aspirations. However, telecommuting relies on the availability (and affordability) of high-speed internet, which has yet to reach many rural communities. By identifying elements that influence rural youth residential aspirations, we can provide relevant information to those in youth programming, education, and community development. This information can be used to focus rural development

efforts targeted toward characteristics youth desire such as the outdoors or a sense of community.

Limitations and Future Research

This research contributes to the body of work exploring the residential aspirations of rural youth by utilizing scale variables for perceptions of school and community as well as taking into account place attachment. However, it does have its limitations. We assessed youth aspirations at a single point in time and do not have measures for where respondents will reside in the future. Additionally, our measure of student family income is a proxy and reliant on students' perceptions of family finances. Finally, students were able to skip any question they did not wish to answer, lowering the number of observations in our models. Future investigation building on this research could explore additional aspects of place attachment. The elements of this study could be explored in other resource-rich areas outside of Maine and Oregon. Additional studies could further this work by focus on specific student populations.

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5. CONCLUSION

A benefit of the applied nature of this research is that it gives youth a voice and helps them contribute to the understanding of their communities (Figures 8 and 9). By increasing our understanding of the complex relationships concerning youth, their skills, and aspirations, planning and training efforts may better meet the goals of rural students. With this support, youth may realize their aspirations in turn fostering local economic development along with retention and recruitment contributing to the vitality of rural communities.



Figure 8. Forest Hills students take the Rural Youth Futures survey in Maine.

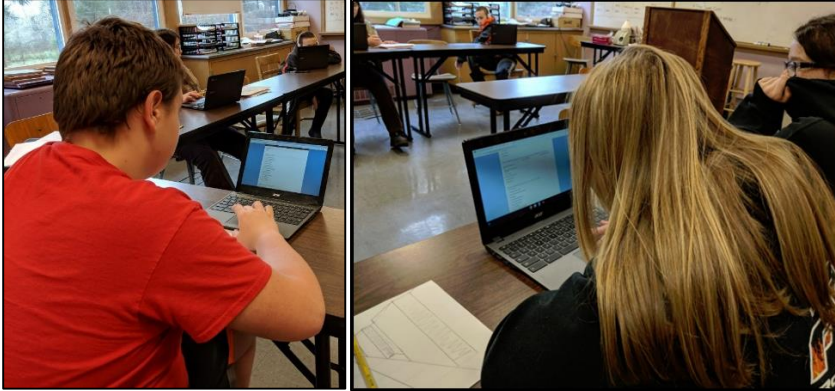


Figure 9. Powers High School students take Rural Youth Futures survey in Oregon. Photo credit: Alexa Carleton (Coos Watershed Association).

Similar studies have explored workforce needs and illustrated high educational needs in specific forestry-related skills, while we found more need for soft skills. This may indicate that natural-resource based fields are less specialized than they used to be. Preparing students with soft skills is translatable to a number of career paths, while reducing existing skill gaps will enable them to secure better jobs following graduation. Equipping students for multiple career options enables them to live and work in rural areas going through economic transitions, better avoid poverty, and help create more sustainable rural communities. Despite perceptions that younger generations are less willing to accept conditions required in many natural resource jobs, we did not find evidence of a work culture mismatch. This speaks to the connection with rural life young respondents are seeking out. Mapping the locations of stated forest industry operations in Maine and where students are willing to live or relocate gives us a picture of where there may be spatial (mis)matches between supply (future employees) and demand (employers) in Maine (Figure 10).

