

Jost Laura (Orcid ID: 0009-0001-5292-5158)  
Rapp Claire (Orcid ID: 0000-0003-1579-5208)

# **The role of gender and ethnicity in perceived public support and sense of belonging among resource management professionals in Oregon and Washington, USA**

**Laura Jost <sup>1</sup>, Claire Rapp <sup>2\*</sup>, and Michael Paul Nelson <sup>1</sup>**

<sup>1</sup> Department of Forest Ecosystems and Society, Oregon State University

321 Richardson Hall, Oregon State University, Corvallis, OR 97331

<sup>2</sup> Colorado Forest Restoration Institute, Colorado State University

1001 Amy Van Dyken Way, Fort Collins, CO 80521

\*Corresponding author email: [claire.rapp@colostate.edu](mailto:claire.rapp@colostate.edu)

**Keywords;** diversity equity and inclusion; natural resource managers; public acceptability; public land managers

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: [10.1002/pan3.70066](https://doi.org/10.1002/pan3.70066)

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## Abstract

1. Federal and state land agencies lack diversity at the natural resource manager level, in turn limiting the agencies' capacity for creative problem solving needed for complex and wicked environmental problems. Diverse representation is imperative to increase public support and trust in natural resource management.
2. We used an online survey method to examine the relationship and experiences between independent demographic variables (e.g., gender, ethnicity, years worked in natural resources) and two dependent variables: 1) perceived public support, and 2) sense of belonging for resource management professionals in the Pacific Northwest, USA.
3. We find in general, that gender is associated with how one progresses through a career in natural resource management. As years in natural resource management increases, sense of belonging decreases for women and remains constant for men. Similarly, as years in natural resource management increases, perceived public support increases for men and remains constant for women.
4. Given that ample past research suggests strong links between sustainable management and diverse perspectives, this study has implications for addressing our current and future natural resource management challenges.

## Introduction

### Public Land Management in the Pacific Northwest, USA

A substantial portion of the land in the Pacific Northwest (including Oregon and Washington states) region of the United States is state and federal public land. Federal land in particular plays an important role in natural resource management in these states since over half of the land in Oregon and nearly a third in Washington is managed by the federal government. The four major federal land agencies in these states, the US Forest Service (Forest Service), the Bureau of Land Management, the US Fish and Wildlife Service (Fish and Wildlife Service) and the National Park Service, have different land management emphases. The Forest Service and Bureau of Land management manage the majority of the public land in the Pacific Northwest and operate under a sustained yield, multiple-use paradigm, while the Fish and Wildlife Service and National Park Service have more narrow administrative focuses on conservation and recreation. At the state level, Oregon and Washington have multiple state agencies with jurisdiction over state and private land. The Oregon Department of Forestry and the Washington State Department of Natural Resources have similar (though not identical) missions and land types as the Forest Service and Bureau of Land Management. Although the objectives and landscapes of these agencies differ, the consistent lack of diversity compared to the population they represent is striking. Oregon and Washington are both less ethnically diverse than the country on average; 65% and 74% of Washingtonians and Oregonians respectively identify as White alone in census data compared to 60% nationally (U.S. Census Bureau, 2022). In comparison, an analysis of over 690 Forest Service workplaces indicated that the workforce demographics overrepresented the White population by 20 percentage points

(Locke et al., 2023). Similarly, the National Park Service workforce consisted of 78.5% White employees. Public land agencies are also male dominated: only 37.8% of National Park Service employees and 34.2% of Forest Service employees are women (NPS History Collection, 2021b, 2021a; Westphal et al., 2022). The lack of diversity in public land agencies in the Pacific Northwest has implications for their ability to respond to the complex land and natural resource management challenges they face.

### **Complex Problem Solving in Natural Resource Management**

Many natural resource challenges are fundamentally “wicked” and complex, lacking one true, objective solution (Balint et al., 2011; Rittel & Webber, 1973). Rather, continual management is needed, with consideration of changing social values and ecological knowledge. This means that effectively managing and addressing natural resource management issues requires innovation, creativity, and a wide array of perspectives and experiences (Shindler & Cramer, 1999). One avenue for innovative land management is leveraging demographic and experiential diversity within decision-making positions. Workforce diversity is directly linked to greater organizational efficiency and higher levels of solution creativity (Richard, 2000; Sohail et al., 2011). In comparison, gender disparity for resource management professionals has significant negative effects on the implementation of innovative solutions and productivity (Arismendi & Penaluna, 2016). As well, workforce diversity increases public engagement with natural resource management and can improve efficacy for multiple-use mandate policies (Lopez & Brown, 2011). Thus, representation in natural resource management is imperative for increasing legitimacy and trust between the public and NR agencies (Ricucci & Van Ryzin, 2017; Selden & Selden, 2001).

Further, representative bureaucracies often advocate for the interests of the social groups reflecting their own demographics (i.e., ethnicity, gender) (Ricucci & Van Ryzin, 2017). Thus, the *status quo* for public land agencies predominately represents the interests of white men. As such, promoting values that move beyond the dominant perspective is critical in engaging a diverse public. This is important as research has shown that diversity in large agencies such as the US Environmental Protection Agency can ameliorate some environmental injustices. Increased minority representation in the workforce reflects distributional equity in resource management, especially for historically marginalized communities (Liang et al., 2020). Natural resource management agencies have historically discriminated against and excluded minorities in both field work and supervisory positions (Mejicano et al., 2022). Acknowledging and increasing accessibility to natural resource programs and management is critical to promoting access to resources, increasing public involvement, and public support. It's also important in allowing values to be heard which have been suppressed in the past (Schelhas, 2002), including the values of diverse resource management professionals.

