

# Mentoring in the USDA Forest Service: A Survey of Aquatic Professionals

Lee Cerveny,<sup>1,\*</sup>  Nabin Baral,<sup>2</sup> Brooke Penaluna,<sup>3</sup> Brett Roper,<sup>4</sup> Daniel Shively,<sup>5</sup> and Shelly Witt<sup>6</sup>

<sup>1</sup>USDA Forest Service, Pacific Northwest Research Station, 400 N. 34th Street, Suite 201, Seattle, WA 98103, USA ([lee.cerveny@usda.gov](mailto:lee.cerveny@usda.gov)).

<sup>2</sup>USDA Forest Service, Pacific Northwest Research Station, 400 N. 34th Street, Suite 201, Seattle, WA 98103, USA ([nbaral@gmail.com](mailto:nbaral@gmail.com)).

<sup>3</sup>USDA Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331, USA, ([brooke.penaluna@usda.gov](mailto:brooke.penaluna@usda.gov)).

<sup>4</sup>USDA Forest Service, Washington Office, Wildlife, Fish and Rare Plants Program, Logan, UT, USA ([Brett.ropert@usda.gov](mailto:Brett.ropert@usda.gov)).

<sup>5</sup>USDA Forest Service, Pacific Northwest Region (Region 6), Portland, OR, USA ([Daniel.shively@usda.gov](mailto:Daniel.shively@usda.gov)).

<sup>6</sup>USDA Forest Service, Washington Office, Seattle, WA, USA ([Shelly.witt@usda.gov](mailto:Shelly.witt@usda.gov)).

\*Corresponding author email: [lee.cerveny@usda.gov](mailto:lee.cerveny@usda.gov)

## Abstract

Mentoring is suggested as an important strategy to promote workplace inclusivity and is shown to be positively associated with high employee morale, yet mentee needs and experiences may not be universal. To evaluate mentoring impacts from the perspective of USDA Forest Service employees, we conducted an online survey of 251 aquatic professionals, including managers and scientists. 70% of respondents had mentors, and mentorship status did not vary across demographic characteristics. Previous mentoring relationships were most frequently identified as “informal” rather than “formal”; female employees were more likely to desire formal mentoring. Mentored respondents found their work more challenging, fulfilling, and valuable than unmentored respondents. Mentees looked for mentors who could provide constructive feedback, speak candidly, use active listening skills, and who cared about their careers. Overall, respondents were satisfied with their mentors’ skills. Despite strong demand for mentoring, access to mentors among aquatic professionals appears low across all categories.

**Study Implications:** Mentored employees convey greater job satisfaction and sense of being valued, challenged, and fulfilled. Strong demand for mentorship exists among aquatic professionals in the USDA Forest Service, yet awareness of and access to mentoring opportunities appear to be uneven. Skills employees found most useful and satisfactory in informal mentoring can serve as a basis for future design of agency mentoring programs. Effectively communicating mentorship opportunities to employees is important for increasing participation rates in mentoring. By encouraging employees to participate in mentoring, organizations can reap tangible and intangible benefits through employee development, such as increased organizational productivity and employee retention.

**Keywords:** employee development, public sector, workforce, organizational culture, gender

Since the Civil Service Reform Act of 1978 was issued, federal agencies in the United States have invested in strategies to diversify their workforce and provide opportunities to advance traditionally underrepresented workers, such as women and Black, Indigenous, and people of color (BIPOC) employees. Targeted hiring strategies in the 1980s led to expansion in the number of women and minorities in the federal workforce. In the 1990s, another national initiative toward a “multi-cultural model” recognized and promoted workforce diversity (Selden and Selden 2001). In 2011, diversity and inclusion in the federal workforce was reinforced by Executive Order 13583, which sought a change in organizational culture that would enable employees to reach their full potential (Office of the President 2011). Despite these efforts, challenges in workplace culture for women and BIPOC employees persisted. As the #MeToo movement and Black Lives Matter demonstrations unfolded, conditions of workplace discrimination, harassment, and hostility were revealed, suggesting

that more work needed to be done (Westphal et al. 2022a). In 2021, President Joseph Biden signed Executive Order 14035 to advance diversity, equity, inclusion, and accessibility in the federal workforce (Office of the President 2021). The order seeks ways to embed these principles in hiring and employment practices and to identify barriers and opportunities for underrepresented workers who may face employment discrimination.

One strategy widely used in public and private management for improving workplace culture is mentoring. Mentorship is a relationship (formal or informal) between mentor and mentee (or protégé) designed to provide employee support and improve career prospects, leading to greater job satisfaction (Kram 1983; Wells et al. 2005). Effective mentoring helps employees achieve personal, professional, and organizational goals by relying on existing, often more seasoned employees to invest in bolstering employee development as part of their duties (Allen et al. 2004; Ivey and Dupre 2020). Although

mentorship programs have been piloted and implemented to promote retention and career advancement, empirical evidence about their efficacy in public management is emergent. Moreover, employee needs may vary based on their background, suggesting that a universal mentoring program may not achieve its desired goals for all. If mentoring is being used as a strategy to promote a more inclusive and equitable workplace in public agencies, more information is needed about how it is being conceived and implemented and whether access to and benefits from mentoring are equally distributed.

We designed an exploratory study to understand the role and impact of mentorship in one federal land management agency, the USDA Forest Service (Forest Service), from the perspective of one category of agency employees: aquatic professionals. We conducted an online survey of all Forest Service aquatic professionals nationwide and throughout various agency branches to understand how mentoring occurs, to assess the impact of mentoring on employee success, and to identify areas for improvement. For purposes of this survey, we defined a mentor as, “a person who has a great positive influence on you as a professional and in your career.” Our study was guided by a desire to understand broadly what mentorship looks like for Forest Service aquatic professionals, who is benefitting, and how. We also sought to understand whether demographic factors influenced how employees experienced mentoring. Our inquiry focused on these questions: (1) What proportion of aquatic professionals have been mentored? (2) How have mentors been identified and mentoring relationships been structured? (3) What attributes are sought in mentors? (4) What skills are mentees hoping to develop through mentorship? (5) How satisfied are mentees with the mentoring they received? (6) What are the perceived benefits of mentoring for mentees and what outcomes have resulted? (7) How do employees learn about and gain access to mentors? Given the needs of agencies to enhance the workplace experience and provide opportunities to female and BIPOC employees, we were especially interested in knowing whether experiences with mentoring varied and whether the benefits of mentoring were evenly distributed. In this analysis, we focused primarily on gender differences.

## Mentoring as an Employee Development Approach

In recent years, attention has been placed on mentoring in both private and public organizations to develop skills and competencies in their workers (Ehrich and Hansford 2008; Ivey and Dupré 2020; Johnson et al. 2020). Mentoring has been associated with improved employee satisfaction as the mentoring relationship fosters new opportunities and career advancement potential (Wells et al. 2005). Mentoring can be a tool, method, strategy, activity, program, or relationship to transfer institutional knowledge and memory and convey the organization's values, commitments, and expectations from one employee cohort to the next. In the literature, three types of mentoring are described: (1) mentoring for new staff, (2) mentoring of existing or aspiring leaders, and (3) mentoring to comply with affirmative actions (Ehrich and Hansford 2008; McGurk 2009). Mentoring is a relationship where guidance has been explicitly sought and that extends over a period of time as opposed to an isolated event (Clutterbuck et al. 2017).

Mentoring can be either formal (facilitated and sanctioned by the organization which matches mentees with mentors) or

informal (organically or spontaneously derived through professional networks) (Allen et al. 2017; Kram 1983). Studies comparing formal and informal approaches found that informal mentoring relationships tended to be longer in duration, and the benefits of these relationships were more long-lasting than formal mentoring (Blake-Beard 2001). Ragins and Cotton (1999) found informal mentoring resulted both in improved career outcomes (salary increases and advancement) and psychosocial benefits (support) compared with formal mentoring. Formal mentoring resulted in improved organizational commitment, job satisfaction, and support among public sector employees compared with unmentored employees (Fowler et al. 2021). Chao (2009) found that formal mentoring requires a diverse pool of mentors and a long-term commitment from mentors and mentees to be successful. One study found that women face challenges navigating formal mentoring relationships, such as managing unrealistic expectations about mentoring outcomes, addressing complex interpersonal dynamics between mentee and mentor, and facing co-worker scrutiny (Blake-Beard 2001). Women in leadership positions have been shown to face challenges accessing mentors through informal processes and professional networks (Cross and Armstrong 2008; Linehan and Scullion 2008). Women were shown to be more ambivalent about pursuing or recruiting informal mentors than male counterparts in one study of an educational organization (Searby and Tripses 2006). More research is needed to understand the implications of formal and informal mentoring programs and gender variations for the public sector workforce.

There are positive and negative outcomes of mentoring for the mentor, mentee, and organization. Mentors benefit from building professional capital, career enhancement, and personal satisfaction (Wells et al. 2005). Mentees gain opportunities for professional development and enhancement of personal skills, such as communication and confidence building, which can translate into career advancement, promotion, or leadership opportunities (Allen et al. 2004; Penaluna et al. 2020). Mentoring is positively associated with the affective organizational commitment through mentor–mentee social exchanges (Reid et al. 2008), which can lead to higher rates of employee retention. A range of differences between mentored and nonmentored employees are reported in terms of work expectations and experiences, for example: (1) motivation, (2) training and development opportunities, and (3) relationships with managers (Eby et al. 2008). A negative or dysfunctional mentoring relationship can lead to increased job withdrawal, turnover, dissatisfaction, stress, and overall lower productivity (Ivey and Dupré 2020).

