

Workforce Diversity in Federal Natural Resource Organizations

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Abstract

Natural resource management in the United States has long suffered from a lack of workforce diversity, with women and minorities generally underrepresented in natural resource careers. Workforce diversity is particularly important for federal natural resource organizations given their importance as major environmental employers and policymakers as well as their legal obligation to ensure a representative federal workforce. This analysis examined workforce trends in gender (from 1998 to 2018) and race/ethnicity (from 2006 to 2018) for nine federal natural resource departments and agencies. Employee demographic data were examined intra-organizationally over time and inter-organizationally in comparison with the federal government overall and the civilian labor force. The results demonstrated that over the last two decades: (1) federal natural resource organizations experienced large losses of employees, in contrast to gains in the number of employees in the federal government overall and the civilian labor force; (2) the percentage of female and minority employees in federal natural resource organizations increased even as the number of employees decreased; (3) federal natural resource organizations had lower percentages of female and minority employees than the federal government overall and civilian labor force; and (4) gaps in female and minority employment between the federal natural resource organizations and the civilian labor force generally remained stable or grew larger over time. Overall, the results indicate that federal natural resource organizations have continued to experience remedial levels of workforce diversity compared to the federal government overall and the civilian labor force.

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List of Abbreviations

BLM	Bureau of Land Management
CLF	Civilian Labor Force
DOI	U.S. Department of the Interior
EPA	Environmental Protection Agency
FS	U.S. Forest Service
FWS	U.S. Fish and Wildlife Service
GS	General Schedule
NPS	National Park Service
NRCS	Natural Resources Conservation Service
OPM	Office of Personnel Management
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

Introduction

There has long been concern that natural resource management in the United States suffers from a lack of diversity. Since the late 19th and early 20th centuries, natural resource and environmental organizations have been overwhelmingly dominated by upper- and middle-class white men (for example, see Collin, 1992; Harry et al., 1969; Schelhas, 2002; Simms, 2012; Taylor, 2008).

Following the civil rights movement, women's liberation movement, and other mass social movements in the 1960s, activists and the public increasingly questioned why natural resource organizations remained predominantly white and male, and criticized their ignorance of and disregard for the needs of marginalized communities (Taylor, 2008, 2015). For example, sociologist and activist Nathan Hare wrote in 1970 that: “[B]lack and their environmental interests have been so blatantly omitted that [B]lack and the ecology movement currently stand in contradiction to each other” (p. 2). Over the last fifty years, a growing body of research on the environmental values of women and minorities has demonstrated that their underrepresentation in natural resource organizations is not due to a lack of interest (for example, see Davis, 2019; Finney, 2014; Taylor, 2018). Since the 1990s, many natural resource organizations have acknowledged the importance of workforce diversification and begun taking steps to rectify historical exclusion (Simms, 2012; Taylor, 2015). However, while progress has been made over the last three decades, women and minorities still remain underrepresented in many natural resource and environmental organizations (Taylor, 2014, 2015, 2018).

In the United States, natural resources are primarily regulated and managed, and frequently owned outright, by governmental entities (Marchak, 1998). This makes federal natural resource

organizations particularly important to study as major environmental employers and policymakers. Federal natural resource organizations are also subject to additional legal obligations to ensure a representative federal workforce. Under the Civil Service Reform Act of 1978, the federal government is directed by law to provide a “federal work force reflective of the Nation’s diversity” (5 U.S.C. § 1101 notes) and to “endeavor to achieve a work force from all segments of society” (5 U.S.C. § 2301(b)(1)). Executive Order 13,583 (2011) affirmed the importance of this mandate and established a governmentwide initiative to promote workforce diversity and inclusion, stating that “a commitment to equal opportunity, diversity, and inclusion is critical for the Federal Government as an employer” (p. 52,847). This order further emphasized that, as the largest employer in the United States, the federal government has a “special obligation to lead by example” (Exec. Order No. 13,583, 2011, p. 52,847) and must serve as “a model of equal opportunity, diversity, and inclusion” (p. 52,847). More recently, the 2017 Presidential Memorandum on Promoting Diversity and Inclusion in Our National Parks, National Forests, and Other Public Lands and Waters specifically directed federal departments and agencies charged with managing public lands to “prioritize building a more diverse and inclusive Federal workforce reflective of our Nation and its citizens” (p. 6,180), stating that responsible stewardship of public lands required “a diverse and inclusive Federal workforce... that recognizes the challenges facing communities across the Nation” (p. 6,180).