### **Marginalization of Diverse Resource Management Professionals**

For marginalized resource management professionals, a lack of diversity and experience with prejudice can negatively impact their wellbeing, undermining the benefits of a diverse workforce and creating a feedback loop that stymies efforts at diversification. Consistent patterns of belittlement can decrease the sense of belonging within an organization or workforce and are associated with lower levels of both mental health and levels of job satisfaction (Rubin et al., 2019). For example, in comparison to their male peers, women working in fields such as wildland fire have often had their abilities questioned or have to

initially prove their competence (Rapp & Wilson, 2022; Reimer & Eriksen, 2018). In one report surveying 18,550 National Park Service employees, 38.7% of employees had experienced some form of harassing and/or assaulting behaviors. Among these employees, 31.1% indicated this was experienced due to their gender (National Park Service, 2017). Further, the employees who had higher rates of harassment and/or assault were more likely to have higher perceived levels of pressure to conform to organizational norms (National Park Service, 2017). In this case, organizational norms were followed to get along with and continue to work with coworkers and supervisors.

The hierarchical structure common in government agencies socializes individuals to a culture of conformity to comply for promotion into desirable positions (Hillman et al., 2023). A culture of conformity can be less welcoming toward minorities (Kern et al., 2020) as minimization of differences between groups reinforces the dominance of the majority and marginalization of the minority (Plaut et al., 2009). Previous studies have shown that individuals who identify as one or more marginalized groups often utilize shifting strategies (i.e., “code-switching” to conform to different contexts) in response to negative stereotypes (Dickens & Chavez, 2018; McDowell, 2008). Identity shifting and managing the values and expectations of different communities can lead to personal conflict internally and behavioral alterations that are mentally exhausting (Kendall et al., 2021).

When taken together, the consequences are predictable. Longitudinal data from 1996-2016 for the Forest Service indicates that while representation increased within higher grade roles in federal agencies, turnover was still higher for employees of color than White male employees (Sachdeva et al., 2023; Westphal et al., 2022). And while initial hiring grades were

higher for people of color and White women in federal resource management professional positions, advancement and length of service were significantly slower and shorter than their white male colleagues (Sachdeva et al., 2023)

Consequently, in natural resource management, we should expect individuals from under-represented backgrounds to feel a lower sense of belonging compared to their peers, which may be exacerbated over time. Marginalized resource management professionals who spend many years in natural resource management may do so subject to the pressures of conformity and the experiences of prejudice. In turn, this may negatively alter their sense of belonging compared to their white, male peers. Because a low sense of belonging may fundamentally undermine the benefits that may accrue from having diverse voices in natural resource management positions, and high sense of belonging is an important indicator for retention rates (Kennedy, 2021), it is important to assess how it changes over time for diverse and non-diverse resource management professionals.

### **Public Perception of Diverse Resource Management Professionals**

Diversity in natural resource management agencies supports managers' ability to serve a diverse public effectively. Simultaneously, diverse resource management professionals interface with and are perceived by the public. In the United States and specifically the Pacific Northwest, resource management professionals work in areas that are overwhelmingly white and where the dominant social image of resource management professionals is masculine. This likely affects the way diverse resource management professionals experience public trust and support. Results from surveys on restoration practices indicate that building trust among stakeholders and the public can be more important than citizen knowledge and issue

awareness when it comes to garnering public support (Gordon et al., 2014). Conversely, a lack of trust in natural resource agencies can result in a lack of public support for decision-making (Shindler et al., 2002). Further, trust can be broken down into several broad forms depending on their function and interactions. For example, affinitive and rational trust are important for natural resource management and collaboration (Stern & Coleman, 2015). Affinitive trust develops from shared positive experiences, similar values, or shared characteristics. In comparison, rational trust develops from the perceived predictability and competence of the trustee (Coleman & Stern, 2018).

Trust occurs across levels of trustee and types of trust. For example, the public may hold affinitive trust for an individual within an agency but lack rational trust for the agency, or vice versa. Affinitive trust has been shown to be particularly integral to increasing public support for management actions (Stuart Carlton et al., 2023; Vaske et al., 2007). However, when affinitive trust is built at least in part on perceived similar values and shared characteristics, resource management professionals with diverse lived experiences that do not match the population at large may be less likely to be granted affinitive trust. Similarly, because resource management professionals from under-represented identities may need to additionally prove their competence compared to their peers (e.g., Rapp and Wilson 2020) they may be less likely to be granted rational trust. These effects may be exacerbated over time as under-represented resource management professionals face more hurdles to building a repertoire of shared experiences and are held to a higher standard to demonstrate their competence.

While public support for agency action has been the subject of considerable research, less is known about how the public responds to resource management professionals from

under-represented backgrounds, and how these resource management professionals perceive public support. Because public support affects agency decision-making, it is important to understand how public support is perceived by marginalized resource management professionals compared to their peers.

### **The present study**

Understanding and evaluating the experiences of marginalized resource management professionals is critical to address low retention, unsuccessful recruitment, and marginalization of diverse voices in natural resource management. We move beyond the well-described lack of diversity in natural resource management agencies (Mejia & Griffis-Kyle, 2020) and begin examining the experiences of marginalized resource management professionals in comparison to their white, male counterparts. We surveyed resource management professionals ( $n = 484$ ) from various natural resource agencies in Oregon and Washington to assess how the identities and experiences of resource management professionals over time interact to affect sense of belonging and perceived public support.