Ideally, mentors and mentees complement each other based on their unique sets of needs and ranges of expertise (Allen et al. 2006). When the mentoring relationship can meet the development needs of both mentor and mentee, then mentoring efforts can be deemed successful (Bozeman and Feeney 2009a). Particularly, mentor expertise and attributes play an important role in mentoring success. Existing research has identified five essential attributes of mentors: (1) nurture relationship, (2) serve as a role model, (3) teach, sponsor, encourage, advise, and befriend, (4) focus on professional/personal development, and (5) active listening and other measures that demonstrate concern for employees (Anderson and Shannon 1988; Samier 2000). Early mentoring theory suggests that differences by position rank are important in facilitating career mentoring and role modeling (Allen et al. 2006);

however, emergent mentoring forms include peer mentoring and reverse mentoring (Abiddin et al. 2012; Haggard et al. 2011). Various mentorship alternatives exist with either “official mentors,” one permanent mentor offering help in all situations, or “mentors-of-the-moment,” mentors offering help in a particular situation that falls within their strength area (Johnson and Smith 2019). It is reported that employees who have had a previous mentoring relationship are more likely to mentor others, producing a virtuous cycle in organizational learning (Bozeman and Feeney 2009b).

Mentoring has been used as an organizational strategy to improve retention and career advancement for workers who have been historically underrepresented or disenfranchised (Choi 2019; Lantz-Deaton et al. 2018). Equity issues are quite critical in mentorship because gender and race/ethnicity can influence mentoring relationships and perceptions of successful outcomes (Neal et al. 2022). Studies have shown that women may face difficulty establishing mentoring relationships owing to existing social and organizational barriers (Noe 1988). Previous research demonstrated that male mentees tend to avoid female mentors and white mentees tend to show a preference for mentors of the same race (Allen et al. 2006). Furthermore, mentored women tend to be more satisfied with their current job status and see more career prospects than male counterparts (Kennedy 1991). Initiatives to improve diversity in biophysical sciences and natural resource professions have identified gaps and offered strategies to fill the gaps, including mentoring (Batavia et al. 2020; Youn et al. 2020). Gaps remain in the mentoring literature about motivations and outcomes based on gender, race/ethnicity, and other characteristics, as well as access to mentoring programs. Less is known about whether male and female employees have different needs for mentoring in terms of developmental areas and mentor qualities, whether they may benefit from different types of mentoring (formal vs. informal), or whether mentoring benefits are distributed evenly.

### Organizational Context: Forest Service

This study focuses on mentorship in the Forest Service to illuminate how mentoring is being implemented in a public agency focused on natural resource management. The Forest Service is a complex bureaucratic organization of 29,254 employees (in 2021) devoted to sustaining “the health, diversity, and productivity of the nation’s forests and grasslands to meet the needs of present and future generations” (Forest Service 2022). The Forest Service is organized into four deputy areas: National Forest Systems, overseeing management of national forests and grasslands totaling 302,000 square miles; Research and Development, conducting science toward improved forest health, management, and use; State and Private Forestry, extending technical assistance and support to tribes, states, private landowners, communities, and partners; and Business Operations, dealing with budgets, policy, personnel, training, and safety. The Forest Service is considered a classical hierarchy with authority transmitted down the chain of command from the Washington Office to individual field offices and characterized by conformity and adherence to rules and norms (Samson and Knopf 2001). Although budget and policy implementation may be top-down, the Forest Service also was highly decentralized by design, with significant autonomy at the field level, where line officers have discretion to make decisions suitable to local conditions (Kaufman 1960), although administrative constraints have

been placed on regional autonomy in recent times (Carroll et al. 1996; Koontz 2007). Some field offices are found in isolated settings and employees rely on their supervisors to identify appropriate opportunities for advancement, training, and skill development.

In response to the Civil Service Reform Act of 1978 and other legislation, federal agencies began moving toward gender diversification and embracing a multicultural model (Brown and Harris 2001; Selden and Selden 2001). In the early years, the Forest Service workforce was predominantly male, with training in forestry, rangeland management, engineering, fire, and aviation (Kaufman 1960). These disciplines also were acknowledged as the best professional tracks for promotion to leadership positions (Thomas and Mohai 1995). Career advancement in the Forest Service was based on performance in grade, adherence to norms, and strategic navigation of position assignments (Chojnacky 2012; Kaufman 1960). Female and BIPOC employees were primarily found in lower-grade levels and experienced a glass ceiling preventing their rise to leadership positions (Carroll et al. 1995; Thomas and Mohai 1995). Concentrated hiring efforts resulted in a new cadre of female employees in the 1980s with a professional background in forestry, engineering, biological science, physical science, recreation, rangelands, and social science (Brown and Harris 2001; Brown et al. 2010; Thomas and Mohai 1995). Research identified many challenges for women in natural resource professions, including limited advancement opportunities and an “old boys” network (Kennedy 1982, Kennedy 1991, Brown et al. 2010). Throughout the 1990s and 2000s, national and agency efforts to promote diversity and inclusion ensued, such as the National Taskforce on Workforce Diversity (1989), the Cultural Transformation Initiative (2011) and numerous executive orders to make the federal workforce reflect society (Westphal et al. 2022b). Public attention was brought to gender discrimination in the Forest Service in 2018, when several news media outlets reported harassment of women working as wildland firefighters. Subsequent studies demonstrated persistent workplace inequities for Forest Service scientists (Kern et al. 2020) and the wildfire workforce (Vinyeta 2022). A study of Forest Service workforce trends between 1995 and 2017 showed that the highest grade levels saw increases in female and BIPOC employees but that the proportion of females declined agencywide. Significant gaps in female and BIPOC numbers existed in entry-level positions (Westphal et al. 2022a).

The passage of the National Environmental Policy Act (1970) and other environmental legislation prompted the Forest Service to shift toward an ecosystem approach, resulting in the need to increase professional diversity by adding wildlife and aquatic biologists, geologists, soil scientists, ecologists, and social scientists (Brown and Harris 1992; Mohai and Thomas 1997). These technical specialists are supported through their “program areas” (e.g., fish and aquatics, wildlife, recreation), which form a parallel organizational structure within the agency alongside the traditional hierarchy (Kennedy and Thomas 1992). Efforts were made to provide employee support and training for these growing professional cadres. A 1984 survey of fish biologists identified the important role that mentoring plays in employee development (Kennedy and Roper 1990). Historically, women and BIPOC professionals have faced barriers in accessing natural science professions (Kennedy 1982). Targeted agency recruitment and

retention programs sought to identify and address these inequities and remove barriers. Based on two studies conducted on fish biologists in the Forest Service, there were more early-career fish biologists who identified as women (42%) in 2020 than 1984 (13%), suggesting that the agency is moving closer to gender parity among fish biologists (Kennedy and Roper 1990; Penaluna et al. 2020). This increase over time is sharp compared with the overall Forest Service workforce, which showed declines in female employees from 38% in 1995 to 34% in 2017 (Westphal et al. 2022a). Meanwhile, research on women and BIPOC individuals in science, technology, engineering, and mathematics (STEM) fields has observed persistent gaps in participation and retention in STEM professions (Fry et al. 2021; National Science and Technology Council 2021). Mentoring has been identified as an important strategy to reduce employment barriers for BIPOC employees in natural resource careers (Balcarczyk et al. 2015).

Until 2018, when this study was initiated, mentoring in the Forest Service had been largely informal, where mentors and mentees found each other organically. However, in 2018, the Forest Service Work Environment and Performance Office (WEPO) was established, with a critical goal to improve workplace culture and address barriers to diversity, equity, and inclusion. In 2019, WEPO launched a national mentoring program that was formal in nature—matching mentors and mentees based on common fields of interest and professional goals. Then and now, coaching and mentoring had been an important component of specialized agency training in leadership, including the Senior Executive Service, the Senior Leader Program, and the Middle Leader Program. Fewer options existed for entry-level employees and for professionals not tapped for their leadership potential.

Concurrently, some Forest Service program leaders were looking into other forms of mentoring to bolster opportunities for employee development. In 2017, the National Fish and Aquatic Strategy (“Rise to the Future”) recognized mentoring as an important strategy for improving career opportunities, enhancing employee morale, developing skills, and improving retention (Shively et al. 2018; USFS 2020). As recommended by the strategy, Forest Service national and regional program leaders explored strategic opportunities to enhance mentoring among fish biologists and aquatic ecologists (hereafter “aquatic professionals”). The Rise to the Future leadership group embarked on the development of a mentorship network and established best practices. In addition, a survey was conducted in 2019 to understand the mentoring needs of Forest Service aquatic professionals across multiple disciplines and who function in leadership and management roles. A previous study by Penaluna et al. (2020) used a portion of the same dataset but focused only on fish biologists (a subset of aquatic professionals) and addressed a different set of research questions. Here, we analyze data from all Forest Service aquatic professionals to identify strengths and gaps for creating more effective mentoring opportunities for a broader array of employees.

## Methods

### Survey Data Collection

A link to our online survey was sent to all Forest Service Fish and Aquatic Ecologist national and regional program leaders in Forest Service National Forest Systems and to fish biologists in Forest Service Research and Development. Program

leaders were instructed to forward this survey to aquatic professionals in their units. Survey respondents primarily worked in aquatics programs although some had assumed different roles in the agency (e.g., program managers and line officers). Surveys were deployed in 2019 in two four-week waves using SurveyMonkey. The first wave survey was conducted between April and May 2019 and the second wave was run between July and August 2019. The intent of the second deployment was a desire to enhance the number of responses in Forest Service regions where the responses during the first period were low. A total of 251 employees completed the online survey (175 in the first wave and 76 in the second wave). Due to the lack of information on the exact number of employees who received the invitation to fill out the questionnaire, the overall response rate was not computed, although we estimate that it was around 50%. Survey completion time varied, but more than half (61%) completed the survey in less than 20 minutes.

