
Practice of Forestry - education & communication

An Adaptive and Evidence-Based Approach to Building and Retaining Gender Diversity within a University Forestry Education Program: A Case Study of SWIFT

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Abstract

Retaining women in forestry and other science, technology, engineering, and mathematics fields is a challenge. University education represents a critical point along the forestry pipeline in which women might leave the profession. Concerned with the low number of women graduating with bachelor's degrees in forestry from the University of Maine's School of Forest Resources, a group of faculty and students formed Supporting Women in Forestry Today (SWIFT) in 2016. An organization guided by literature on improving gender diversity in the workplace, SWIFT has taken an adaptive and evidence-based approach while hosting events throughout each academic year. Surveys indicate that SWIFT has been effective at helping participants increase awareness of gender-related issues, gain strategies, and develop connections. Although challenges still exist for women in forestry, this case study suggests that SWIFT is an effective model that could be used elsewhere to support the retention of women in the forestry profession.

Keywords: gender, retention, women, diversity, higher education

The profession of forestry has long been dominated by men (FAO 2006). Employers now often seek to diversify their workforce, recognizing that more diverse organizations have more innovation and better financial returns (Hewlett et al. 2013). However, the success or failure of educational institutions at recruiting and retaining gender diversity has a direct influence on the diversity of applicants (Arismendi and Penaluna 2016). In addition, increasing demographic diversity without

increasing inclusivity limits the positive impacts of improved representation (Sherbin and Rashid 2017). Educational institutions and employers within forestry must therefore also increase the extent to which women feel welcome and included.

Undergraduate and graduate programs have been identified as junctions along the educational pipeline where “leaks,” or stages when women leave scientific fields, occur (Pell 1996, Buckles 2019). Many

Management and Policy Implications

Many employers, from private companies to the federal government, value a diverse and representative workforce, and would like to have the largest possible pool of skilled labor from which to select. Yet engaging women to study forestry and ensuring that they complete school eager to join the workforce remains a problem. Groups that foster support and validation for women's experiences in the education portion of the training-to-workforce pipeline have the potential to help recruit and retain women while also boosting their participation in the forestry profession. This case study surveyed participants in Supporting Women in Forestry Today (SWIFT) in 2016 and 2019. Using these surveys and gender literature to adapt SWIFT's development showed that the combination of educational readings and discussions, panel sessions, social events, and hands-on-training were promising as an effective way to engage women in the forestry profession and increase the likelihood of program completion and workforce participation. Furthermore, participants report benefits from the networking opportunities and shared experiences provided by groups like SWIFT.

US forestry bachelor's degree programs struggle to matriculate and graduate women (Sharik 2015), and women remain underrepresented within the student body and among faculty and professional staff (Bal 2019). Although increasing representation is one part of the solution (Friedman 2000), it may not be sufficient to merely increase the gender diversity of faculty if the goal is to retain women students (Blickenstaff 2005). The forestry pipeline "leaks" because of an unwelcoming climate, the perception that forestry is a "male" profession, lack of feeling a sense of belonging, and lack of perceived career opportunities (Hubbard 2014, McGown 2015).

Research and practices from other fields dominated by men can provide insight into ways to reduce discrimination and improve inclusivity in forestry. Identifying and interpreting incidents of bias is both a necessary step toward improving the climate and a barrier to confronting discrimination at an organizational level (Ashburn-Nardo et al. 2008). Both observers and targets may struggle to detect discrimination that is less overt. Education about the forms of discrimination, the frequency at which it occurs, and whom it affects can help (Ashburn-Nardo et al. 2008). Education about "second-generation gender bias"—bias that creates a context in which women fail to reach their full potential—is a primary suggestion for organizations looking to support women's access to leadership positions (Ibarra et al. 2013). In fact, accurately recognizing and interpreting bias leads women to feel more empowered by providing avenues for action (Ibarra et al. 2013).

In a study of persistence of women of color in science, technology, engineering, and mathematics (STEM) fields, conscious building of peer networks was a key strategy used to reduce isolation (Ko et al. 2014). Ko et al. (2014) concluded that encouraging students, faculty, and employees to participate in mentoring networks could better support women of color. Other

research has found that social support from organized programs led to a greater sense of belonging and can be a key indicator of engagement in academic settings (Rosenthal et al. 2011). Brainard and Carlin (1998) found that the presence of a departmental women's group was enough to encourage students to stay in engineering, another field dominated by men.