We ask the following research questions:

1. How do gender and ethnicity affect sense of belonging and perceived public support among resource management professionals in the Pacific Northwest?
2. How do gender and ethnicity interact with the accumulation of personal experience, i.e., years in natural resource management, to affect sense of belonging and perceived public support among resource management professionals in the Pacific Northwest?

### **Materials and methods**

## Subjects

We analyzed responses from state and federal managers working for the Oregon Department of Forestry, Washington Department of Natural Resources, US National Park Service, US Fish and Wildlife Service, US Bureau of Land Management, and US Forest Service. We selected these agencies to capture the main four federal public land agencies and the state agencies that are most similar to the largest federal agencies in the Pacific Northwest, the Forest Service and Bureau of Land Management

Because “natural resource manager” and “resource management professional” are not a specific job title and the traditional duties of a resource management professional can fall under a variety of positions, we filtered out professionals who do not directly manage land or water through a multi-step process for every agency except the Forest Service. First, we solicited email lists of all employees working for the agencies in Washington and Oregon through public records requests. From these lists, we filtered out all names and contact information for people working in Human Resources and Information Technology, or as Field Technicians and Research Scientists. Next, we contacted all remaining potential respondents and invited them to participate in the survey if all or a significant portion of their job entailed planning or implementing management actions on a landscape. We also used a filter question at the beginning of the survey with similar phrasing (see Supporting Information).

For the Forest Service, we were not able to gain direct access to the sample population through public record requests. Instead, our survey was sent on our behalf to approximately 450 potential respondents via internal Forest Service listservs that included managers in Oregon and Washington. Like the other agencies, potential respondents were encouraged to

participate if they planned or implemented management actions on a landscape. Forest Service respondents also went through the same filter question.

All respondents provided informed consent to participate in this survey; the first page of the survey included a consent statement that described that by clicking to the next page of the survey they consented to participate. Data was collected in a manner where participants were unable to be identified directly or through identifiers. Furthermore, the Qualtrics survey was set to anonymize responses and neither data nor information collected was shared outside the research team. Each wave of data collection received approval from the Oregon State University Institutional Review Board. We received approval from the state (IRB #: HE-2023-183, HE-2023-348, HE-2023-399).

### **Survey design**

We measured sense of belonging and sense of public support with 6 items each, using 5-point scales (-2 to 2) from Strongly Disagree to Strongly Agree. Items used to measure sense of belonging and public support are available in the Supporting Information. Sense of belonging included items measuring how well respondents got along with their colleagues and how well their values matched the values of their unit and agency. Sense of public support included items measuring how well the respondent believed the public understood and supported the expertise and objectives of their unit. Respondents answered demographic questions including gender and ethnicity, agency employment, and years in their current job and natural resource management. Both sense of belonging and sense of public support had sufficient internal reliability to average their respective items together ( $\alpha = 0.75$  and  $0.80$ , respectively) and analysis indicated dropping any items would not improve reliability. Beliefs about sense of

belonging were calculated by averaging how well the respondents ranked getting along with people in their unit, agreement with agency values and priorities, and coworker rapport.

Respondents were surveyed in how well they felt the public supported and understood the objectives of their unit and trusted their expertise. Respondents answered demographic questions including gender and ethnicity, years in their job and years in natural resource management, home agency, and region where they worked.

### **Variable Transformation**

We transformed gender into a binary numeric variable (0 = male, 1 = female). In our survey, our measure of gender included a combined “Other/Prefer not to say” category. Because our survey combined these categories, we cannot know whether respondents in the third category identified as non-binary or did not want to provide information. Consequently, we exclude the third category from our analysis. We also transform ethnicity into a binary numeric variable (0 = white, 1 = non-white, “prefer not to say” excluded). We used the U.S. Census categories to measure ethnicity and allowed respondents to indicate they identified as one or more U.S. Census ethnic groups, with an “Other” and “prefer not to say” option. In the context of our results, “white” respondents are those who identified as white and no other ethnicity. One significant limitation to this analysis is grouping all respondents who identified as one or more non-white ethnicities, as a monolithic “non-white” category. As a result, this may create false generalizations for a diverse group of people.

### **Analysis**

We describe sample characteristics, including demographics and average sense of belonging and public support. We use multiple linear regression with robust standard error and

interaction terms. We treat our dependent variables as continuous. Our independent variables are either binary or continuous. We use an independent link function, which assumes our independent and dependent variables have a linear relationship. We use the `lm()` function in R to test our models. For each of our models, the Shapiro-Wilks test of normality of residuals indicated our residuals were heteroscedastic ( $p < .05$ ). To address this issue, we used robust standard errors. We used the “sandwich” and “lmtest” packages in R to compute robust standard errors for our regression coefficients. Results were similar with normal and robust standard errors. We report the variable coefficients from the robust standard error models. For statistically significant interaction terms, we probed the interactions using the Johnson-Neyman technique to find the areas of significance (Bauer et al., 2005; Spiller et al., 2013). We used the “interactions” package in R for simple slopes analysis of interaction effects. ChatGPT was used to assist in writing code for data cleaning, preparation, and statistical analysis. Data were analyzed in R version 4.4.1.