The survey included 42 questions overall, with the majority being fixed response items (i.e., checklists or ordinal-scale questions). Survey questions included background questions about position and role, satisfaction with work and position, participation in mentoring programs, desired skills to enhance through mentoring, attributes sought in a mentor, satisfaction with the mentoring experience, perceptions of mentoring benefits and indicators of successful mentoring. No evidence existed to suggest that such questions dissuaded more aquatic professionals from responding to the survey for privacy reasons. The survey also asked respondents to discuss their perceptions of agency approaches to mentorship. The survey included a few single- or multiple-choice as well as open-ended questions. Our team thoroughly read written text answers to the semi-closed questions that had “Other”—an open text box to submit an answer not offered in the survey—in the response options. If the text clearly indicated that the response should belong to one of the preprepared response options, then we changed the “Other” response to that specified option. A sample of the questionnaire is available online (Supplement S1).

Ethical considerations for the protection of human subjects in social research were adhered to in the survey administration, data collection, and data analysis. After introducing the research topic, prospective respondents were informed that their participation in the survey was welcomed, they could skip questions that they chose not to answer, and there would be no consequences for rejection or withdrawal. They also were informed that personally identifiable information would not be collected, and their responses would be anonymous. After reading the study description, they were invited to click the “next” button to launch the survey. The survey was forwarded broadly to aquatic professionals across multiple corners of the agency and there was no way to track who responded, nor were there any repercussions for nonparticipation. Each respondent was labelled with a computer-generated ID and the study team could not link responses back to individuals. To prevent individual identification, any subgroup analysis that had the sample size of fewer than ten was not conducted and reported.

Due to a skip-logic malfunction in the SurveyMonkey platform, a few respondents were not directed forward to the relevant sections of the questionnaire based on their initial response to the yes/no question about whether they had a mentor. Because of this, some respondents ended up repeating

questions they had already responded to and others were asked questions that did not pertain to their circumstances. For the repeated entries, we kept the first responses issued and moved the displaced information to where it should belong to ensure that we had comparable information for all questions.

## Data Analysis

Both parametric and nonparametric data analytic tools were used. When Likert-type ordinal items contain at least five categories in the response format, they can be considered (or treated) as continuous variables and analyzed using a parametric approach (Harpe 2015). Normality, homogeneity, and independence assumptions were evaluated. Simulation research has shown that parametric tests are quite robust to the violation of assumptions if it is not extreme (Carifio and Perla 2008; Mircioiu and Atkinson 2017; Norman 2010; Sullivan and Artino 2013).

For the expression of central tendency, we presented means and standard deviations if the variables had five or more categories in the response format, otherwise median (or mean rank) was used. We performed the one sample *t*-test and sign test to determine whether the average ratings were significantly above or below the neutral response. We used the parametric unpaired two sample *t*-test with unequal variance to compare average ratings between two groups of mentored and unmentored respondents. To ascertain the robustness of the results, we conducted the nonparametric Kruskal-Wallis test when the parametric assumptions were not met by the data. There was no substantive difference between the parametric and nonparametric test results. We present the test results for the appropriate test used that met the assumptions. We normalized the mean differences as a percentage by taking the average ratings of unmentored respondents. Because mean differences allow us to evaluate the effect size of any intervention, it addresses the issue that statistical significance does not imply practical importance of how much improvement is produced by the intervention.

To determine the strength of bivariate linear association between two quantitative variables, we computed Pearson's product moment correlation coefficients. For categorical variables, we used the chi-square test to analyze group differences (or bivariate association). The test produces reliable results even when the distribution of the data is seriously skewed, the sample sizes of the study groups are unequal, and the assumption of equal variance is violated (McHugh 2013). All the required statistical assumptions for the chi-square test were met: the data should be categorical, and cells should have frequencies or counts, categories must be mutually exclusive, no cell should have an expected value less than one, and the study groups must be independent. The Cramer's *V* statistic was computed to determine the strength of bivariate association only if the chi-square test was statistically significant. When relevant, the "not applicable" responses in the survey items (where someone chose not to rate) were shown in frequency distributions but excluded in the statistical analyses.

## Results

### Respondent Characteristics

Among the 251 respondents, 52% were male and 48% female; none chose a nonbinary option. We combined race and ethnicity categories. Respondents were 88% white and 12% were BIPOC including mixed race (Table 1). On average,

respondents had worked 24 (SD = 10) years throughout their professional career, including 16 (SD = 10) years for the Forest Service. About 10% of respondents planned to retire within the next five years, and 72% were likely to spend the next five years of their career with the Forest Service.

Three deputy areas were represented in the sample: National Forest Systems, Research and Development, and Business Operations. Respondents were represented in all National Forest System regions and research stations. Respondents came from diverse job series—a grouping of positions in the federal government based on specialized line of work and qualification requirements, containing a numerical code and name in the title—in various aquatic professions and management. This included: 0482—Fish Biology (56%), 1315—Hydrology (12%), 0486—Wildlife Biology (10%), 0401—General Natural Resources Management and Biological Sciences (10%). The remaining 12% belonged to eight other job series, like Soil Science, Biological Science Technician, Botany, and Forestry.

### Elements of Mentorship

For the survey, a mentor was defined as a person who has a great positive influence on them as a professional and in their career. More than two-thirds of respondents indicated that they had a mentor at some point in their careers. Among those who had a mentor, four out of five (79%) respondents had more than one mentor in their career. Whether or not employees had a mentor did not vary by gender, race/ethnicity, region, or deputy area (Supplement S2).

Knowing how employees become acquainted with mentors is helpful for understanding routes to informal mentorship (Table 2). The mentoring relationship often "naturally evolved" while working at the Forest Service, so most mentors (81%) were from within the agency. Mentors assumed a variety of roles, but 87% respondents identified the primary role of their mentor as "informal," defined as a relationship that is initiated on an infrequent, as-needed basis for input or consultation. Far fewer (8%) mentioned that the relationship had been "formal," as indicated by an established mentor and mentee with a commitment, verbal or written, to conduct mentoring over a specified timeframe, or "coach" (4%), a relationship where the individual is an impartial listener focusing on providing input on concrete issues such as how to manage more efficiently or improving communication skills. Of the 174 respondents who had mentors, 66% of employees identified supervisors as their mentors (despite our definition of a mentor as "someone other than a supervisor"). When asked to evaluate, 47% of respondents either agreed or strongly agreed to the statement that their supervisor possesses the qualities of an effective mentor ( $n = 170$ ). In half of the mentored cases, expectations of the mentoring relationship had never been clearly discussed, but males were more likely to discuss desired outcomes than females ( $\chi^2_4 = 8.68$ ,  $P = 0.07$ ,  $V = 0.23$ ,  $n = 165$ ). Variations in mentor duration were observed by gender, with 34% of female respondents having an association with a mentor for five years or more compared to 48% male respondents having the same length of association ( $\chi^2_3 = 12.54$ ,  $P = 0.01$ ,  $V = 0.27$ ,  $n = 166$ ). One-third of mentees met with their mentors once a week or more whereas 32% met one to three times per month, 14% four to six times per year, 9% two to three times per year, 8% once a year or less ( $n = 168$ ). There were no gender distinctions in the meeting frequency ( $\chi^2_6 = 4.38$ ,  $P = 0.63$ ,  $df = 6$ ,  $n = 164$ ).

**Table 1.** Frequency distributions of respondent characteristics.

| Variables                    | Levels/categories       | Number | Percentage |
|------------------------------|-------------------------|--------|------------|
| Gender                       | Female                  | 115    | 47.9%      |
|                              | Male                    | 125    | 52.1%      |
| Race/ethnicity               | White                   | 205    | 87.6%      |
|                              | People of color         | 29     | 12.4%      |
| Career stages*               | Early career            | 69     | 27.9%      |
|                              | Early mid-career        | 65     | 26.3%      |
|                              | Late mid-career         | 58     | 23.5%      |
|                              | Late career             | 55     | 22.3%      |
| General Schedule (GS) grades | GS-05 to 09             | 44     | 18.0%      |
|                              | GS-11 to 12             | 150    | 61.2%      |
|                              | GS-13 to 15             | 51     | 20.8%      |
| Mentorship                   | Mentored                | 174    | 69.6%      |
|                              | Unmentored              | 76     | 30.4%      |
| Deputy areas                 | National Forest Systems | 218    | 87.2%      |
|                              | Research & Development  | 30     | 12.0%      |
|                              | Business Operations     | 2      | 0.8%       |
| USDA Forest Service Regions  | Region 1                | 22     | 10.3%      |
|                              | Region 2                | 16     | 7.5%       |
|                              | Region 3                | 12     | 5.6%       |
|                              | Region 4                | 16     | 7.5%       |
|                              | Region 5                | 29     | 13.6%      |
|                              | Region 6                | 62     | 29.1%      |
|                              | Region 8                | 21     | 9.9%       |
|                              | Region 9                | 19     | 8.9%       |
|                              | Region 10               | 16     | 7.5%       |

\*Career stages are categorized into four based on the responses to the question how many years they have worked for the USDA Forest Service: the respondents who worked for seven years or less were considered as early career, eight to 15 years as early midcareer, 16 to 25 years as late midcareer, and 26 years or more as late career employees.