There is increasing evidence of the role that both men and women need to play in creating more welcoming climates and combating discrimination. One key to motivating men to support these initiatives is helping them recognize that gender bias exists (Prime and Moss-Rascusin 2009). In a study of the NSF-funded program Advocates and Allies, men engaged in gender-equity work recognized that it encompassed actions from small (e.g., challenging biased comments) to large (e.g., revamping institutional processes) (Anderson 2017).

Case Study Context

The University of Maine's School of Forest Resources (SFR) is similar to many university forestry programs in the underrepresentation of women, particularly students in the baccalaureate forestry major (Figure 1). Although enrollment of women has increased in SFR since 2009, in several of those years, no (2014) or only one (2009, 2016) woman graduated with a bachelor's degree in forestry. Furthermore, although women accounted for 43 percent of the graduate students in SFR in 2018–19, most did not have forestry undergraduate degrees, indicating a potential lack of awareness to enter the profession at an earlier stage. In terms of faculty within the Society of American Foresters' accredited forestry program, SFR had only one tenure-track woman faculty member between 1981 and 2006, and none from 2006 to 2014.

In recognition of this context, six women in SFR met in the fall of 2015 to discuss concerns of recent

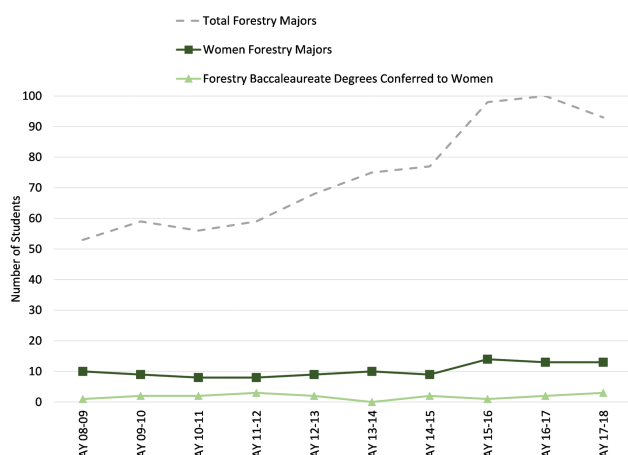


Figure 1. Enrollment and graduates in the undergraduate forestry major at the University of Maine, School of Forest Resources, for academic years (AY) 2008–9 through 2017–18. Total forestry majors is the dashed gray line; women forestry majors is the dark green line with square markers; forestry baccalaureate degrees conferred to women is the light green line with triangle markers. Data provided by the University of Maine, Office of Institutional Research and Assessment.

attrition from undergraduate enrollment and difficulties in retaining women from education to employment in forestry. Inspired by literature and by a working group within the US Forest Service, Northern Research Station (Kenefic et al. 2017), we posited that developing a group specifically addressing the experiences of women could improve the climate for women in SFR through increased perceptions of belonging and engagement with the field of forestry, ultimately leading to improved retention. This hypothesis motivated the creation of an education, support, and networking group for women in SFR called Supporting Women in Forestry Today (SWIFT) (Figure 2). The goal of SWIFT is to *support and encourage women in SFR in their forestry education and careers* by helping women recognize and overcome existing barriers and fostering a more inclusive community. We do this through four approaches: education about gender discrimination, development of strategies for success in a field dominated by men, improved networking for women, and education for and about the role of men as allies.

In this case study, we describe our experiences creating, adapting, and sustaining SWIFT over the 3 years following the group's creation. In this paper, we: (1) provide a rich, detailed description of the case study, including the adaptive management of SWIFT; (2) share relevant findings and themes that evaluate the effectiveness of the four approaches in meeting the goal of SWIFT; and (3) share results identifying



Figure 2. Current logo for SWIFT, Supporting Women in Forestry Today, designed by Planning Team member Maren Granstrom. Used with permission.

unanticipated benefits of SWIFT as well as future areas of concern for women in forestry. Our findings offer suggestions for those wishing to use a similar model at other institutions or workplaces to improve the climate and support retention of women at all levels, ultimately improving diversity within the field of forestry.