## Results

### Sample characteristics

The research team contacted 2,273 people working for the Bureau of Land Management, Fish and Wildlife Service, National Park Service, Washington Department of Natural Resources, and Oregon Department of Forestry. 568 people clicked on the survey (response rate = 25%) and 461 people completed the survey (adjusted response rate = 20%). For the Forest Service, the survey was sent by a collaborator to approximately 450 potential respondents via internal Forest Service listservs that included managers in Oregon and

Washington. We received 34 responses from Forest Service employees. Agency membership of respondents is summarized in Table 1.

**Table 1. Agency membership used in the study (n = 352)**

	BLM	USFWS	NPS	USFS	ODF	WDNR
<b>TOTAL</b>	100	11	13	34	65	129

Respondents reported working in natural resource management for an average of 19 years (Table 2). On average they felt a positive sense of belonging ( $\bar{x} = 1.02$ ) and a neutral sense of public support ( $\bar{x} = 0.08$ ). Of respondents who provided both gender and ethnicity information, 93% identified as white (e.g., German, Irish, Italian, Polish, etc.) and 65% identified as men. However, when looking at the intersections of ethnicity and gender, we find 64% of white respondents and 84% of non-white respondents identified as male. Only around 1% of our sample identified as non-white and female (Table 3).

**Table 2. Summary of continuous variables**

Variable Name	Mean	Standard Deviation	Range	n
<b>Years in Natural Resource Management</b>	19	11.02	0 – 50	349
<b>Sense of Belonging</b>	1.02	0.59	-2 – 2	353
<b>Sense of Public Support</b>	0.075	0.7	-2 – 2	352

**Table 3. Gender and ethnicity comparison used in the study (n=298)**

	FEMALE	MALE
<b>NON-WHITE</b>	4	21

WHITE

98

175

## Model Results

For sense of belonging, we do not find any statistically significant direct effects ( $p < .05$ ) of gender, years in natural resource management, or ethnicity on sense of belonging (Table 4). However, ethnicity is approaching significant ( $p = 0.07$ ). We find a significant interaction effect between gender and years in natural resource management ( $\beta = -0.017$ ,  $p = .02$ ). Simple slopes analysis reveals years in natural resource management has no significant impact on sense of belonging for men ( $p = .54$ ) but has a negative effect on sense of belonging for women ( $\beta = -0.015$ ,  $p = .02$ ) (Table 5, Figure 1).

For perceived public support, we do not find a statistically significant direct effect ( $p < .05$ ) of ethnicity on perceived public support. We find a significant direct effect of gender ( $\beta = 0.375$ ,  $p = .02$ ) and years in natural resource management ( $\beta = 0.013$ ,  $p = .01$ ) on perceived public support. We find a significant interact effect between gender and years in natural resource management ( $\beta = -0.018$ ,  $p = .01$ ). Simple slopes analysis reveals years in natural resource management has a positive effect on perceived public support for men ( $\beta = 0.014$ ,  $p = .01$ ), but has no significant impact on perceived public support for women ( $p = .35$ ) (Figure 2).

**Table 4. Regression results**

Model	term	$\beta$	robust SE	t-stat	p*	R <sup>2</sup> (df)
	Intercept	1.003	0.08	12.061	<.001	
<b>Sense of Belonging</b>	Gender	0.186	0.13	1.400	0.16	
	Years in NRM	0.003	0.00	0.839	0.40	
	Ethnicity	0.343	0.19	1.847	0.07	

	Gender*Years	-0.017	0.01	-2.430	0.02*	
	Ethnicity*Years	-0.009	0.01	-0.770	0.44	0.043 (287)
	Intercept	-0.247	0.12	-2.088	0.04	
	Gender	0.375	0.16	2.312	0.02*	
<b>Perceived</b>	Years in NRM	0.013	0.00	2.609	0.01*	
<b>Public Support</b>	Ethnicity	0.056	0.32	0.176	0.86	
	Gender*Years	-0.018	0.01	-2.596	0.01*	
	Ethnicity*Years	0.008	0.01	0.593	0.55	0.040 (286)