Workforce diversity in natural resources is not just a matter of representative bureaucracy but is also a demographic necessity. Employment in the life, physical, and social sciences—including agriculture science, biological science, and environmental science—is projected to grow faster than the national average from 2018 to 2028 (U.S. Bureau of Labor Statistics, n.d.-a). At the

same time, the United States' population is projected to age considerably (Vespa et al., 2020), with high percentages of natural resource employees reaching retirement age in the coming years (Balcarczyk et al., 2015; Taylor, 2015). The United States is also becoming increasingly diverse, with the U.S. Census Bureau projecting that by 2045 white non-Hispanics will no longer make up the majority of the population (Vespa et al., 2020). To meet these labor demands and demographic constraints, natural resource organizations cannot afford to rely on their traditional recruitment pool of white men (Balcarczyk et al., 2015; Taylor, 2007, 2014, 2015). Engaging underrepresented populations may prove difficult, however, given the historical lack of diversity in natural resources. Studies have shown that undergraduate enrollment of women and minorities is lower in natural resource programs than other disciplines (Sharik et al., 2015) due in part to students' concerns about the lack of workforce diversity in natural resource organizations and the likelihood of future discrimination (Haynes et al., 2015; Sharik & Frisk, 2011). Furthermore, research has shown that both graduate and undergraduate students interested in science careers consider institutional commitment to diversity and inclusion an important factor when deciding whether to work for an organization, with women and minorities placing a higher value on workforce diversity than men and white non-Hispanics (Taylor, 2007, 2018).

Given the legal mandate to achieve a "federal work force reflective of the Nation's diversity" (Civil Service Reform Act, 1978, 5 U.S.C. § 1101 notes), federal natural resource agencies and departments have a higher duty than non-governmental natural resource organizations to diversify their workforces. Combined with national demographic changes, as well as the historical lack of diversity in natural resources and the moral and ethical imperative to strive for equity and social justice (Batavia et al., 2019), workforce diversification in federal natural

resource organizations takes on even greater importance. That begs the question: have federal natural resource agencies and departments increased employee diversity over time to attain a representative workforce? This analysis sought to address that question by examining trends in gender and race/ethnicity workforce demographics in federal natural resource organizations and assessing both intra-organizational change over time as well as inter-organizational comparisons to the federal government overall and the United States' labor force.

Previous research

The following sections provide an overview of the literature on workforce diversity in natural resource organizations more generally, workforce diversity in the federal government as a whole, and workforce diversity in federal natural resource organizations specifically.

Literature on workforce diversity in natural resources

Research on diversity in natural resources has encompassed a broad array of focus areas over time. Recent literature on the paucity of women and minorities in natural resources has included studies on outdoor recreation and park visitation (for example, see Davis, 2019; Flores & Kuhn, 2018; Makopondo, 2006; Pease, 2015; Roberts & Chitewere, 2011; Stanfield McCown et al., 2012; Weber & Sultana, 2012); student and faculty diversity, especially more broadly in science, technology, engineering, and mathematics (for example, see Farr et al., 2017; Gervais et al., 2017; Sharik et al., 2015; Smith et al., 2015; Taylor, 2007, 2018); and representation in environmental media (for example, see Bal & Sharik, 2019a, 2019b; Frazer & Anderson, 2018; Martin, 2004; McNiel et al., 2012). While these areas of research are not the focus of this analysis, they are important to note given their relationship to contextual influences—such as

lack of exposure to nature and natural resource careers, lack of institutional and academic support, etc.—that underlie some of the barriers to diversifying the natural resources workforce (Haynes et al., 2015).