Methods

Adaptive Management through Participant Observation and Surveys

As foresters, the concept of adaptive management (Holling 1978) has proven useful in guiding our efforts related to SWIFT. We were all members of the volunteer SWIFT Planning Team and used our experiences following methods of participant observation to guide adaptations (Musante 2014). We also used formal evaluation feedback from participants to monitor the success of SWIFT and guide adaptations over time.

Initial SWIFT meetings were scheduled for the spring semester of 2016 and advertised to everyone in SFR identifying as a woman (inclusive of all marginalized genders), from enrolled undergraduate and graduate students to faculty and staff, including administrative professionals and research scientists. This pool was later expanded to include students enrolled in the forest ecosystems concentration of the ecology and environmental science undergraduate and graduate programs.

The SWIFT Planning Team (hereafter, Team) used an anonymous survey to help assess whether the approaches used by SWIFT were effective and guide adaptive management. The survey collected information on participants' perceptions of SWIFT and skills gained through participation, as well as challenges faced by women in forestry. Paper copies were distributed at a SWIFT meeting, and a link to an online version was emailed to all women invited to SWIFT events, regardless of participation, at the end of the first semester (spring 2016) and 3 years later (spring 2019). As the survey was not designed to be a representative sample, but instead to evaluate and monitor SWIFT, it is possible that some respondents completed the survey in both years. In addition, the survey was sent to only those who identified as women; the effectiveness of SWIFT from men's perspectives is not analyzed here.

Open-ended questions and closed questions that had either yes/no or predefined multiple-choice options were asked in the survey. Likert scale questions were on a 5-point scale from definitely no (1) to definitely yes (5). Basic summary statistics were used to assess

participant responses. Open-ended responses for 2016 and 2019 were coded together, assigned broad themes, and assessed for commonalities.

Results

In the 3 years since the initial meeting, both observations and survey results have formed the basis of several lessons learned that reinforced or led to modifications in the operation of SWIFT (Figure 3). These lessons, along with the results described here, inform our understanding of the role groups like SWIFT can play in recruitment and retention of women, and form guidelines for others who may wish to build off this effort.

Using Participant Observation to Guide Adaptation of SWIFT

The Team has operated on a consensus basis since its inception. As SWIFT is not a membership-driven organization, but open to all who care to participate in any given event, it was critical that the Team work collectively to develop events and respond to feedback.



Figure 3. Lessons learned from 3 years of SWIFT development.

However, the composition of the Team has adapted over time. Initial members were those willing and able to participate, and the Team was comprised solely of faculty and graduate students. Following suggestions by undergraduate participants, the Team is now capped at six members: two faculty/staff, two graduate students, and two undergraduate students. Although there are no formal roles or designated leadership positions, one undergraduate student serves as communications coordinator as both a professional development opportunity and an avenue to increase student involvement.

The inclusion of men in some SWIFT meetings was another intentional adaptation. At first, the Team felt strongly that it was important for women to be able to talk freely about their experiences; literature has shown that having a safe space for to share and compare experiences can increase feelings of support and validation among women and encourage them to talk openly (e.g., [Ibarra et al. 2013](#)). Initial feedback confirmed the value of women-only sessions. However, literature has also shown that whereas men may be less likely to recognize sexism, their confrontation of it can be effective at changing the culture ([Drury and Kaiser 2014](#)). In addition, many within SFR expressed a desire for men to have the same opportunities for learning about gender bias and issues; several survey respondents commented on the need to educate our peers, and several men expressed a desire to learn

more about gender bias and being an effective ally. To balance these perspectives, SWIFT began hosting one meeting a semester open to people of all gender identities, denoted as a “SWIFT + Allies” event. This balance of offerings provides a safe space to explore sensitive issues and an avenue to improve awareness across the SFR community.

Another adaptation was the development of ground rules to guide meetings, set expectations, and frame conversations. The current ground rules and motivation behind each ([Table 1](#)) are read aloud at the beginning of each meeting. Although this is potentially repetitive, doing so accommodates the shifting participation of the group (any given meeting could potentially include new participants); it also helps reinforce the shared responsibility of respectful communication.