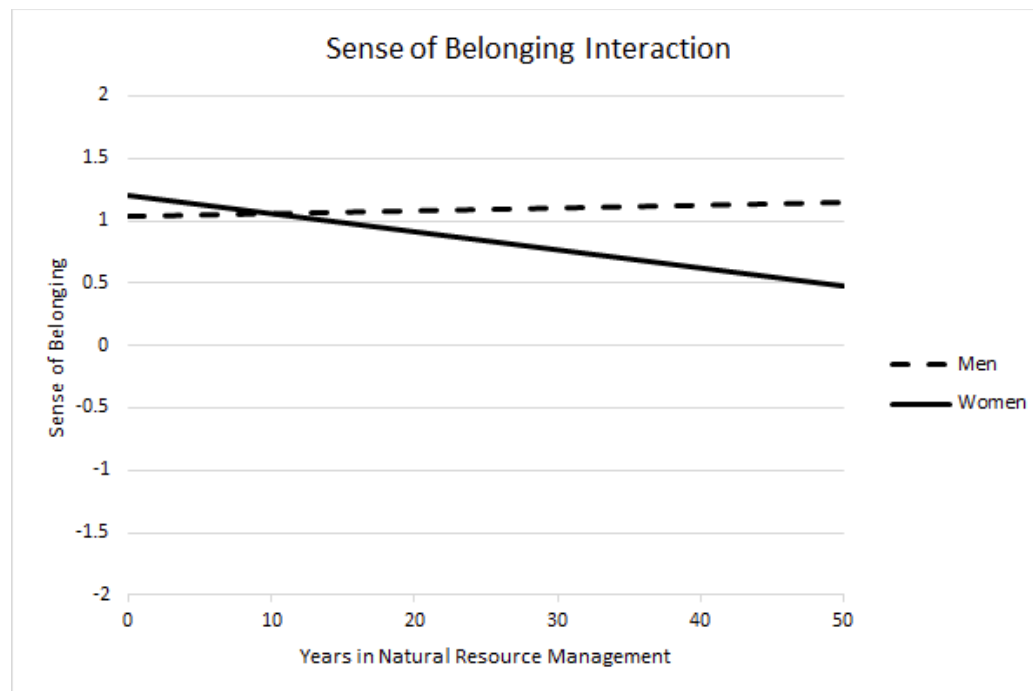
\*indicates  $p < .05$

**Table 5. Simple slopes analysis**

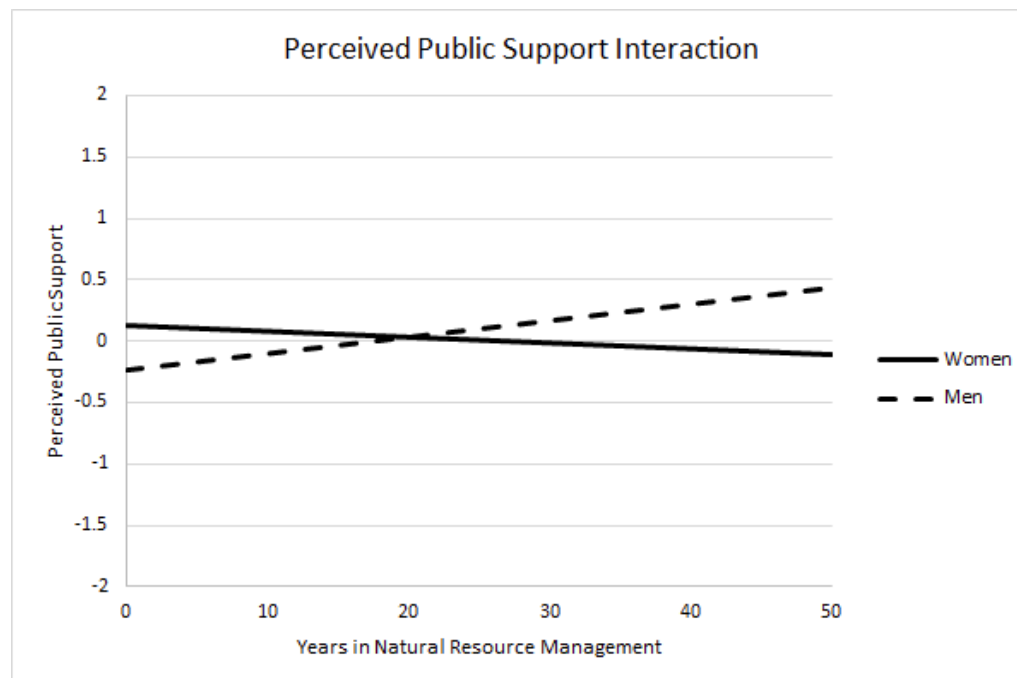
<b>Moderator Value (Gender of Respondent)</b>	<b>X, Y</b>	<b><math>\beta</math></b>	<b>SE</b>	<b>t-stat</b>	<b>p*</b>
<b>Male</b>	Years in NRM, Belonging	0.002	0.004	0.678	0.50
<b>Female</b>	Years in NRM, Belonging	-0.015	0.006	-2.408	0.02*
<b>Male</b>	Years in NRM, Public Support	0.014	0.005	2.829	0.01*
<b>Female</b>	Years in NRM, Public Support	-0.005	0.005	-0.927	0.35

\*indicates  $p < .05$

**Figure 1. Interaction between gender and years in natural resource management on sense of belonging**



**Figure 2. Interaction between gender and years in natural resource management on perceived public support.**



## Discussion

These findings illustrate the ongoing demographic diversity discrepancies in natural resource management. At the descriptive level, we see that the population of resource management professionals in the Pacific Northwest is overwhelming white, male, and white male. Although diversity within natural resources has increased in the last few decades (Sachdeva et al., 2023; Westphal et al., 2022), there is still a clear gap in the experiences of men and women in natural resource management. Our results highlight the benefits accrued to men working in natural resource management over time. Though men and women who are early in their career in natural resource management (as indicated by the number of years they have been in the field) have a similar sense of belonging, we find a widening gap as the years in natural resource management increases. Similarly, we see that as years in natural resource management increases, men feel greater public support, while women do not. Importantly, our results are not longitudinal: it is not clear from our data if today's early career women will see their sense of belonging decrease over time, or if sense of belonging is going up with each new cohort, and we have similar limitations in interpreting perceived public support. Regardless, this lower sense of belonging among later-career women is concerning and aligns with the experience of women in other natural resource management contexts. Interviews with wildland fire incident management teams indicate that familiarity through shared past experiences and gender play important roles in trust between supervisors and subordinates: women experienced the questioning of their competency and trustworthiness based on gender (Rapp & Wilson, 2022). If later-career women have a lower sense of belonging and perceived public support than their male peers, they may not be able to leverage the same shared experiences

and familiarity and consequently have their competence and trustworthiness more likely to be questioned (Stern & Coleman, 2015).