In the growing body of literature on diversity in natural resources, there have been few comprehensive longitudinal studies on workforce diversity in the profession. Taylor (2014, 2018) and Green 2.0 (2019) have provided some of the most extensive overviews of workforce diversity in environmental organizations to date (see Taylor, 2018, pp. 154–156 for a particularly useful compilation of data from studies published from 1990 to 2016). Some of the earliest broad studies on workforce diversity in natural resources showed that women made up 21% of conservation leadership in 1988 while minorities made up 2% of conservation staff in 1990 (Taylor, 2018). By 2014, women and minorities respectively made up 78% and 16% of paid staff in environmental grantmaking foundations, 56% and 12% in mainstream environmental organizations, and 40% and 12% in government environmental agencies (federal, state, and local) (Taylor, 2014). In 2019, data on the top forty mainstream environmental non-governmental organizations and their top forty funders showed that women and minorities in these organizations respectively made up 64% and 30% of full-time employees, 54% and 22% of senior staff, and 42% and 25% of board members (Green 2.0, 2019). All of these studies found that the percentages of women and minorities have generally increased in various types of environmental institutions over the last 30 years, but that both groups remain underrepresented especially in leadership and higher-level positions (Green 2.0, 2019; Taylor, 2014, 2018). Minorities also appear to have experienced a smaller relative increase than women in environmental organizations (Taylor, 2018). This is consistent with findings in previous research

that diversification efforts have primarily benefitted white women while leaving minorities—especially women of color—behind (Taylor, 2014).

In addition to the broad assessments of workforce diversity in environmental organizations provided by Taylor (2014, 2018) and Green 2.0 (2019), individual natural resource organizations and sub-disciplines have also produced reports and studies on workforce diversity. For example, some natural resource sub-disciplines with recent literature on workforce diversity include: fisheries science (Arismendi & Penaluna, 2016), rangeland management and research (Ganguli & Launchbaugh, 2013), forestry companies (Hansen et al., 2016), the Wildlife Society (Davis et al., 2002), the Ecological Society of America (Women and Minorities in Ecology Committee II, 2006), and the Natural Resources Council of America (Stanton, 2005). From 2000 to 2019, Batavia et al. (2020) found 97 journal articles on institutional diversity in wildlife, fisheries, range, forestry, or natural resources in general, of which 78% were published in the last ten years. The authors concluded that the recent literature demonstrates a “genuine and enduring commitment to diversity in natural resources communities” (Batavia et al., 2020, p. 176). While encouraging, the broad patterns revealed by Taylor (2014, 2018) and Green 2.0 (2019) indicate these good intentions have not necessarily led to equivalent progress in actual workforce diversification in natural resource and environmental organizations.

Literature on workforce diversity in the federal government overall

Since the late 1980s, numerous studies have examined workforce diversity in the federal government as a whole. The Hudson Institute’s 1988 report *Civil Service 2000* cast doubt on the federal government’s ability to retain a viable workforce into the future given predicted national

demographic changes and recommended emphasizing the recruitment, training, and promotion of female and minority employees. This report served as a catalyst for much of the subsequent action and research into federal diversification. In the 1990s, the U.S. Merit Systems Protection Board produced two reports on barriers to federal employment faced by women (1992) and minorities (1996) that found that sex- and race-based biases were inhibiting both groups' equal advancement in the federal workforce. As the federal government began implementing further workforce diversification programs, research on the type and extent of programs followed. Studies in the late 1990s and early 2000s found variation in the extent and type of diversity programs being implemented across different agencies and departments, with many organizations focusing on traditional affirmative action and equal employment opportunity initiatives and relatively fewer embracing diversity management strategies to value and prioritize workforce diversity and inclusion as essential aspects of the organization (Laudicina, 1995; Naff & Kellough, 2001; Kellough & Naff, 2004).

Evaluations of the effectiveness of federal diversity programs have revealed mixed results. Pitts (2009) and Choi and Rainey (2010) examined how federal employees perceived diversification initiatives. Pitts (2009) found that federal diversity programs were linked to higher job satisfaction and perceptions of higher group performance, especially for minority employees. Choi and Rainey (2010) found that federal employees' perceptions of greater organizational effectiveness generally corresponded with higher levels of gender diversity, but only corresponded with higher levels of racial diversity when employees also believed their organizations and supervisors were committed to diversity management. Naff and Kellough (2003) examined the effect of federal diversity programs on employment equity as measured by

promotions, dismissals, and voluntary turnover, and found that diversity programs had not increased employment equity for women and minorities in the federal government. Ricucci (2009) compared the percentages of female and minority federal employees in 1984 to their percentages in 2004 and concluded that, although some progress has been made in federal workforce diversification, women and minorities remained in lower-level and lower-paying federal jobs compared to white men. Ricucci (2009) also found notable “glass walls” resulting in the concentration of women and minorities in agencies that have traditionally been more welcoming to them (such as the Department of Education, Department of Health and Human Services, and Department of Housing and Urban Development).