The first SWIFT meeting was an open group discussion. With 20 participants, the group was too large to generate thoughtful discussion and include everyone’s perspective—one of the desired outcomes. Since that meeting, the default format has been adapted so that members of the Team introduce the topic and provide questions or scenarios for discussion before asking participants to break into small groups. Participants reconvene as a large group to report back following small group discussions. This format is intended to facilitate greater participation in discussion among

Table 1. SWIFT meeting ground rules developed to guide participants and set an appropriate framework at each meeting, along with the motivation for each rule

Ground rule	Motivation
Assume positive intent on the part of fellow participants.	Some topics may induce strong feelings and/or responses among participants; assuming good intent helps minimize offense.
Seek to understand, then be understood.	Be an active listener; work to ensure you understand what another is saying before formulating your response.
Let as many people as possible contribute.	The goal is to encourage participation from as many people as possible; remind participants not to dominate.
Don’t be afraid of silence.	Recognize that some people may need a larger pause in conversation to want to jump in.
Respond with honest, open questions instead of advice or corrections.	Encourage people to resist giving advice and “correcting” others’ perceptions or reactions, to foster inclusivity and acceptance.
Respect others’ experiences.	Recognize that experiences are varied, and all deserve respect. They may not be the same as one’s own.
Speak from personal experience and try to avoid stereotyping.	Avoid generalizing whenever possible. Speaking from experience can help and provides concrete examples.
Stories are complex and evolving.	Everyone chooses how much to share; we may not know the full story. The experience may not be over. Limit judgement of others.
Maintain people’s confidentiality.	To maintain a safe space, refrain from discussing other people’s personal experiences outside the SWIFT setting. Do share strategies and ideas for success, and your own story when you want.

individuals, some of whom might be intimidated by speaking in front of a large group.

The yearly schedule of events has generally mirrored the approaches identified to achieve SWIFT's goal: education for women about concepts of gender bias; development of strategies for success; improved networking; and education and opportunities for allies. Since 2016, SWIFT has hosted three to four meetings or events each semester. An example list of events and a brief summary from the 2018–19 academic year is shown in Table 2.

Generally, one event each semester is primarily social and provides an opportunity for new and returning SFR women to connect with each other. A second event is designed to provide an opportunity for participants to hone skills and share what brought them to forestry in the first place: being in the woods. These outdoor events have included an all-woman field tour (involving women foresters from the local area) of US Forest Service research

on the Penobscot Experimental Forest, a birding hike led by a woman on the SFR faculty, and the ever-popular chainsaw practice session on the University Forest, where women of all skill levels can practice chainsaw use in a safe and supportive environment (Figure 4). As noted previously, a third event is designated a SWIFT + Allies event, open to all; this and the remaining SWIFT event(s) are typically more educational, featuring popular press articles or scientific findings related to gender discrimination. These have included topics such as the confidence gap (Kay and Shipman 2014), “Leaning In” (Sandberg 2013), impostor syndrome (Clance and Imes 1978), self-advocacy, strategies for negotiating (Bowles and Babcock 2012), identifying bias and discrimination (Stangor et al. 2003), and panel discussions with professionals or guest speakers. These events typically incorporate either small group discussions or role-playing of strategies for responding to difficult situations.

Table 2. Examples of SWIFT activities from the 2018–19 academic year, including a brief description of each event. Numbers below participants refer to which of the approaches used by SWIFT the event contributed to: (1) education of women about terms and concepts in gender discrimination; (2) development of strategies for success in a male-dominated field; (3) improving networking for women; and (4) education, discussion, and opportunities for and about men as allies.