## Mentor Attributes

We asked respondents to identify the attributes that they sought out in mentors and explored differences in responses by gender (Table 3). Overall, mentees looked for someone who had the ability to provide constructive feedback, speak candidly, provide a supportive atmosphere, used active listening skills, and cared about the employee's career. Having a similar background or high position in the agency was not considered as important. However, for females, having a supportive atmosphere (4.59 vs. 4.27), inclusivity and respect for diversity (4.35 vs. 3.87), taking care of the professional development (4.41 vs. 4.23), active listening skills (4.44 vs. 4.23), and the ability to be nonjudgmental (4.28 vs. 3.94) were more important than for males based on the average rating scores on a five-point scale. For other attributes, there was no difference between male and female respondents.

## Skills Mentees Sought to Develop and Satisfaction with Mentors

From a list of 13 skills, respondents were asked to indicate the skills they sought to develop with help from a mentor in terms of degree of importance (1 to 5). They also were asked their degree of satisfaction with the mentoring relationship for each of those 13 skills. Considering the average rating as primary input, we found a statistically significant positive correlation ( $r = 0.68$ ,  $P < 0.01$ ,  $n = 13$ ) between the

importance of skills being acquired by respondents through mentorship and their levels of satisfaction with the acquired skills. Based on whether the average ratings were above or below the overall average on two dimensions of importance and satisfaction, the following four categories emerged: (1) high importance—high satisfaction, (2) high importance—low satisfaction, (3) low importance—high satisfaction, and (4) low importance—low satisfaction (figure 1, Supplement S3). Four skills learned through mentorship belonged to the high importance—high satisfaction category: technical, communication, project management, and leadership skills. In the high importance—low satisfaction category were career management or planning and improving networking skills. The following three belonged to the low importance—high satisfaction category: building self-confidence, enhancing informal skills, and the development of professional values/ethics. The low importance—low satisfaction category had the following: balancing work and personal life, motivating employees, conflict resolution skills, and effective time management.

When comparing importance/satisfaction tables between female and male respondents, different sets of skills emerged in the high importance/high satisfaction sector, suggesting mentorship is serving employees differently (Supplement S4). Female respondents were satisfied with only three skills labelled as important: technical expertise, communication, and project management. Meanwhile, male respondents were satisfied with twice as many skills (6), including technical

**Table 2.** Frequency distributions of variables comprising elements of mentorship.

| Variables/Levels                  | <i>n</i> | %    | Variables/Levels                         | <i>n</i> | %    |
|-----------------------------------|----------|------|------------------------------------------|----------|------|
| Primary role of mentor            |          |      | How relationship was initiated           |          |      |
| Formal mentor                     | 14       | 8.3  | I reached out to the mentor or coach     | 16       | 9.5  |
| Informal mentor                   | 147      | 87.0 | Suggested to me by my supervisor         | 5        | 3.0  |
| Coach                             | 7        | 4.1  | Initiated by the mentor or coach         | 10       | 5.9  |
| Other                             | 1        | 0.6  | Part of leadership training program      | 8        | 4.7  |
| Relationship to your mentor       |          |      | The relationship naturally evolved       | 125      | 74.0 |
| Supervisor                        | 82       | 48.2 | Other                                    | 5        | 3.0  |
| Supervisee                        | 14       | 8.2  | How you met mentor/coach <sup>a</sup>    |          |      |
| Co-worker                         | 32       | 18.8 | College or graduate training             | 22       | 13.1 |
| Peer                              | 28       | 16.5 | Job outside the Forest Service           | 25       | 14.9 |
| Other                             | 14       | 8.2  | While working at the Forest Service      | 132      | 78.6 |
| Length of mentorship <sup>φ</sup> |          |      | Professional meeting or conference       | 6        | 3.6  |
| Less than one year                | 13       | 7.6  | During a training session                | 7        | 4.2  |
| 1–2 years                         | 32       | 18.8 | Professional development center          | 2        | 1.2  |
| 3–4 years                         | 56       | 32.9 | Other                                    | 4        | 2.4  |
| 5 years or more                   | 69       | 40.6 | Affiliation of your mentor/coach         |          |      |
| Frequency of mentor meeting       |          |      | USDA Forest Service                      | 136      | 80.5 |
| Once a week or more               | 56       | 33.3 | Other governmental agency                | 20       | 11.8 |
| 1 to 3 times per month            | 55       | 32.7 | University                               | 8        | 4.7  |
| 4 to 6 times per year             | 23       | 13.7 | Other                                    | 5        | 3.0  |
| 2 to 3 times per year             | 16       | 9.5  | How expectations determined <sup>b</sup> |          |      |
| Once a year                       | 7        | 4.2  | Written agreement                        | 7        | 4.1  |
| Less than once a year             | 6        | 3.6  | Discussion of desired outcomes           | 21       | 12.4 |
| Other                             | 5        | 3.0  | Emerged gradually/organically            | 65       | 38.5 |
|                                   |          |      | Never clearly discussed                  | 74       | 43.8 |
|                                   |          |      | Other                                    | 2        | 1.2  |

<sup>a</sup>Because the respondents could select multiple options, the percentage is calculated by dividing the number of responses by the number of respondents. Therefore, the total of percentages exceeds 100.

<sup>b</sup>Gender difference was statistically significant at  $\alpha \leq 0.10$  significance level.

expertise, communication, networking, values/ethics, leadership, and informal skills.

### Mentoring Outcomes and Impacts

Respondents were asked about their perceptions of the benefits or outcomes of the mentoring relationship from a list of twelve items using a three-point scale (“greatly,” “somewhat,” or “not at all”). The items that were most likely to have benefited respondents greatly were greater agency awareness, greater awareness of strengths and weaknesses, and technical skills (Table 4). Few differences were detected between male and female respondents, except problem solving skills, which was a greater benefit for males (60% male indicated greatly compared to 42% female).

The average rating scores on the organizational outcomes such as motivation, satisfaction, and aspiration were higher than the neutral response and fell in the agreement region of the five-point ordinal scale (Table 5). When we compared mentored and unmentored employees, the magnitude of mentored respondents’ average ratings was consistently higher than that of unmentored respondents. When the mean difference was statistically significant, the average ratings of mentored respondents were 8% to 13% higher than the average ratings of unmentored respondents. Mentored respondents found their work more challenging, fulfilling, and valuable than unmentored respondents. Not only were mentored

respondents more satisfied with their current position, but they also perceived that a mentor would be more valuable to their career than unmentored respondents. In terms of gender, females were more likely to report that mentoring would be valuable to their professional growth than males; the average rating on a five-point scale being 4.11 for females and 3.92 for males. There was no difference in the demographic characteristics between mentored and unmentored employees.

### Access to Mentors

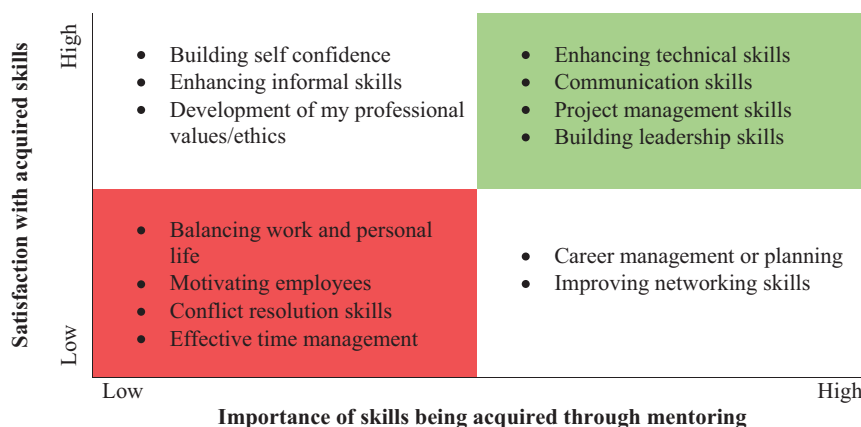
More than two-thirds of the respondents (69%) wished that the Forest Service would provide more training for mentors and coaches (figure 2). 84% of respondents agreed or strongly agreed that their agency could use more mentors to serve employees. In addition, 81% agreed that mentoring and coaching is a cost-effective way to develop employees and 81% also agreed that employee morale would benefit from a successful mentoring program. In terms of gender, females were more likely to agree that more agency employees would benefit from having a mentor than males. The average rating on a five-point scale was 4.40 for females and 4.18 for males. As shown in figure 2, the difference in gender was significant in three items, with females being even more supportive of the need for mentors and mentor training.