### **Practical Implications and Recommendations**

The lack of diversity in natural resource management agencies may hinder complex and innovative problem solving needed to address current environmental challenges (Arismendi and Penaluna, 2016). Our results highlight two reasons why agencies may struggle to leverage creative problem solving and innovation due to workforce homogeneity. First, even with diversification, public land use agencies are likely less able to leverage these benefits due to lower sense of belonging among women with longer tenure, and thus more experience, in natural resource management. However, empowering current employees, mitigating low retention rates, and reducing the effects of the leaky pipeline all offer actionable steps toward workforce diversification and empowerment for institutions and agencies. For example, increasing colleague support would likely improve sense of belonging. Through early career stages, having mentors who reflect similar backgrounds may help retention rates. In part, having supervisors with similar demographic characteristics can help reduce feelings of imposter syndrome and lack of belonging (Cokley et al., 2017; Orr et al., 2021).

Second, demographic characteristics affect how resource management professionals perceive public support for their unit's actions. Perception of public support is an important determinant of manager decision-making even when managers have flexibility in policy (Steelman & McCaffrey, 2011). Our data highlights that the more time spent in natural resource management, the greater perceived public support men feel, while years in natural resource management does not affect perceived public support. Taken with the decreasing sense of

belonging over time for women, we see that women with the greatest experience and tenure in land management may feel the least supported and empowered to engage in innovative decision-making. While agencies cannot directly change cultural conceptualizations of natural resource management as masculine and male-dominated, agencies can still be aware of the impact demographics have on managers' perceptions and take steps to ensure managers feel supported and respected in their work.

### **Limitations and Future Research**

There are several limitations to this study. Westphal et al. (2022) calls attention to the change in reporting categories with the addition of identifying as two or more races as a potential confounding factor when analyzing growth in ethnic diversity. This can present several challenges given the diverse lived experiences of multi-racial individuals. We combined biracial, multiracial, and people of color into one group which prevented us from examining the complexities of colorism and prejudice. Furthermore, we were unable to measure intersectionality adequately due to a limited sample size (e.g., four women of color). There are also many other measures of diversity and the intersectionality of many categories such as sexual orientation, religion, and socioeconomic status (Batavia et al., 2020). All these factors may affect the cultures of conformity versus diversity of perspectives in public land agencies. Further research is needed to assess the intersectionality of marginalized identities within public land agencies.

Further, our work highlights the way years in natural resource management interact with identity to affect sense of belonging. However, as described previously, our data is not longitudinal and we cannot determine the extent to which the differences we observe between

early and late-career women is due to sense of belonging declining the longer women are in natural resource management, or sense of belonging being lower initially for women who started working in natural resource management earlier. Longitudinal and qualitative studies examining both how marginalized people experience being in the natural resource management field over time can help unpack the differences observed.

Finally, at a broader level, our study discusses the instrumental value of a diverse workforce in natural resource management. However, we suggest diversity ought to be valued intrinsically; if the instrumental value of diversity for its impact on problem solving is over-emphasized, the importance of social justice and diversity for its own inherent value may be neglected (Batavia et al., 2020). While diversity can indeed have instrumental benefits, this does not undermine or replace the intrinsic value and obligation to uphold justice, fairness, and equity.

## Conclusion

The field of natural resource management has historically lacked ethnic and gender diversity. Our findings highlight the experiences of marginalized resource management professionals in relation to perceived public support and sense of belonging over time. We find NR agencies in the Pacific Northwest continue to be overwhelmingly white and male-dominated, with very low representation from women of color. This has negative implications for the ability of these bureaucracies to advocate and represent diverse voices (Ricucci and Van Ryzin, 2017). Further, our results highlight the way gender is associated with progression through a career in natural resource management: while men's sense of belonging does not

change over time, women's sense of belonging decreases with years in natural resource management. Similarly, while women's perceived public support does not change over time, men's perceived public support increases with years in natural resource management. Diverse perspectives benefit organizations because they foster creativity and innovation (Richard, 2000; Sohail et al., 2011). However, if diverse perspectives are present but not empowered or trusted, they will be marginalized, sidelined, and not leveraged. Natural resource agencies face complex and difficult challenges that require creativity, innovation, and public trust to manage (Shindler & Cramer, 1999, Shindler et al 2002). Equitable representation is both a moral imperative agencies ought to embody and a critical solution for addressing present real world challenges.

### **Author Contributions**

Claire Rapp, Laura Jost, and Michael Paul Nelson conceived the ideas and designed methodology; Claire Rapp and Michael Paul Nelson collected the data; Claire Rapp and Laura Jost analyzed the data; Laura Jost and Claire Rapp led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

### **Acknowledgements**

Data were provided by the H.J. Andrews Experimental Forest and Long-Term Ecological Research (LTER) program, administered cooperatively by Oregon State University, the USDA Forest Service Pacific Northwest Research Station, and the Willamette National Forest. This material is based upon work supported by the Center for Future of Forests and Society in the

College of Forestry at Oregon State University and the National Science Foundation under the grant LTER8 DEB-2025755.

**Conflict of Interest:** We have no conflicts of interest to declare.

**Data Availability Statement:** The data and that support the findings of this study are openly available in The Environmental Data Initiative repository at <https://doi.org/10.6073/pasta/5be824b73254ea912c6f72b98024e205>.