In addition to external research on workforce diversity in the federal government, the Office of Personnel Management (OPM) is charged with compiling internal data on equal employment opportunities across all federal agencies and departments. OPM’s Federal Equal Opportunity Recruitment Program Report to Congress is published annually and provides data on the percentages of underrepresented employees governmentwide. While these reports present useful comparisons to the United States’ labor force at large, they generally only examine the two most recent years of data and are not intended for longitudinal comparisons of federal workforce diversity over time. The most recently available Federal Equal Opportunity Recruitment Program Report for fiscal year 2017 found that the federal workforce was composed of 37% minorities and 43% women—almost equivalent to their respective percentages of 37% and 47% in the national labor force (OPM, 2019). In addition to the annual reports to Congress, OPM is also responsible for developing, evaluating, and reporting on governmentwide diversity programs. For example, OPM recently assessed the Pathways Programs—the latest iteration of a series of

federal initiatives designed to bring a diverse and qualified pool students and recent graduates into the federal workforce. Comparing 2014 hiring data from the Pathways Programs to 2010 hiring data from its predecessor programs, OPM found that the Pathways Programs hired an equivalent percentage of women and a higher percentage of minorities (OPM, 2016b). OPM also published the Governmentwide Inclusive Diversity Strategic Plan in 2016 pursuant to Executive Order 13,583 (2011). The plan provided specific recommendations to address OPM's previous finding of "a general lack of urgency throughout the [federal] system to create inclusively diverse organizations" (OPM, 2016a, p. 4).

Literature on workforce diversity in federal natural resource organizations

Studies on workforce diversity in natural resource federal agencies have most often focused on the U.S. Forest Service (FS). In 1981, following a class-action lawsuit claiming gender-based employee discrimination in Region 5 (California), the FS and the district court agreed to a consent decree that required the agency's workforce to match the demographic profile of the state (Lewis, 2005). Much of the research on FS workforce diversification has consequently focused on gender. For example, Brown and Harris (2001) examined employee perceptions of whether gender diversification had "resulted in a more capable workforce" in 1996 and found that many male employees disagreed with that statement (60% of lower-level staff and 43% of line officers) while most female employees (62% of lower-level staff and 85% of line officers) agreed. This same question was asked again in 2008 with similar results, although both male and female employees showed less agreement than in 1996, likely due in part to workforce reductions and other challenges facing the FS at that time (Brown et al., 2010). Other studies have also assessed FS employees' perceptions and experiences of gender discrimination. In 1995

Carroll et al. found that perceptions of gender bias and discrimination against women were greater in the FS than in the federal government overall. Fifteen years later, a survey of FS Northern Research Station scientists in 2009–2010 found that women experienced discrimination at higher rates than men, with over 30% of female respondents reporting discrimination from FS supervisors and over 25% reporting discrimination from FS and non-FS scientists (Kern et al., 2020).

Additional research on workforce diversity in the FS has tracked the proportion of female employees (and occasionally the proportion of minority employees) in the agency over time. Thomas and Mohai (1995) analyzed the number of women and minorities employed by the FS from 1983 to 1992 and found that the percentages of female and minority employees increased from 30% and 10% respectively in 1983 to 40% and 15% in 1992. However, they also found that both groups were primarily employed in lower-level jobs that would not lead to leadership positions (Thomas & Mohai, 1995). From 1993 to 1996 diversification trends slowed as workforce reductions shrank the FS workforce by 15% (Brown & Harris, 2001). In 1996 the percentage of female FS employees was the same as in 1992 (40%) and women were still severely underrepresented in higher-level positions (Brown & Harris, 2001). By 2007, the percentage of female FS employees had actually decreased to 39% (likely due in part to continued workforce reductions), and while women made up a higher proportion of leadership positions they were still significantly underrepresented at senior levels (Brown et al., 2010). In a narrower study of gender diversity in FS Research and Development in 2008–2009, Kern et al. (2015) compared FS scientists with university faculty in comparable study areas and found that the FS had outperformed universities at closing the gender gap. However, women were still

underrepresented in both institutions, and especially in senior positions (Kern et al., 2015).