Respondents tended to agree that the agency needs to improve its approaches to mentorship and coaching (Table

**Table 3.** Frequency distributions and average ratings of the most important attributes employees seek in mentors.

|                                                                  | Not at all important | Not very important | Somewhat important | Very important | Extremely important | Mean (SD)   |
|------------------------------------------------------------------|----------------------|--------------------|--------------------|----------------|---------------------|-------------|
| Ability to speak candidly                                        | 0.6%                 | 0.0%               | 5.1%               | 36.9%          | 57.3%               | 4.50 (0.66) |
| Ability to provide constructive feedback                         | 0.6%                 | 0.0%               | 2.5%               | 45.6%          | 51.3%               | 4.47 (0.61) |
| Providing a supportive atmosphere <sup>a</sup>                   | 0.6%                 | 1.3%               | 8.9%               | 33.1%          | 56.1%               | 4.43 (0.76) |
| Active listening skills <sup>a</sup>                             | 0.0%                 | 0.0%               | 8.4%               | 50.3%          | 41.3%               | 4.33 (0.62) |
| Cares about my future & my professional development <sup>a</sup> | 0.6%                 | 1.9%               | 9.6%               | 40.4%          | 47.4%               | 4.32 (0.79) |
| Impartiality or objectivity                                      | 1.3%                 | 1.3%               | 13.5%              | 39.1%          | 44.9%               | 4.25 (0.83) |
| Asking good questions                                            | 0.6%                 | 0.6%               | 13.5%              | 48.7%          | 36.6%               | 4.20 (0.74) |
| Leadership skills                                                | 0.6%                 | 1.9%               | 16.7%              | 43.6%          | 37.2%               | 4.15 (0.81) |
| Inclusive and respecting diversity <sup>a</sup>                  | 1.9%                 | 7.0%               | 12.1%              | 35.0%          | 43.9%               | 4.12 (1.00) |
| Ability to be non-judgmental <sup>a</sup>                        | 1.3%                 | 5.7%               | 15.9%              | 34.4%          | 42.7%               | 4.11 (0.96) |
| Strategic or tactical skills                                     | 0.6%                 | 3.2%               | 16.0%              | 48.7%          | 31.4%               | 4.07 (0.81) |
| Technical competence                                             | 0.6%                 | 4.5%               | 21.0%              | 36.9%          | 36.9%               | 4.05 (0.90) |
| Impact as a role model for me                                    | 2.0%                 | 5.3%               | 21.7%              | 32.9%          | 38.2%               | 4.00 (1.00) |
| Knowledge of the agency                                          | 3.2%                 | 1.3%               | 25.3%              | 38.3%          | 31.8%               | 3.94 (0.96) |
| Admired in their profession or discipline                        | 1.3%                 | 11.5%              | 32.7%              | 34.6%          | 19.9%               | 3.60 (0.97) |
| Recognized in their field                                        | 2.6%                 | 14.8%              | 35.5%              | 33.5%          | 13.6%               | 3.41 (0.98) |
| Located close by—easy to access                                  | 7.8%                 | 17.0%              | 30.7%              | 30.7%          | 13.7%               | 3.25 (1.13) |
| Having a similar background as me                                | 13.0%                | 40.3%              | 29.9%              | 10.4%          | 6.5%                | 2.57 (1.05) |
| High position in the agency                                      | 19.3%                | 43.2%              | 27.1%              | 8.4%           | 1.9%                | 2.30 (0.94) |

<sup>a</sup>Gender difference was statistically significant at  $\alpha \leq 0.10$  significance level.



**Figure 1** A four-quadrant diagram shows where skills and attributes fall based on their importance to the mentored respondents and their satisfaction with the mentoring relationship in supporting these skills.

6). Fewer than one-fourth (22%) agreed that the agency values mentor relations for employees. Likewise, 31% agreed that they have access to mentorship opportunities in the agency. 11% agreed that the Forest Service encourages employees to seek mentors and 16% agreed that their supervisor had encouraged them to work with a mentor. 9% agreed that the agency communicates mentorship opportunities effectively.

Respondents were largely unaware of any formal mentoring program being offered by the Forest Service but believed that it is important to have one. Around the time of the survey, the Forest Service WEPO had piloted a National Mentoring Program, which was launched agencywide after the survey was completed. This effort was independent of our study of

aquatic professionals. Only 11% respondents were aware of the formal mentoring program, but 56% reported that it would be important for their unit to have a formal mentoring program. This finding does not suggest that informal mentoring is unimportant. In fact, 53% of respondents also believed that mentoring should be informal or situational. It also is noteworthy that male respondents were more likely than female to indicate that they prefer mentoring to be informal or situational ( $\chi^2_1 = 2.71$ ,  $P = 0.10$ ,  $n = 208$ ).

## Discussion

Our survey of Forest Service aquatic professionals revealed that a high proportion of these employees have been

**Table 4.** Reported levels of benefits derived from the mentoring relationship<sup>a</sup>.

|                                                   | Not at all | Somewhat | Greatly |
|---------------------------------------------------|------------|----------|---------|
| Better understanding of the agency                | 6.3%       | 22.9%    | 70.8%   |
| Improved technical skills                         | 5.3%       | 37.8%    | 56.9%   |
| Greater awareness of my strengths and weaknesses  | 8.7%       | 34.7%    | 56.6%   |
| Greater confidence                                | 4.6%       | 44.7%    | 50.7%   |
| Improved problem-solving skills <sup>b</sup>      | 6.1%       | 43.2%    | 50.7%   |
| Greater job satisfaction                          | 9.9%       | 39.7%    | 50.3%   |
| Better project management skills                  | 8.8%       | 42.2%    | 49.0%   |
| Better understanding of my core values            | 10.7%      | 40.0%    | 49.3%   |
| Enhanced communication skills                     | 7.2%       | 57.9%    | 34.9%   |
| Improved work habits or organizational skills     | 14.5%      | 47.6%    | 37.9%   |
| Improved work attitude                            | 12.2%      | 53.1%    | 34.7%   |
| Improved conflict management or resolution skills | 15.7%      | 47.6%    | 36.7%   |

<sup>a</sup>Percentages might not add precisely 100% due to rounding off the numbers. “Not applicable” responses were excluded in the analysis.

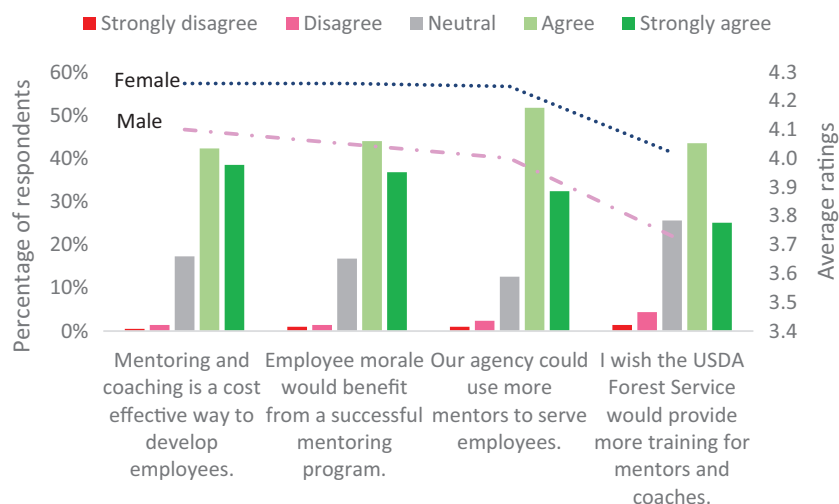
<sup>b</sup>Gender difference was statistically significant at  $\alpha \leq 0.10$  significance level.

**Table 5.** Comparison of average ratings of motivation, satisfaction, and aspiration between mentored and unmentored respondents.

|                                                                     | Mentored |      | Unmentored |      | Mean difference    | Kruskal-Wallis test statistics        |
|---------------------------------------------------------------------|----------|------|------------|------|--------------------|---------------------------------------|
|                                                                     | Mean     | SD   | Mean       | SD   |                    |                                       |
| What I work on is challenging.                                      | 4.39     | 0.76 | 3.97       | 0.93 | 10.4% <sup>a</sup> | $\chi^2_1 = 12.38, P < 0.01, n = 249$ |
| What I work on is important.                                        | 4.38     | 0.82 | 4.21       | 0.99 | 4.0%               | $\chi^2_1 = 1.45, P = 0.23, n = 248$  |
| Having a mentor can improve job satisfaction.                       | 4.18     | 0.70 | 3.98       | 0.89 | 5.0%               | $\chi^2_1 = 1.92, P = 0.17, n = 209$  |
| Having a coach or mentor is valuable to my career.                  | 4.15     | 0.72 | 3.85       | 1.06 | 7.8%               | $\chi^2_1 = 2.43, P = 0.12, n = 208$  |
| Mentoring would be valuable to my professional growth. <sup>b</sup> | 4.01     | 0.81 | 4.00       | 1.06 | 0.3%               | $\chi^2_1 = 0.20, P = 0.65, n = 208$  |
| My work is fulfilling.                                              | 3.95     | 0.92 | 3.57       | 1.16 | 10.6% <sup>a</sup> | $\chi^2_1 = 5.57, P = 0.02, n = 248$  |
| How satisfied are you with your current position?                   | 3.85     | 0.97 | 3.57       | 1.10 | 7.9% <sup>a</sup>  | $\chi^2_1 = 3.48, P = 0.06, n = 247$  |
| I feel valued in my workplace.                                      | 3.60     | 1.08 | 3.20       | 1.30 | 12.6% <sup>a</sup> | $\chi^2_1 = 5.13, P = 0.02, n = 249$  |

<sup>a</sup>Mean differences are also statistically significant at  $\alpha \leq 0.10$  significance level.

<sup>b</sup>Gender difference was statistically significant at  $\alpha \leq 0.10$  significance level.

**Figure 2** Frequency distributions (in columns) and average ratings (dotted lines) of male and female respondents' beliefs about mentoring within the Forest Service.

**Table 6.** Respondents' perceptions of the effectiveness of mentoring in the USDA Forest Service <sup>a</sup>.

|                                                                            | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Mean (SD)   |
|----------------------------------------------------------------------------|-------------------|----------|---------|-------|----------------|-------------|
| More agency employees would benefit from having a mentor. <sup>b</sup>     | 0.5%              | 0.0%     | 10.0%   | 49.8% | 39.7%          | 4.28 (0.68) |
| Very few people I work with have mentors.                                  | 4.8%              | 9.7%     | 20.8%   | 42.0% | 22.7%          | 3.68 (1.08) |
| I have access to mentorship opportunities within my agency.                | 9.6%              | 23.4%    | 35.9%   | 25.4% | 5.7%           | 2.94 (1.05) |
| My agency values mentor relations for employee development.                | 13.4%             | 25.8%    | 39.2%   | 18.2% | 3.4%           | 2.72 (1.02) |
| The USDA Forest Service encourages employees to seek out mentors.          | 15.8%             | 34.4%    | 38.8%   | 9.6%  | 1.4%           | 2.46 (0.92) |
| My current supervisor has encouraged me to work with a mentor.             | 23.9%             | 33.0%    | 26.8%   | 14.8% | 1.4%           | 2.37 (1.05) |
| My agency effectively communicates mentorship opportunities for employees. | 28.7%             | 40.7%    | 21.5%   | 8.6%  | 0.5%           | 2.11 (0.94) |

<sup>a</sup>Percentages might not add precisely 100% due to rounding off the numbers.