## References

- Arismendi, I., & Penaluna, B. E. (2016). Examining diversity inequities in fisheries science: A call to action. In *BioScience* (Vol. 66, Issue 7, pp. 584–591). Oxford University Press.  
<https://doi.org/10.1093/biosci/biw041>
- Balint, P. J., Stewart, R. E., Desai, A., & Walters, L. C. (2011). *Wicked Environmental Problems: Managing Uncertainty and Conflict*. Island Press/Center for Resource Economics.
- Batavia, C., Penaluna, B. E., Lemberger, T. R., & Nelson, M. P. (2020). Considering the Case for Diversity in Natural Resources. *BioScience*, 70(8), 708–718.  
<https://doi.org/10.1093/biosci/biaa068>
- Bauer, D. J., Curran, P. J., & Thurstone, L. L. (2005). Probing interactions in fixed and multilevel regression: Inferential and graphical techniques. *Multivariate Behavioral Research*, 40(3), 373–400. [https://doi.org/10.1207/s15327906mbr4003\\_5](https://doi.org/10.1207/s15327906mbr4003_5)
- Cokley, K., Smith, L., Bernard, D., Hurst, A., Jackson, S., Stone, S., Awosogba, O., Saucer, C., Bailey, M., & Roberts, D. (2017). Impostor feelings as a moderator and mediator of the relationship between perceived discrimination and mental health among racial/ethnic minority college students. *Journal of Counseling Psychology*, 64(2), 141–154.  
<https://doi.org/10.1037/cou0000198>
- Coleman, K., & Stern, M. J. (2018). Exploring the Functions of Different Forms of Trust in Collaborative Natural Resource Management. *Society and Natural Resources*, 31(1), 21–38.  
<https://doi.org/10.1080/08941920.2017.1364452>

- Dickens, D. D., & Chavez, E. L. (2018). Navigating the Workplace: The Costs and Benefits of Shifting Identities at Work among Early Career U.S. Black Women. *Sex Roles*, 78(11–12), 760–774. <https://doi.org/10.1007/s11199-017-0844-x>
- Gordon, R., Brunson, M. W., & Shindler, B. (2014). Acceptance, Acceptability, and Trust for Sagebrush Restoration Options in the Great Basin: A Longitudinal Perspective. *Rangeland Ecology and Management*, 67(5), 573–583. <https://doi.org/10.2111/REM-D-13-00016.1>
- Hillman, J. G., Fowlie, D. I., & MacDonald, T. K. (2023). Social Verification Theory: A New Way to Conceptualize Validation, Dissonance, and Belonging. In *Personality and Social Psychology Review* (Vol. 27, Issue 3, pp. 309–331). SAGE Publications Inc. <https://doi.org/10.1177/10888683221138384>
- Kendall, D., Cannon, S., & Gill, J. (2021). The Role of White Support in Predicting Racial Minorities' Feelings of Inclusion and Retention. *Journal of Organizational Psychology*, 21(2), 168–182.
- Kennedy, J. T. (2021). Belonging: The Secret to Building Engagement for Employees of All Backgrounds. *Leader to Leader*, 2021(99), 45–51. <https://doi.org/https://doi.org/10.1002/ltl.20552>
- Kern, C. C., Kenefic, L. S., Dockry, M. J., & Cobo-Lewis, A. (2020). Discrimination and career satisfaction: Perceptions from US forest service scientists. *Journal of Forestry*, 118(1), 44–58. <https://doi.org/10.1093/jofore/fvz057>
- Liang, J., Park, S., & Zhao, T. (2020). Representative Bureaucracy, Distributional Equity, and Environmental Justice. *Public Administration Review*, 80(3), 402–414. <https://doi.org/10.1111/puar.13160>

- Locke, D. H., Sachdeva, S. S., Westphal, L. M., Kenefic, L. S., Dockry, M. J., & Fisher, C. L. B. (2023). Spatially Explicit Assessment of the USDA Forest Service as a Representative Bureaucracy. *Forest Science*, 69(4), 443–451. <https://doi.org/10.1093/forsci/fxad018>
- Lopez, R., & Brown, C. (2011). Why Diversity Matters. *Wildlife Professional*, 5: 20-27. [www.lotek.com/cc](http://www.lotek.com/cc)
- Mcdowell, J. (2008). *Head black woman in charge: An investigation of black female athletic directors' negotiation of their gender, race, and class identities* [PhD Dissertation]. Texas A&M University.
- Mejia, M. F., & Griffis-Kyle, K. L. (2020). Diversity in the natural resource workforce. *Texas Journal of Science*, 72(1). [https://doi.org/10.32011/TXJSCI\\_72\\_1\\_ARTICLE8](https://doi.org/10.32011/TXJSCI_72_1_ARTICLE8)
- Mejicano, E., Dockry, M. J., & Kilgore, M. A. (2022). *Workforce Diversity in Federal Natural Resource Organizations*.
- National Park Service. (2017). *National Park Service Work Environment Survey Technical Report*.
- NPS History Collection. (2021a). *Comparison of NPS Workforce to U.S. Population*.
- NPS History Collection. (2021b). *Total Permanent NPS Employees by Gender (1975-2021)*.
- Orr, C. J., McLaurin-Jiang, S., & Jamison, S. D. (2021). Diversity of mentorship to increase diversity in academic pediatrics. In *Pediatrics* (Vol. 147, Issue 4). American Academy of Pediatrics. <https://doi.org/10.1542/peds.2019-3286>
- Plaut, V. C., Thomas, K. M., & Goren, M. J. (2009). *Is Multiculturalism or Color Blindness Better for Minorities?*