Meeting	Participants and approach	Description
September: Chili Social	Women only (3)	Informal social gathering (“meet and greet”) at the start of the school year.
November: Chainsaw Practice	Women only (2, 3)	Overview of chainsaw safety and operating basics, followed by opportunities for women to practice using the saw as much or as little as they would like.
November: How to Be an Ally (SWIFT + Allies)	All genders (1, 2, 3, 4)	One-hour workshop that included presentations about allyship and gender-related issues (e.g., implicit bias) along with small- and large-group discussions. The group produced a list of ways they could be an ally to others in SFR, which was posted on the SWIFT website (forest.umaine.edu/swift).
February: Leaning in to the Job Market	Women only (1, 2, 3)	One-hour, moderated, large-group discussion in which participants discussed their experiences on a variety of job-related topics, from applying to jobs to interactions with colleagues.
March: Speaking Up: Why We Do it When We Do and Why Sometimes We Don't	Women only (1, 2, 3)	Panel of undergraduate students, graduate students, and faculty who shared experiences of both successful and unsuccessful times when they spoke up about discrimination, and times when they chose not to speak up. Large-group discussion followed.
April: The Good, the Bad, and the Ugly: Experiences as a woman in forestry (SWIFT + Allies)	All genders (1, 3, 4)	Seminar presentation by Professor Nicole Rogers (University of Maine Fort Kent) on her ten-year career in forestry. Followed by lunch with women undergraduates and informal happy hour with women graduate students.
May: Guided Bird Hike	Women only (2, 3)	Bird identification skills hike in a local conservation area led by Dr. Amber Roth, followed by brunch.



Figure 4. Scenes from SWIFT events. Left: Faculty and students birding in a local nature preserve in May 2019. Right: Graduate student Maren Granstrom helps undergraduate student and SAF student chapter Chair Michaela Kuhn start her chainsaw at the chainsaw practice in November 2018.

One of the challenges the Team has encountered is balancing the need to present foundational content about gender bias each year while not repeating presentations already seen by long-term participants. The solution has been to vary the format of meetings covering introductory topics, e.g., presentations versus small group discussions. Another challenge has been ensuring that those delivering the content have the background and skills to do so. Defining gender bias and how it is experienced can be a sensitive topic; it is vital that educational sessions be presented in a way that is accurate. To that end, Team members vet sources of information and upcoming presentations, and, when needed, seek presenters or materials from fields of study or organizations that specialize in these topics.

Using the Survey to Evaluate the Success of SWIFT Programming and Logistics

Survey response rates were 38 percent in 2016 (21 of 55 in the target population) and 28 percent in 2019 (23 of 82). As our primary goal was to monitor SWIFT, no follow-up requests were made after the initial survey invitation, which likely led to a response rate more on par with mail survey response rates. In 2016, 24 percent of respondents were undergraduates, 24 percent were master's students, 10 percent were doctoral students, 29 percent were faculty, 5 percent were staff (including research scientists), and 10 percent did not indicate their position. In 2019, 17 percent of respondents were

undergraduates, 26 percent were master's students, 13 percent were doctoral students, 26 percent were faculty, 13 percent were staff, and 4 percent did not indicate their position. In terms of meetings, survey responses confirmed the benefit of the adaptations guided by participant observation. For instance, a majority of survey respondents found the ground rules useful and helpful, whereas small group discussions were rated as the most effective meeting format, with 90 percent of respondents indicating they were extremely or very effective in 2016 and 78 percent in 2019. Analysis of both open and closed responses led to the following findings about the impacts of the approaches used.

Finding 1: Gender Bias Education and Strategy Development Can Help Women Overcome Barriers

The first theme identified through the surveys was an increase in awareness on topics of gender bias. The survey asked participants to rank their agreement with several statements following the prompt "Since attending SWIFT meetings, have you . . .". A majority of respondents showed strong agreement with statements that they had become more aware of bias (4.56 and 4.33 in 2016 and 2019, respectively) and related SWIFT topics to their own experiences in ways they previously had not (4.60 and 4.27, respectively; [Figure 5](#)). Overall, almost all respondents (95 percent in 2016 and 100 percent in 2019) reported learning at least one new thing through participation in SWIFT