<sup>b</sup>Gender difference was statistically significant at  $\alpha \leq 0.10$  significance level.

mentored. Similar to Kennedy and Roper (1990), we found that most employees surveyed had been mentored and many had experienced multiple mentoring relationships over their careers. Compared to other studies of workforce mentorship, (see Johnson et al. 2020, who found that fewer than half of employees had been mentored), mentorship rates for aquatic professionals in the Forest Service appear to be on the higher side. Still, three in ten employees had never been mentored. We found no significant differences in overall mentorship rates by sex, region, deputy area, race or ethnicity, which suggests that mentorship is more or less accessible to aquatic professionals across the organization. Although it appears that mentorship participation is equitable, agency leaders may contemplate whether higher rates of mentorship are desired for targeted employee groups that have faced historical barriers. Accelerating mentoring rates for historically underrepresented groups could support employee development and advancement, leading to improved retention and potential to transition employees into leadership positions. Mentoring relationships last longer for males than for females, suggesting that the benefits may not be evenly distributed over time. Finding ways to ensure that all employees have enduring mentoring opportunities is important for equity of opportunities, organizational morale, and employee retention. Strategies to expand mentoring become increasingly important, as recent demographic analysis of the Forest Service workforce shows a dearth of female and BIPOC employees at entry-level positions (Westphal et al. 2022a).

Supervisors play a significant role as mentors for nearly half of the aquatic professionals surveyed, which suggests that access to mentors beyond the supervisor may be limited for some. Given that more than half of respondents did not agree that their supervisors had the quality to be an effective mentor, employees mentored by their supervisor may not be reaping the full benefits of mentorship. Research suggests that supervisors may be more effective than other mentors in generating improved job satisfaction and employee commitment (Raabe and Beehr 2003) and may be especially helpful during employee orientation and onboarding. However, supervisors may not be ideal mentors for employees seeking transformation (Johnson 2007). The inherent power differential associated with the supervisory role may inhibit candor and limit exposure to outside thinking that may help the mentee to develop. This lends support to formal agency programs that match mentees with persons outside their immediate work unit.

Although we learned that the mentoring of aquatic professionals had been predominantly informal and that relationships evolved organically, we also found support for formal mentoring (where mentors are assigned), particularly among female employees. This raises questions about whether male employees may be more practiced at pursuing prospective mentors and negotiating an informal mentor relationship than female employees or whether males have greater access to opportunities to develop professional networks, such as conferences and professional training, as others have noted (Cross and Armstrong 2008; Linehan and Scullion 2008). When informal mentoring occurs among professionals not trained in mentoring or who are entrenched in a particular worldview, it could create a space ripe for the propagation of preexisting biases or preferences that inhibit employee development or promotion opportunities. Formal mentoring programs may help to level the playing field by arranging mentorships through a third party, providing opportunities for those with limited access to potential mentors. Moreover, formal mentoring may be relevant in hybrid and telework environments or in times of budget scarcity or health constraints, such as during the pandemic, when travel to professional meetings is limited.

There appears to be a link between mentoring and employee well-being. Compared to those who were unmentored, mentees experienced improved job satisfaction, fulfillment, or feeling valued, which suggest that mentoring may be a useful way to develop, motivate, and support employees. Our findings support the previous claim that mentored employees have higher levels of motivation than others (Eby et al. 2008; Ghosh and Reio 2013). We cannot be certain that employees who are already satisfied or fulfilled by their jobs tend to seek mentors more often or whether these outcomes result from the mentoring relationship. Our results departed slightly from Penaluna et al. (2020) who found the relationship to be marginally significant ( $P = 0.10$ ) when only fish biologists were included. In this study, the  $P$  value climbed when all aquatic professionals, including those in management roles, were investigated ( $P = 0.14$ ). This suggests that job satisfaction may be related both to having a mentor and the type of work that is being performed or the position being held. For example, it is possible that skills developed through mentoring are even more impactful to those in leadership positions or otherwise inhabiting roles that have drifted away from fish biology or other technical fields. Given the observational research design, we can make claims about the association

only, not the causality. Still, employees surveyed identified several direct benefits from the mentorship experience, such as greater confidence, improved work habits, and organizational skills. Consistent with existing literature on mentoring, we can thus hypothesize that mentoring leads to aspirations, which in turn increase employees' productivity (Allen et al. 2017). More research is needed to further explore this relationship between mentoring and productivity in the context of a public agency.

For agencies developing and designing mentorship and training opportunities, it is helpful to identify attributes sought in a mentor, the skills that mentees sought to develop through mentoring, and their level of satisfaction with their mentor's ability to provide those skills. What we learned about desired mentor attributes was consistent with the literature, with an emphasis on providing support, candid feedback, and active listening (Abiddin et al. 2012; Samier 2000). Yet we also observed gender differences, where female employees consistently wanted these support qualities to a greater degree than males, suggesting that attention to mentor selection is important. We found that mentees are most satisfied with mentors' ability to provide skills in communication, project management, leadership, and technical expertise. Male employees also indicated satisfaction with their mentors' provision of skills in networking and values/ethics as well as informal skills. New mentoring programs may benefit from focusing on these core skills to maximize their impact while paying attention to how to maximize skill development for all employees. Although mentees highly sought skills in networking and career planning, they were far less satisfied with their mentors' competency in meeting these needs. If these skills are important to develop, it is worth considering whether they are appropriate in the mentorship context or whether mentors lack training or confidence in imparting these skills. There also was both less interest and less satisfaction in skills related to conflict resolution, time-management, and work-life balance. Although there were slight differences in these relationships when looking at fisheries biologists (Penaluna et al. 2020), the overall relationship is similar. We suspect that employees have access to other internal training opportunities to develop these skills beyond mentoring. However, in a highly decentralized agency, employees in remote field sites may have less access to agency-sponsored training opportunities, thus increasing the importance of mentors who can address diverse needs. Mentors may be especially important for female and BIPOC employees in isolated field sites.

Our research findings show that surveyed employees (especially female) support greater agency investment in mentorship programs, including training for new mentors. There was interest in both formal and informal programs, which suggests the value in exploring diverse mentorship forms. Although there is significant support for mentoring, our results suggest that communication about mentoring opportunities is uneven. As noted in previous research, mentoring can serve as a cost-effective way to develop, retain, and empower employees (Hudson 2013). Mentoring also is viewed as an important strategy for enhancing workplace diversity and inclusivity, particularly in STEM disciplines and professions (Fry et al. 2021; Womack et al. 2020; Yu 2020).

It is important to note the limitations of our study. First, our sampling and recruitment approach does not allow us to generalize findings beyond this immediate study group. Because the population of aquatic professionals working in

various roles throughout the agency is unknown, we can only estimate an approximate response rate. Second, our study focuses on aquatic professionals in one federal land management agency, the Forest Service. There may be unique or exceptional elements of this professional cadre based on education, advanced training, or socialization, as well as aspects associated with the structure of the Forest Service National Fisheries Program that influenced our findings. More studies are needed to investigate mentoring in other professional disciplines, employment sectors, and public management agencies to see whether the trends reported in this study remain consistent.

## Implications

The need of both formal and informal mentoring is recognized as well as the important differences in these approaches (Samier 2000). Given what we learned about mentoring among aquatic professionals in the Forest Service, it is useful to consider ways to support both formal and informal mentoring approaches, which potentially reach different groups. In 2022, the Forest Service invested in its National Mentoring Program, which featured formal training, third-party pairing of mentors and mentees, a structured, six-month mentorship commitment, and a continuous evaluation cycle. Informal mentoring often occurs without formal training of mentors and often is more casual and long term (Blake-Beard 2001). Not every employee has the wherewithal or networks to cultivate an informal mentor; finding an appropriate match may be especially difficult for female mentees (Cross and Armstrong 2008; Linehan and Scullion 2008). Identifying strategies to communicate information and provide access to resources that support formal and informal mentoring may help organizations bolster mentoring skills and make these relationships more impactful and longstanding. Incentivizing supervisors to share information about mentoring with employees also may help to expand awareness of opportunities. This survey was completed prior to the full implementation of the agency's formal program and thus awareness of mentoring opportunities may have improved since then.

Our study of the Forest Service can be instructive for other federal agencies considering ways to provide opportunities for employee advancement and professional support to implement Executive Order 14035. Although a direct correlation between mentoring and diversity, equity, inclusion, and accessibility was not explored here, evidence elsewhere suggests this link (Hinton et al. 2020; Mullen et al. 2021). Research conducted in the US Fish and Wildlife Service identified mentoring as an important support to reduce employment barriers for minoritized employees (Balcarczyk et al. 2015). We suggest that mentoring can be considered key practice toward inclusivity, because a critical element of mentoring is listening and appreciating employees, as well as providing a space for employees to feel heard, which are known to promote inclusion (Shore et al. 2018). Mentoring also can result in positive internal action (promotion, advancement) and thus can be critical to long-term retention for women and BIPOC employees (Fry et al. 2021; Womack et al. 2020). Although the long-term impacts of mentoring have not been evaluated based on demographic characteristics, future research can be designed with these goals in mind.