Relatively fewer studies have been conducted on workforce diversity in other federal natural resource agencies. In the National Park Service (NPS), an analysis of relevancy, diversity, and inclusion programs from 2005 to 2016 found that most programs were directed toward diversity among park visitors or partnerships, whereas only 16% of programs were directed toward agency staff (Schultz et al., 2019). The authors argued internal diversity programming is important for creating an inclusive culture, noting the current lack of workforce diversity (and frequency of sexual harassment) in the NPS (Schultz et al., 2019). Soni (2000) studied employee perceptions of workforce diversification in the Environmental Protection Agency (EPA) and found that, compared to men and white non-Hispanics, women and minorities in the EPA perceived more discrimination, experienced lower job satisfaction, and showed more support for agency diversification efforts. This study revealed that a large number of EPA employees viewed diversity programs with skepticism and resistance, and that the existing diversity programs were having minimal effects on organizational patterns of bias or diversity valuation (Soni, 2000). In the U.S. Fish and Wildlife Service (FWS) a qualitative analysis of barriers and supports for recent hires found that employees perceived racial, gender, and age discrimination early in their FWS careers, and that such early experiences of discrimination may inhibit the retention of new employees in the agency (Balcarczyk et al., 2015). Finally, Naff and Kellough (2003) conducted case studies on the Bureau of Land Management (BLM) and National Oceanic and Atmospheric Administration (NOAA) and found that, despite each agency's broad array of diversity programs, the programs yielded mixed results for employment equity as measured by promotions, dismissals, and voluntary turnover.

Gaps in the literature

Despite the large body of literature at the nexus of workforce diversity in natural resource organizations and the federal government, a comprehensive, longitudinal study synthesizing workforce diversity data across federal natural resource organizations has not yet been undertaken. This analysis seeks to address this gap by assessing federal natural resource organizations' trends in gender and race/ethnicity workforce demographics over time. Employee demographic data in federal natural resource organizations were compared with demographic data from the federal government overall and the United States' labor force. Trends were also assessed across the total workforce, by employment level, and by age range. This analysis addressed the research question: what do federal natural resource organizations' trends in gender and race/ethnicity workforce demographics reveal about their progress towards achieving a "federal work force reflective of the Nation's diversity" (Civil Service Reform Act, 1978, 5 U.S.C. § 1101 notes) when examined intra-organizationally over time and inter-organizationally in comparison with the federal government overall and the United States' labor force?

Materials and methods

For this analysis, key metrics on federal employment were retrieved from Fedscope (<https://www.fedscope.opm.gov/>), a publicly available tool from OPM that publishes summary data on the federal workforce. Each federal agency is responsible for regularly submitting personnel and human resources information to OPM, which in turn publishes the aggregated data using the Fedscope tool (OPM, n.d.-a). This analysis used information from two Fedscope

datasets: the Employment Cubes, which include a gender metric (OPM, n.d.-c, n.d.-d), and the Diversity Cubes, which include a race and ethnicity metric (OPM, n.d.-f, n.d.-g). Both datasets provide quarterly employee population data reflecting the number of employees in pay status at the end of a quarter (or a quarter's last pay period) (OPM, n.d.-b). The Employment Cubes currently provide data from September 1998 to September 2018, while the Diversity Cubes provide data from September 2006 to September 2018. For seasonal consistency, and to maximize the available data, this analysis used only the September quarterly data for all years. Although both datasets suppress data for small employment counts (less than twelve for the Employment Cubes and less than four for the Diversity Cubes), by combining various measures and subtracting known values it was possible to calculate employment numbers for all cells.