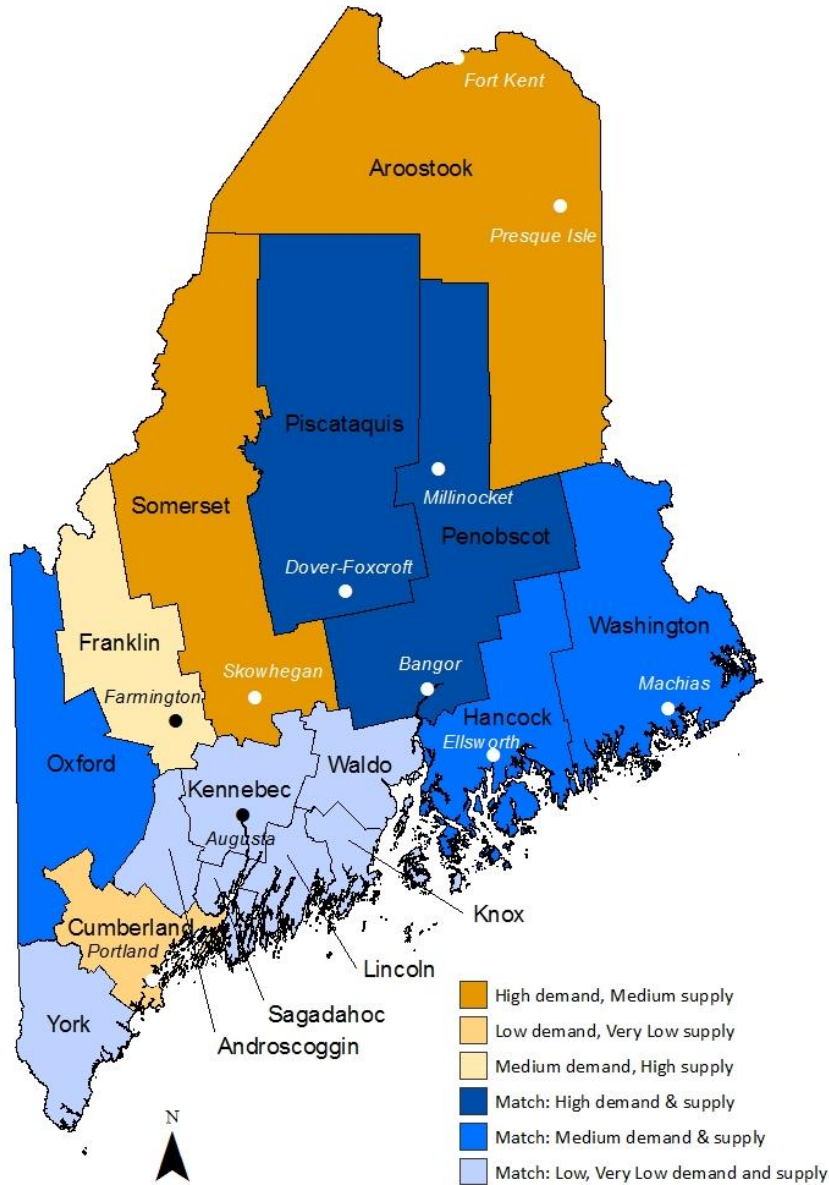


Figure 10. Comparison of frequency between location of stated forest industry operations (demand) and where students are willing to live or relocate (supply). Blue colors indicate matches; tan colors indicate possible mismatches.

Stakeholder engagement was key to ensure this research was relevant to our study sites and would increase the applicability of our findings in local communities. Central to this engagement was application of the Community Capital Framework (Flora et al. 2016) which led to representation from diverse aspects of the communities we engaged with in

order to capture as many resources and assets as possible. This was done in the hopes that our research will support sustainable communities through economic security, healthy ecosystems, and social inclusion (Figure 11). By avoiding decapitalization, one capital (or aspect of community) was not emphasized above others, which can occur in communities reliant on resource extraction. This work is done with legacy in mind, both in terms of recommendations that support the next generation in rural communities, and continuation of the research by providing our community partners with our survey instrument so they may examine trends over time (Figures 12 and 13).