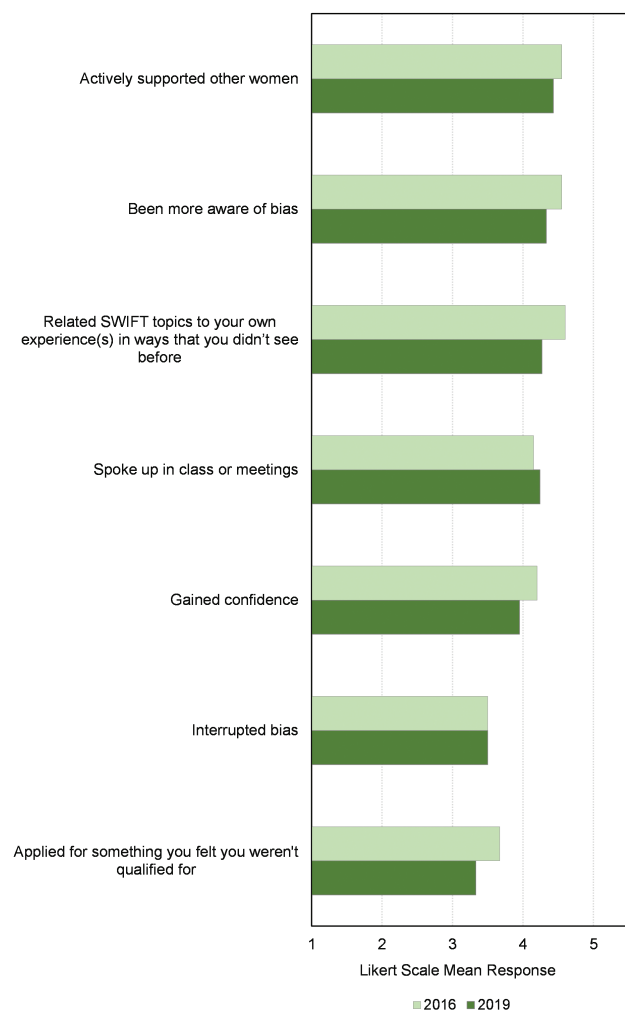


Figure 5. Mean responses to “Since attending SWIFT meetings, have you . . .” using a 5-point Likert scale ranging from “Definitely no” (1) to “Definitely yes” (5). Results from 2016 in light green and 2019 in dark green.

meetings. Over three-quarters of respondents (80 percent in 2016, 77 percent in 2019) indicated that they gained new skills (Figure 6). Open-ended responses articulated both general and specific skills that participants acquired through SWIFT. Many appreciated the unique environment of a women-only chainsaw practice session: “. . . chainsaw training (last year) was my favorite experience with SWIFT. It was great to learn how to handle a chainsaw without the level of self-consciousness I would have felt with a male-dominated group.”

Survey respondents reported that since participating in SWIFT, they had spoken up more in class/meetings (4.15 and 4.24 in 2016 and 2019, respectively) and actively supported other women more (4.55 in 2016 and 4.43 in 2019; Figure 5). A majority (90 percent in 2016 and 95 percent in 2019) indicated they gained new

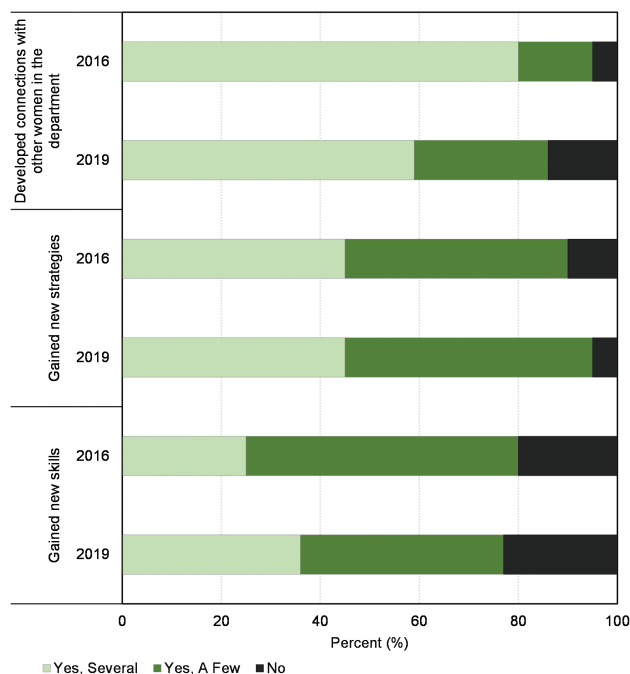


Figure 6. Percentage of survey respondents who reported having gained connections, strategies, or skills by participating in SWIFT activities. Participants gained several of these (light green), a few of these (dark green), or none of these (black). 2016 responses are shown above 2019 responses.

strategies (Figure 6). Several open-ended responses included specific references to speaking up in uncomfortable situations, such as: “By drawing attention to bias and building confidence in speaking up, I spoke up about an uncomfortable situation at the gym. Without the awareness and strategies gained at SWIFT (and a supportive peer group who helped me craft my message), I would not have done that pre-SWIFT.” Shifts in personal behaviors were also reported; as one respondent in 2016 indicated, “Now that I’m aware of ‘imposter syndrome’, I call myself out on it all the time.” Recognizing experiences and generating strategies have been powerful tools that improved feelings of belonging and allowed individuals to respond more effectively to discrimination.