In addition to the gender metric (available only from the Employment Cubes), and the ethnicity and race indicator (available only from the Diversity Cubes), this analysis used three additional metrics from both Fedscope datasets: agency, general schedule (GS) and equivalent grade, and age. Descriptions of all metrics are provided below:

Gender: Listed as male, female, or unspecified. The terms “men” and “women” are also used in this analysis to refer to “male” and “female” respectively.

Ethnicity and Race Indicator: “An employee's ethnicity and race identification as defined by [OPM]. Ethnicity and Race Indicator (ERI) consists of one ethnicity category (Hispanic or Latino) and five race categories. All applicable categories may be selected, and at least one category must be selected” (OPM, n.d.-b). The race and ethnicity categories are:

Hispanic or Latino; American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; and White. For definitions of each category see <https://www.fedscope.opm.gov/datadefn/>. The ethnicity and race indicator metric may also be listed as unspecified.

For the purposes of this analysis, employees with a Hispanic or Latino ethnicity are assessed in that category alone, regardless of their race. For example, an employee identifying as racially white and ethnically Latino would be counted only under the Hispanic or Latino category, not the white category. The terms “white” and “white non-Hispanic” are used interchangeably in this analysis to refer to employees whose race is white and who do *not* have Hispanic or Latino ethnicity. The term “minority” is used in this analysis to describe all racial and ethnic categories *except* white non-Hispanic.

General Schedule (GS) and Equivalent Grade: “The General Schedule grade for pay plans in the General Schedule and Equivalently Graded pay plans category” (OPM, n.d.-b). Grades 1-15 are each listed separately, in addition to records of “NA” (for employees on pay plans that are not on or equivalent to the general schedule, such as employees in the Senior Executive Service) and “*” (for incorrectly entered data). For the purposes of this analysis and to examine general trends over time, this metric was categorized into two subsets: GS-1 through GS-8, and GS-9 through GS-15. GS-9 is the level which typically requires a master’s degree or at least two years of graduate study or equivalent experience (OPM, n.d.-i).

Age: Listed in five-year intervals or as unspecified. For the purposes of this analysis and to examine general trends over time, this metric was categorized into three subsets: under 30, 30-49 years old, and 50 or older.

Agency: “The employing organization” (OPM, n.d.-b). In addition to values for the federal government overall (abbreviated as “F.Gov.” in subsequent tables and figures), nine federal natural resource organizations were included in this analysis: two departments—the Department of Agriculture (USDA) and Department of the Interior (DOI); six sub-agencies within those departments—the U.S. Forest Service (FS) and Natural Resources Conservation Service (NRCS) within USDA, and the Bureau of Land Management (BLM), U.S. Geological Survey (USGS), National Park Service (NPS), and U.S. Fish and Wildlife Service (FWS) within DOI; and one independent agency—the Environmental Protection Agency (EPA). The USDA and DOI are the main federal departments concerned with natural resources and conservation. Of the seven agencies, the FS, BLM, NPS, and FWS are considered land management agencies because they collectively manage 95% of all federally owned land (608 million acres) (Hoover, 2019). The remaining non-land management agencies (USGS, NRCS, and EPA) have diverse missions focused mainly on science, partnerships, and regulation.

While these nine agencies and departments represent a large portion of federal employees working in natural resources, they are not all-encompassing. For example, the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce manages fisheries and protects marine mammals; the U.S. Army Corps of Engineers in

the Department of Defense manages many of the nation's wetlands; etc. The organizations selected for this analysis were intentionally limited to concentrate more narrowly on natural resource work alone (such that selected organizations' missions are primarily focused on natural resources, conservation, and/or environmental science), while also providing breadth in the types of included organizations.

In addition to the metrics on federal employment, comparable data were retrieved on the civilian labor force (CLF). The CLF is defined as non-institutionalized civilians aged 16 or older residing in the United States who are classified as either employed or unemployed (actively looking for work)—in other words, the CLF represents the national labor pool (U.S. Bureau of Labor Statistics, 2018). CLF data were retrieved from two sources: the U.S. Census Bureau (n.d.) (<https://www.census.gov/cps/data/cpstablecreator.html>) and the U.S. Bureau of Labor Statistics (n.d.-b) (<https://data.bls.gov/PDQWeb/ln>). Multiple data sources were necessary because no single source of CLF data was comparable with the two Fedscope datasets.