- Rapp, C. E., & Wilson, R. S. (2022). Factors that contribute to trustworthiness across levels of authority in wildland fire incident management teams. *International Journal of Disaster Risk Reduction*, 73. <https://doi.org/10.1016/j.ijdrr.2022.102877>
- Reimer, R., & Eriksen, C. (2018). The wildfire within: Gender, leadership and wildland fire culture. *International Journal of Wildland Fire*, 27(11), 715–726.  
<https://doi.org/10.1071/WF17150>
- Riccucci, N. M., & Van Ryzin, G. G. (2017). Representative Bureaucracy: A Lever to Enhance Social Equity, Coproduction, and Democracy. *Public Administration Review*, 77(1), 21–30.  
<https://doi.org/10.1111/puar.12649>
- Richard, O. C. (2000). Racial Diversity, Business Strategy, and Firm Performance: A Resource-Based View. In *Source: The Academy of Management Journal* (Vol. 43, Issue 2).  
<https://www.jstor.org/stable/1556374>
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, 4, 155–169.
- Rubin, M., Paolini, S., Subašić, E., & Giacomini, A. (2019). A confirmatory study of the relations between workplace sexism, sense of belonging, mental health, and job satisfaction among women in male-dominated industries. *Journal of Applied Social Psychology*, 49(5), 267–282. <https://doi.org/10.1111/jasp.12577>
- Sachdeva, S. S., Westphal, L. M., Kenefic, L. S., Dockry, M. J., Locke, D. H., & Fisher, C. L. (2023). Despite Workforce Diversity Efforts, Career Metrics Differ for Some Demographic Groups in the USDA Forest Service. *Society and Natural Resources*, 36(6), 680–695.  
<https://doi.org/10.1080/08941920.2023.2183447>

- Schelhas, J. (2002). Race, Ethnicity, and Natural Resources in the United States: A Review. In *Natural Resources Journal*, Fall (Vol. 42, Issue 4).
- Selden, S. C., & Selden, F. (2001). Rethinking Diversity in Public Organizations for the 21st Century. *Administration & Society*, 33(3), 303–329.
- Shindler, B., & Cramer, L. A. (1999). Shifting Public Values for Forest Management: Making Sense of Wicked Problems. *Western Journal of Applied Forestry*, 14(1).
- Shindler, B. A., Brunson, M., & Stankey, G. H. (2002). *Social Acceptability of Forest Conditions and Management Practices: A Problem Analysis*.
- Sohail, A., ur Rehman, K., Javaid Iqbal, J., Razaq, A., & Suleman Sabir, M. (2011). The impact of Diversity training on Commitment, Career satisfaction and Innovation. In *Journal of Economics and Behavioral Studies* (Vol. 3, Issue 4).
- Spiller, S. A., Fitzsimons, G. J., Lynch, J. G., & McClelland, G. H. (2013). Spotlights, floodlights, and the magic number zero: Simple effects tests in moderated regression. *Journal of Marketing Research*, 50(2), 277–288. <https://doi.org/10.1509/jmr.12.0420>
- Steelman, T. A., & McCaffrey, S. (2011). What is limiting more flexible fire management-public or agency pressure? *Journal of Forestry*, 109(8), 454–461.
- Stern, M. J., & Coleman, K. (2015). The Multidimensionality of Trust: Applications in Collaborative Natural Resource Management. *Society and Natural Resources*, 28(2), 117–132. <https://doi.org/10.1080/08941920.2014.945062>
- Stuart Carlton, J., Ropicki, A., & Shivilani, M. (2023). Support for resource management: The role of information sources and affinitive trust. *Journal of Environmental Management*, 347. <https://doi.org/10.1016/j.jenvman.2023.119150>

U.S. Census Bureau. (2022). *Quick Facts: Washington; Oregon; United States*.

Vaske, J. J., Absher, J. D., & Bright, A. D. (2007). Salient Value Similarity, Social Trust and Attitudes toward Wildland Fire Management Strategies. *Human Ecology Review*, 14(2), 223–232.

Westphal, L. M., Dockry, M. J., Kenefic, L. S., Sachdeva, S. S., Rhodeland, A., Locke, D. H., Kern, C. C., Huber-Stearns, H. R., & Coughlan, M. R. (2022). USDA Forest Service Employee Diversity During a Period of Workforce Contraction. *Journal of Forestry*, 120(4), 434–452. <https://doi.org/10.1093/jofore/fvab071>

## Plain Language Summary

**Authors:** Laura Jost, Claire Rapp, Michael Paul Nelson

**Title:** As careers progress, the difference in experience between men and women in Pacific Northwest natural resources widens.

**Plain Language Summary:** Having a diversity of perspectives in natural resource management is important because diverse perspectives contribute to creative problem solving. However, most people in natural resource management are white men. The increasing number of white women and people of color in natural resource management positions have different experiences in the field than white men.

We surveyed natural resource managers in Oregon and Washington, USA to assess how much people feel like they belong in their job, and how much they feel like the public supports their professional decisions. We find that a higher percentage of our sample was white men than in the Oregon and Washington public at large, demonstrating continued under-representation of diverse people. Women of color were especially under-represented. Further, we find that as years in natural resource management increases, men's subjective experiences improve and women's get worse. As women spend more years in natural resource management, their sense of belonging goes down, and how much they feel the public supports them stays the same. In comparison, as men spend more years in natural resource management, their sense of belonging stays the same and how much they feel the public supports them goes up.

This is important because diverse voices can only contribute to creative problem-solving if people listen to those voices. If women do not feel they belong as much as their male coworkers, and if they do not feel the public supports them as much as their male coworkers, then natural resource and public land agencies may not be able to retain them or leverage their perspective and expertise to solve important environmental challenges.

### Image:

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