Labeling experiences and understanding the role that bias can play in interactions also helped women become more resilient and confident, and participate more fully in the field of forestry. Respondents indicated that since attending meetings, most had gained confidence (4.20 and 3.95 in 2016 and 2019, respectively), and many applied for something that they previously would not have because they felt they were not fully qualified (3.67 and 3.33 in 2016 and 2019, respectively; Figure 5). As one respondent in 2016 said,

“I have learned that the experiences that I have as a female in a male-dominated space are real. Also, that those experiences are shared among other female students, faculty, staff. As a result, I’ve gained confidence in sharing those experiences with others, especially my peer group. I realize, more so now, that when I speak up, I don’t just speak for myself.” As a 2019 respondent said, “In the past, I sometimes wondered if negative experiences I had as a woman in forestry were due to something I was doing wrong. When encountering gender bias, I would feel uncertain and not respond effectively. Those experiences made me feel isolated and alone. Now I am able to recognize those experiences for what they are, and I know that they are happening because I am a woman and not because of something that is my fault.” Another respondent articulated it this way: “Being able to label bias and discrimination has helped me to understand my experiences and not let them undermine my confidence in my own abilities to succeed in forestry.”

Finding 2: Networking through SWIFT Helped Build Community and Improve Climate

As a means to improve networking and social support for women in forestry, SWIFT was successful; almost all survey respondents stated that they developed connections with other women in the SFR community due to their participation in SWIFT (Figure 6). These connections included shared experiences and mentorship opportunities, validation, and a feeling of safety to express and discuss issues. Since the creation of SWIFT, there has been a noticeable increase in conversation between students, faculty, and staff, and a majority of comments in both surveys mentioned increased feelings of connectedness and belonging. The potential for feeling isolated was highlighted by several respondents: “On some days when I go to school, I’m the only female student in each SFR classroom I enter throughout my entire day. SWIFT trainings and meetings provide a comfortable environment for all the women in forestry (faculty and students) to talk about similar experiences, and to connect with one another” (2019); “It was really nice to have a ‘safe place’ to communicate with other women in forestry across the professional/educational spectrum. It made me feel welcome and appreciated” (2016); “I’ve expanded my network in the department among women. I don’t get to interact with many women in the department outside of SWIFT, and SWIFT has built a community of support” (2019). Meetings that sought to connect SWIFT participants with other forestry professionals

were also highly regarded, with 85 percent (2016) and 100 percent (2019) of respondents rating them either very or extremely effective.

Using the Survey to Identify the Challenges that Remain and Unexpected Benefits of SWIFT

Survey respondents in 2016 and 2019 were asked to list the top three challenges facing women in forestry. In both survey years, the top two challenges mentioned can be grouped into (1) bias, microaggressions, and discrimination and (2) isolation, lack of support, and networking struggles. Although unequal pay and inequality were the third most common challenges identified in 2016, in 2019 it was the challenges and barriers to addressing discrimination that ranked third. In both 2016 and 2019, only 40 percent and 45 percent of respondents, respectively, said they had interrupted bias (e.g., challenged discriminatory comments) as a result of participating in SWIFT (Figure 5, percentages not shown), although both survey results and informal feedback suggested that a higher proportion experienced bias. As one respondent in 2016 wrote, “[A problem in forestry is] a lack of options to deal with discrimination. You’re damned if you do and damned if you don’t when it comes to co-worker ratings of competency, getting credit for your work, etc.” In 2019, another wrote: “The old guard is still there. Many student peers are up to speed on professional expectations but the male professors haven’t caught up with society yet. [While it is unclear] how to overcome male issues of feeling like ‘they can’t say anything’ around women [or] being overly worried about being accused of harassment, it’s really not that hard to be a decent person.”