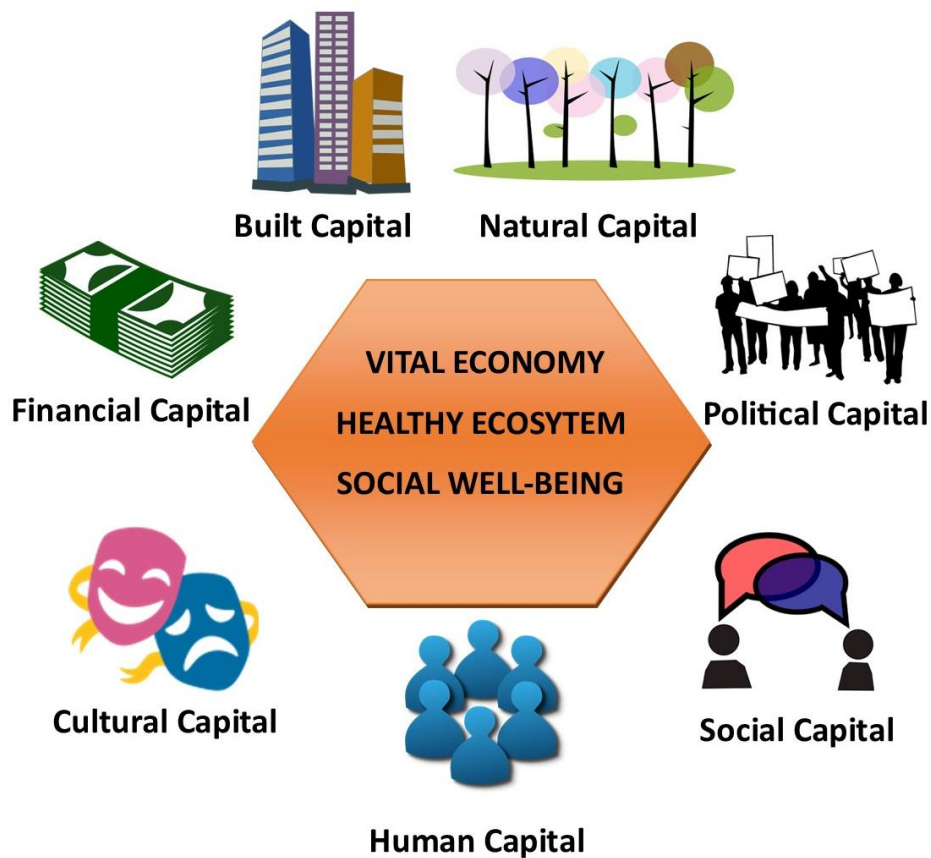


Figure 11. Diagram of Community Capital Framework. Adapted from Flora, Flora, and Gasteyer (2016).



Figure 12. Nicole Bernsen reviews survey results in real time with Forest Hills Principal Thad Lacasse.



Figure 13. Nicole Bernsen presents preliminary results in Dover-Foxcroft, Maine and community members discuss implications of the preliminary findings.

Final results this research will be disseminated through traditional academic forums and media targeting participating communities, policy makers, and general public. This multi-pronged communication strategy will ensure the broadest reach and application of our findings. This work has and will be shared with scholars at academic conferences and through peer-reviewed journal articles. In collaboration with the Ecosystem Workforce Program in the Institute for a Sustainable Environment at the University of Oregon, two-page county-level policy briefing papers are being prepared for Piscataquis and Coos Counties. Additionally, four-page fact sheets are being designed for each school district in Maine and Oregon, 11 in total. The fact sheets will have a county-wide introduction section followed by three spheres of relevance: schools, community, and youth programming. The section for schools will be targeted towards administrators, parents, and students with survey results on school perceptions, educational aspirations, engagement, and occupational aspirations. The component on community will provide our steering committees, service providers, and economic and community development professionals with information on residential aspirations, community perceptions, place attachment, development desires, and community concerns from youth. Lastly, information on desired skills and training, local employment, and occupational aspirations will be pertinent to youth programs administered by non-profits, community and technical colleges, and universities. These briefing papers and fact sheets will be disseminated electronically and via hard copy to stakeholders and school officials in each state, and stored on the Ecosystem Workforce Program website (<http://ewp.uoregon.edu/>).

Our research analyzed the connections between educational institutions, local community context, and economic trajectories in order to inform local schools, industries, and communities. Through close work with community partners, this work will enhance current efforts at youth development through improved coordination, programming, and innovative evaluation. These outcomes will lead to stronger, more proactive communities that support future decisions of youth. The results of this research will allow rural communities throughout the United States to better understand the challenges regarding youth retention and recruitment, and will provide insights as to how to set rural development trajectories that meet the needs of current and future generations.

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BIOGRAPHY OF THE AUTHOR

Nicole Rhiannon (Gayer) Bernsen was born in Ventura, California on June 30, 1983. She lived in Ventura, Ojai, and Spokane but spent her formidable years in Templeton, California which she considers her hometown. Nicole graduated from Templeton High School in 2001 where she lettered in cross country, basketball, tennis, and track. She earned an associate's degree in liberal studies from Ventura College in 2003 where she played basketball and tennis. Nicole transferred to the University of California Santa Barbara as a Regent Scholar. During her time at UCSB, she studied abroad at the American University of Paris, participated in the UCDC program interning for the White House Environmental Executive, conducted research for the Department of French and Italian Studies and the Sustainable Living Program, and fell in love with rugby. She graduated in 2005 with a bachelor's degree in global studies concentrating in socioeconomics and politics focused on Europe and Eurasia, and minored in environmental studies. Nicole went on to earn a secondary social sciences teaching credential from Cal Poly San Luis Obispo. After substitute teaching for two years in California and gaining tenure at St. Paul High School in Oregon, where she taught for four years and coached basketball and rugby, Nicole earned a master's degree in political science from the University of New Mexico in 2016. At UNM she conducted applied policy research for the Policy Office, U.S. Department of State, and New Mexico Evaluation Lab.

Nicole joined Dr. Mindy Crandall's Management and Economics Lab in the School of Forest Resources at the University of Maine in August of 2016. During her time in Orono, Nicole served as the UMaine Women's Rugby Club coach, which was subsequently nationally ranked for the first time in recent school history, reaching 9th for 15s and 3rd for 7s. At UMaine, she had the opportunity to conduct applied educational research with a variety of stakeholders and community partners in Maine and Oregon. Nicole is a candidate for the Doctor of Philosophy degree in Forest Resources from the University of Maine in May 2020.