## Conclusion

Our study of aquatic professionals in the Forest Service found mentorship to be associated with greater job satisfaction and mentored employees were more likely to feel valued and challenged, suggesting that mentoring can be considered as one element of a broader strategy toward improving agency morale and employee well-being. We found that mentoring provides an array of benefits to employees. There is demand for both formal and informal mentoring, suggesting that the agency consider fostering both types to reach a greater diversity of employees. Mentored employees are highly satisfied with their mentoring experience and report multiple benefits. Desired mentor attributes and skills being sought by mentees vary by gender, suggesting that a “one-size fits all” mentoring program would not meet every need. Improvements in technical, project management, and communication skills seem to contribute most to the respondents’ satisfaction with mentorship. The challenges for increased participation in mentoring include the lack of awareness of or access to mentoring opportunities, lack of supervisor encouragement, and minimal help from the agency to seek out mentors. Effective communication about and commitment to providing mentoring opportunities will help to expand employee access to mentors, allowing a more even distribution of mentoring benefits. In sum, organizations might evaluate various strategies to reinforce and reward a strong mentoring culture, including a learning and adaptive component to make needed adjustments over time.

## Supplementary Materials

Supplementary data are available at *Journal of Forestry* online.

## Acknowledgments

This manuscript developed from efforts among the national mentoring work group established as part of the USDA Forest Service’s Rise to the Future National Fish and Aquatic Strategy in 2018–2019. Work group members who are not coauthors here include J. Ryan Bellmore, James Capurso, John Chatel, Shannon Claeson, Andy Dolloff, Holly Eddinger, Rebecca Flitcroft, Bill Janowsky, Don Martin, Yvette Paroz, Craig Roghair, Scott Spaulding, Allison Stringer, and Steve Wondzell. This research was supported in part by an appointment to the United States Forest Service (Forest Service) Research Participation Program administered by the Oak Ridge Institute for Science and Education (ORISE) through an interagency agreement between the U.S. Department of Energy (DOE) and the U.S. Department of Agriculture (USDA). ORISE is managed by ORAU under DOE contract number DE-SC0014664. All opinions expressed in this paper are the author’s and do not necessarily reflect the policies and views of USDA, DOE, or ORAU/ORISE.

## Literature Cited

- Abiddin, N.Z., and A. Hassan. 2012. “A Review of Effective Mentoring Practices for Mentees Development.” *Journal of Studies in Education* 2 (1):72–89.
- Allen, T.D., L.T. Eby, G.T. Chao, and T.N. Bauer. 2017. “Taking Stock of Two Relational Aspects of Organizational Life: Tracing the History and Shaping the Future of Socialization and Mentoring Research.” *The Journal of Applied Psychology* 102 (3):324–337.
- Allen, T.D., L.T. Eby, and E. Lentz. 2006. “Mentorship Behaviors and Mentorship Quality Associated with Formal Mentoring Programs: Closing the Gap Between Research and Practice.” *The Journal of Applied Psychology* 91 (3):567–578.
- Allen, T.D., L.T. Eby, M.L. Poteet, E. Lentz, and L. Lima. 2004. “Career Benefits Associated with Mentoring for Protégés: A Meta-Analysis.” *The Journal of Applied Psychology* 89 (1):127–136.
- Anderson, E., and A. Shannon. 1988. “Toward a Conceptualization of Mentoring.” *Journal of Teacher Education* 9 (1):38–42.
- Balcarczyk, K.L., D. Smaldone, S.W. Selin, C.D. Pierskalla, and K. Maumbe. 2015. “Barriers and Supports to Entering a Natural Resource Career: Perspectives of Culturally Diverse Recent Hires.” *Journal of Forestry* 113 (2):231–239.
- Batavia, C., B.E. Penaluna, T.R. Lemberger, and M.P. Nelson. 2020. “Considering the Case for Diversity in Natural Resources.” *BioScience* 70 (8):708–718.
- Blake-Beard, S.D. 2001. “Taking a Hard Look at Formal Mentoring Programs: A Consideration of Potential Challenges Facing Women.” *Journal of Management Development* 20 (4):331–345.
- Bozeman, B., and M.K. Feeney. 2009b. Public Management Mentoring: A Three-tier Model.” *Review of Public Personnel Administration* 29 (2):134–157.
- Bozeman, B., and M.K. Feeney. 2009a. “Public Management Mentoring: what Affects Outcomes?” *Journal of Public Administration Research and Theory* 19 (2):427–452.
- Brown, G., and C. Harris. 1992. “The US Forest Service: Toward the New Resource Management Paradigm?” *Society and Natural Resources* 5 (3):231–245.
- Brown, G., and C. Harris. 2001. “A Longitudinal Study of Environmental Attitudes of Women and Gender Diversification in the U.S. Forest Service 1990–1996.” *Forest Science* 47 (2):246–257.
- Brown, G., C. Harris, and T. Squirrell. 2010. “Gender Diversification in the US Forest Service: Does It Still Matter?” *Review of Public Personnel Administration* 30 (3):268–300.
- Carifio, J., and R. Perla. 2008. “Resolving the 50-year Debate Around Using and Misusing Likert Scales.” *Medical Education* 42 (12):1150–1152.
- Carroll, F.O., J. Freemuth, and L. Alm. 1996. Women Forest Rangers: Revisiting Kaufman’s *The Forest Ranger*. *Journal of Forestry* 94 (1):38–41.
- Carroll, F.O., W.D. Patton, and L.R. Alm. 1995. “The Glass Ceiling in the USDA Forest Service: Willing to Conform, Demanding Change.” *Public Administration Quarterly* 18 (4):457–477.
- Chao, G.T. 2009. “Formal Mentoring: Lessons Learned from Past Practice.” *Professional Psychology Research and Practice* 40 (3):314–320.
- Choi, S. 2019. “Breaking Through the Glass Ceiling: Social Capital Matters for Women’s Career Success?” *International Public Management Journal* 22 (2):295–320.
- Chojnacky, C.C. 2012. “Leadership Impact on Forest Service Operations: Intriguing Ideas from Public Administration Theories.” *Journal of Forestry* 110 (8):457–462.
- Clutterbuck, D.A., N. Dominguez, L.G. Lunsford, and F. Kochan. 2017. *The SAGE Handbook of Mentoring*. The SAGE Handbook of Mentoring: Sage Publications Ltd.
- Cross, C., and C. Armstrong. 2008. “Understanding the Role of Networks in Collective Learning Processes: The Experiences of Women.” *Advances in Developing Human Resources* 10 (4):600–613.
- Eby, L.T., T.D. Allen, S.C. Evans, T. Ng, and D.L. DuBois. 2008. “Does Mentoring Matter? A Multidisciplinary Meta-Analysis Comparing Mentored and Non-Mentored Individuals.” *Journal of Vocational Behavior* 72 (2):254–267.
- Ehrich, L., and B. Hansford. 2008. “Mentoring in the Public Sector.” *International Journal of Practical Experiences in Professional Education* 11 (1):1–16.
- Fowler, J.L., D.S. Fowler, and J.G. O’Gorman. 2021. “Worth the Investment? An Examination of the Organisational Outcomes of a