Other issues mentioned by multiple respondents across both survey years included the need to address the confidence gap between men and women; safety, and the perception of men that women have physical limitations in the field (mentioned especially in 2019); a lack of diversity and representation in forestry; “straight up” (outright) sexual harassment; young women unaware that forestry can be a career; and the need for retention of women in forestry.

An unexpected outcome of SWIFT was the improved perception of the culture and reputation of SFR; one respondent in 2016 pointed out that SWIFT was “reinforcing an image that we, as a department, are doing more than talking about enacting change. It shows organization, longevity, and a positive trajectory for shattering glass ceilings.” In 2019, one respondent answered “Do we need SWIFT?” with “. . . there

are indirect benefits. Having an initiative focused on women in forestry shows people in the forestry program, in other programs on campus, and outside the University that supporting women is important here. In addition, highlighting a commitment to diversity in the forestry program creates an atmosphere in which students and faculty/staff feel empowered to discuss issues of bias and discrimination. Bringing these things out into the open allows us to address and resolve them, to everyone's benefit."

Looking beyond the University setting, one respondent noted that "SWIFT can help prepare both men and women for the challenges that they'll face in the workforce related to equity and professionalism." Students today see the need and relevance for efforts like SWIFT not just for themselves, but for the field of forestry as a whole: "I believe equality in the workplace is very relevant and conducive to an effective working environment, especially in those industries where there is a dominant demographic."

Discussion and Conclusion

The goal of SWIFT is to support and encourage women in SFR in their forestry education and careers by using approaches designed to help women be aware of and overcome existing barriers (i.e., education about gender discrimination, development of strategies for success in a male-dominated field) and to foster a more inclusive community (i.e., improve networking for women, provide education for allies). Ultimately, our aspiration is to increase and retain women in forestry from education to employment. Increasing demographic diversity in forestry benefits us all, on an individual and collective level. Forestry needs creativity more than ever as we balance competing objectives and social preferences related to land management. Creating a more inclusive environment can help avoid what one survey respondent described as "women turning away from what they love professionally to do what feels safer and more inclusive."

Other research on groups like SWIFT that are aimed at supporting and increasing women in forestry have documented both successes and continued challenges (Brandth et al. 2004, Kenefic et al. 2017). The forestry profession has made important advances in recruiting and retaining women (Kern et al. 2015), and our results showed that respondents reported feeling more aware, connected, and equipped to recognize and respond to bias and discrimination than before SWIFT. Although it is too soon to quantitatively assess SWIFT's

impact on student matriculation and graduation rates, this case study provides additional evidence that small-scale groups like SWIFT can instigate larger-scale positive changes for women in forestry.

Future Work

Many challenges remain for women in forestry. Our results are in line with studies that emphasize both perceived and actual professional and social penalties of women who speak up (Stangor et al. 2003, Rehge et al. 2008, Hunt 2010). Despite increased awareness and even the emergence between the survey periods of the #MeToo movement (Zacharek et al. 2017), it remains difficult for women in forestry to interrupt bias. Harassment, bias, discrimination, and safety are issues for everyone in forestry, and one group of women at one institution cannot solve all of these issues alone (Mansfield et al. 2019).

The organizational framework outlined here, based on adaptive management and evidence-based design, can be adapted and incorporated in many settings that have the goal of improving both the current experiences and the retention of women in forestry. Organizations that have explicit goals for diversity, inclusivity, and the advancement of people from traditionally underrepresented groups, such as those articulated by the Society of American Foresters (Cubbage and Menashes 2017) and the US Forest Service (USDA Forest Service 2015), make ideal candidates for implementation of such programs. Although SWIFT began as an informal, grass-roots effort, we see an opportunity for administrations and leaders to endorse and support similar top-down efforts. Departments or colleges within universities, individual leaders within forest resource companies and organizations, and professional societies can all help by facilitating the creation of similar groups when feasible. In fact, the organization of a network—something that only a central clearing house like the Society of American Foresters Diversity Working Group or the National Association of University Forest Resource Programs could create—would be essential in sharing ideas, information, and best practices among groups to enable us to continue to adapt and create an environment where the numbers and role of women in forestry can grow.

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