- Formal Structured Mentoring Program." *Asia Pacific Journal of Human Resources* 59 (1):109–131.
- Fry, R., B. Kennedy, and C. Funk. 2021. *STEM Jobs See Uneven Progress in Increasing Gender, Racial and Ethnic Diversity*. Pew Research Center, Washington, DC 28p.
- Ghosh, R., and T.G. Reio Jr. 2013. "Career Benefits Associated with Mentoring for Mentors: A Meta-Analysis." *Journal of Vocational Behavior* 83 (1):106–116.
- Haggard, D.L., T.W. Dougherty, D.B. Turban, and J.E. Wilbanks. 2011. "Who is a Mentor? A Review of Evolving Definitions and Implications for Research." *Journal of Management* 37 (1):280–304.
- Harpe, S.E. 2015. "How to Analyze Likert and Other Rating Scale Data." *Currents in Pharmacy Teaching and Learning* 7 (6):836–850.
- Hinton, A.O. Jr, Z. Vue, C.M. Termini, B.L. Taylor, H.D. Shuler, and M.R. McReynolds. 2020. "Mentoring Minority Trainees: Minorities in Academia Face Specific Challenges that Mentors Should Address to Instill Confidence." *EMBO Reports* 21 (10):e51269.
- Hudson, P. 2013. "Mentoring as Professional Development: 'Growth for Both' Mentor and Mentee" *Professional Development in Education* 39 (5):771–783.
- Ivey, G.W., and K.E. Dupré. 2020. "Workplace Mentorship: A Critical Review." *Journal of Career Development* 49 (3):714–729.
- Johnson, W.B. 2007. "Transformational Supervision: When Supervisors Mentor." *Professional Psychology: Research and Practice* 38 (3):259–267.
- Johnson, W.B., and D.G. Smith. 2019. "Real Mentorship Starts with Company Culture, not Formal Programs" *Harvard Business Review* December 30, 2019. Available online at <https://hbr.org/2019/12/real-mentorship-starts-with-company-culture-not-formal-programs>; last accessed. 5 May 2022.
- Johnson, W.B., D.G. Smith, and J. Haythornthwaite. 2020. "Why Your Mentorship Program isn't Working" *Harvard Business Review* 7. Available online at <https://hbr.org/2020/07/why-your-mentorship-program-isnt-working>; last accessed 5 May 2022.
- Kaufman, H. 1960. *The Forest Ranger: A Study in Administrative Behavior*. New York: Routledge.
- Kennedy, J.J. 1982. "Dealing with Masculine/Feminine Gender Labels in Natural Resource Professions". In *Women in Natural Resources: An International Perspective*, eds. M. Stock, J.E. Force, and D. Ehrenreich. Moscow, ID: University of Idaho Press.
- Kennedy, J.J. 1991. "Integrating Gender Diverse and Interdisciplinary Professionals into Traditional U.S. Department of Agriculture-Forest Service Culture." *Society and Natural Resources* 4(2):165–176.
- Kennedy, J.J., and B.B. Roper. 1990. "The Role of Mentoring in Early Career Development of Forest Service Fisheries Biologists." *Fisheries* 15 (3):9–13.
- Kennedy, J.J., and J.W. Thomas. 1992. "Exit, Voice, and Loyalty Of Wildlife Biologists In Public Natural Resource/Environmental Agencies". P. 18 in *American Fish and Wildlife Policy: The Human Dimension*, Mangun, W.R., ed. Carbondale, IL: Southern Illinois University Press.
- Kern, C.C., L.S. Kenefic, M.J. Dockry, and A. Cobo-Lewis. 2020. "Discrimination and Career Satisfaction: Perceptions from US Forest Service Scientists." *Journal of Forestry* 118 (1):44–58.
- Koontz, T.M. 2007. "Federal and state Public Forest Administration on the New Millennium: Revisiting Hebert Kaufman's The Forest Ranger." *Public Administration Review* 67 (1):152–164.
- Kram, K. 1983. "Phases of the Mentor Relationship." *The Academy of Management Journal* 26 (4):608–625.
- Lantz-Deaton, C., N. Tabassum, and B. McIntosh. 2018. "Through the Glass Ceiling: is Mentoring the Way Forward?" *International Journal of Human Resources Development and Management* 18 (3-4):167–197.
- Linehan, M., and H. Scullion. 2008. "The Development of Female Global Managers: The Role of Mentoring and Networking". *Journal of Business Ethics* 83 (1):29–40.
- McGurk, P. 2009. "Developing 'Middle Leaders' in the Public Services? The Realities of Management and Leadership Development for Public Managers." *International Journal of Public Sector Management* 22 (6):464–477.
- McHugh, M.L. 2013. "The Chi-Square Test of Independence." *Biochemia Medica* 23 (2):143–149.
- Mircioiu, C., and J. Atkinson. 2017. "A Comparison of Parametric and Non-Parametric Methods Applied to a Likert Scale." *Pharmacy* 5 (2):26.
- Mohai, P., and J.C. Thomas. 1997. "Racial, Gender, and Professional Diversification in the Forest Service: A Rejoinder." *Policy Studies Journal* 25 (1):63–65.
- Mullen, C.A., and C.C. Klimaitis. 2021. "Defining Mentoring: a Literature Review of Issues, Types, and Applications." *Annals of the New York Academy of Sciences* 1483 (1):19–35.
- National Science and Technology Council (NSTC). 2021. *Best Practices for Diversity and Inclusion in STEM Education and Research: a Guide by and for Federal Agencies*. Interagency Working Group on Inclusion in STEM, Federal Coordination in STEM Education Subcommittee, Committee on STEM Education, Washington DC 46p.
- Neal, S.M., A. Kline, A.M. Olejarski, and M. Gherardi. 2022. "I'm Only Human: A New e-road to Advancing Social Equity Through a Humanist Approach to Mentoring in Public Service." *Review of Public Personnel Administration* xx:1–21.
- Noe, R.A. 1988. "Women and Mentoring: A Review and Research Agenda." *The Academy of Management Review* 13 (1):65–78.
- Norman, G. 2010. "Likert Scales, Levels of Measurement and the 'Laws' of Statistics." *Advances in Health Sciences Education* 15 (5):625–632.
- Office of the President. 2011. *Executive Order 13583-- Establishing a Coordinated Government-wide Initiative to Promote Diversity and Inclusion in the Federal Workforce*. Available online at <https://obamawhitehouse.archives.gov/the-press-office/2011/08/18/executive-order-13583-establishing-coordinated-government-wide-initiative>; last accessed 5 May 2022.
- Office of the President. 2021. *Executive Order on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce*. Available online at <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/06/25/executive-order-on-diversity-equity-inclusion-and-accessibility-in-the-federal-workforce>; last accessed 8 September 2022.
- Penaluna, B.E., D. Shively, B.B. Roper, L.K. Cerveny, S. Witt, and J.D. Rothlisberger. 2020. "Mentoring Relates to Job Satisfaction for Fish Biologists: a Longitudinal Study of the USDA Forest Service." *Fisheries* 45 (12):656–663.
- Raabe, B., and T.A. Beehr. 2003. "Formal Mentoring Versus Supervisor and Coworker Relationships: Differences in Perceptions and Impact." *Journal of Organizational Behavior* 24 (3):271–293.
- Ragins, B.R., and J.L. Cotton. 1999. "Mentor Functions and Outcomes: a Comparison of Men and Women in Formal and Informal Mentoring Relationships." *The Journal of Applied Psychology* 84 (4):529–550.
- Reid, M.F., M.W. Allen, C.K. Riemenschneider, and D.J. Armstrong. 2008. "The Role of Mentoring and Supervisor Support for State IT Employees' Affective Organizational Commitment." *Review of Public Personnel Administration* 28 (1):60–78.
- Samier, E. 2000. "Public Administration Mentorship: Conceptual and Pragmatic Considerations." *Journal of Educational Administration* 38 (1):83–101.
- Samson, F.B., and F.L. Knopf. 2001. "Archaic Agencies, Muddled Missions, and Conservation in the 21st Century." *BioScience* 51 (10):869–873.
- Searby, L., and J. Tripses. 2006. "Breaking Perceptions of 'Old Boys' Networks': Women Leaders Learning to Make the Most of Mentoring Relationships." *Journal of Women in Educational Leadership* 4 (3):29–46.
- Selden, S.C., and F. Selden. 2001. "Rethinking Diversity in Public Organizations for the 21st Century: Moving Toward a Multicultural Model." *Administration & Society* 33 (3):303–329.
- Shively, D., J.D. Rothlisberger, N. Gillespie, M. Dombeck, V. Moore, C. Roghair, D. Demario, et al. 2018. "Historical Perspectives and a new US Forest Service Strategy for Fish and Aquatic Stewardship." *Fisheries* 43 (9):386–395.

- Shore, L.M., J.N. Cleveland, and D. Sanchez. 2018. "Inclusive Workplaces: A Review and Model." *Human Resource Management Review* 28 (2):176–189.
- Sullivan, G.M., and A.R. Artino. 2013. "Analyzing and Interpreting Data from Likert-Type Scales." *The Journal of Graduate Medical Education* 5 (4):541–542.
- Thomas, J.C., and P. Mohai. 1995. "Racial, Gender, and Professional Diversification in the Forest Service from 1983 to 1992." *Policy Studies Journal* 23 (2):296–309.
- US Department of Agriculture Forest Service [USFS]. 2020. *Business Practices for Mentoring Forest Service Fisheries Biologists and Aquatic Ecologists*. Rise to the Future National Fish and Aquatic Strategy Report 2020–001, U.S. Forest Service, Washington, DC 33 p.
- US Department of Agriculture Forest Service [USFS]. 2022. *FY2023 Budget Justification*. Available online at <https://www.fs.usda.gov/sites/default/files/2022-03/FS-FY23-Congressional-Budget-Justification.pdf>; last accessed 5 May 2022.
- Vinyeta, K. 2022. "Under the Guise of Science: how the US Forest Service Deployed Settler Colonial and Racist Logics to Advance an Unsubstantiated Fire Suppression Agenda." *Environmental Sociology* 8 (2):134–148.
- Wells, K.M.S., M.R. Ryan, H. Campa III, and K.A. Smith. 2005. "Mentoring Guidelines for Wildlife Professionals." *Wildlife Society Bulletin* 33 (2):565–573.
- Westphal, L.M., M.J. Dockry, L. Bramwell, H. Brown, J. Lootens-White, L.S. Kenefic, S.S. Sachdeva, D.H. Locke, and C.L. Fisher. 2022b. Forest Service Diversity in Context: An Interactive Timeline. USDA Forest Service. Available online at doi:[10.2737/FS-Diversity-Inclusion-Timeline](https://doi.org/10.2737/FS-Diversity-Inclusion-Timeline); last accessed 20 September 2022.
- Westphal, L.M., M.J. Dockry, L.S. Kenefic, S.S. Sachdeva, A. Rhodeland, D.H. Locke, C.C. Kern, et al. 2022a. "USDA Forest Service Employee Diversity During a Period of Workforce Contraction." *Journal of Forestry* 120 (4):434–452.
- Womack, V.Y., B.K. Thakore, C.V. Wood, D.C. Jewett, R.F. Jones, S.L. Ingram, J.A. Clark, et al. 2020. "The ASPET Mentoring Network: Enhancing Diversity and Inclusion Through Career Coaching Groups Within a Scientific Society." *CBE Life Sciences Education* 19 (3):1–15.
- Youn, S.-J., B.E. Penaluna, and S. Phang. 2020. "Increasing diversity and inclusion in fisheries." P. xx–yy in *Lessons in Leadership: Integrating Courage, Vision, and Innovation for the Future of Sustainable Fisheries*, William Taylor, A. Carson, A. Bennett, and C.P. Ferreri (eds.). Bethesda, MD: American Fisheries Society Press. Available online at <https://fisheries.org/>.
- Yu, H.H. 2020. "Glass Ceiling in Federal Law Enforcement: An Exploratory Analysis of the Factors Contributing to Women's Career Advancement". *Review of Public Personnel Administration* 40 (2):183–201.