Both the U.S. Census Bureau CLF dataset and the U.S. Bureau of Labor Statistics CLF dataset use estimates from the Current Population Survey—a monthly sample survey jointly sponsored by both bureaus—and are rounded to the nearest thousand individuals (U.S. Bureau of Labor Statistics, 2017). CLF data from the U.S. Census Bureau were used in conjunction with the race and ethnicity data from the Fedscope Diversity Cubes as they include a comparable race and ethnicity metric (other CLF datasets do not include a discrete white non-Hispanic category). This dataset uses annual averages, includes age data, and is available from 2003 onward. CLF data from the U.S. Bureau of Labor Statistics were used in conjunction with the gender data from

Fedscope as they are available from a longer period of time (1948 onwards) and include a metric for gender. To most closely match the September quarterly Fedscope data, the CLF data accessed from this dataset were seasonally adjusted third quarter averages. Age data were also retrieved from this dataset but were only available in non-seasonally adjusted annual averages. For all years of data available from both datasets (2003 to 2018), their estimates of the total CLF never differ by more than 1%. In addition, the U.S. Census Bureau dataset includes a disclaimer stating that: “While tabulations may be conceptually the same as published estimates, in many cases they will not exactly match published estimates because the Table Creator uses the [Current Population Survey] public use file” (U.S. Census Bureau, n.d.).

For each selected federal natural resource organization, data on the number and percentage of employees by gender and race/ethnicity were examined over time for the total workforce, two GS ranges (GS-1 to GS-8 and GS-9 to GS-15), and three age ranges (under 30 years old, 30 to 49, and 50 and above). Data were compared across agencies and departments, as well as with the federal government overall and with the CLF. For the GS data, this analysis excluded employees not on the GS scale or an equivalently graded pay plan. From 1998 to 2018, such employees averaged less than 10% of all the selected federal natural resource organizations except the DOI (19%) and NPS (28%), as well as the federal government overall (28%). Since there is no comparable national system of graded pay plans for the CLF, GS data for the selected organizations were examined in comparison with data for the total CLF. In contrast, age data for the selected organizations were examined in comparison with equivalent age data for the CLF. For the purposes of this analysis, the phrase “underrepresented employees” refers collectively to female and minority employees, while the phrase “overrepresented employees” refers

collectively to male and white non-Hispanic employees.

Results

Employment data from the selected federal natural resource organizations, federal government overall, and CLF were analyzed for trends in employee gender (from 1998 to 2018) and for trends in employee race/ethnicity (from 2006 to 2018). The following subsections describe changes in workforce demographics in the total workforce, two GS ranges (GS-1 to GS-8 and GS-9 to GS-15), and three age ranges (under 30 years old, 30 to 49, and 50 and above). Within each subsection, general patterns are presented first, followed by the results for gender, and then the results for race/ethnicity. A final summary of the results for gender and for race/ethnicity across all employment categories is provided at the end of this section.

Change in workforce demographics

The total number of employees decreased in the selected federal natural resource organizations from 1998 to 2018 but increased in the CLF and federal government overall (Table 1). Non-land management agencies had the greatest relative losses over this period, with the NRCS losing 27% of its employees, the EPA losing 25%, and the USGS losing 23%. In comparison, the federal government overall increased its workforce by 16% and the CLF increased by 18% during this same time period. Most of the selected organizations experienced a continuous decrease in the number of employees from 1998 to 2018, with greater losses in later years from 2006 to 2018. The DOI, BLM, and FWS, however, experienced an initial increase in the total number of employees from 1998 to 2006 that was subsequently offset by a larger decrease in the

number of employees from 2006 to 2018. Both the CLF and the federal government overall experienced a consistent increase in the number of employees from 1998 to 2018.

Table 1. Change in the number of employees over time.

	Annual snapshots: number of employees			Change 1998–2018 by gender		Change 2006–2018 by race and ethnicity	
	1998	2006	2018	Female	Male	Minority	White
CLF*	137,814,000	151,585,000	162,022,000	+12,350,000	+11,858,000	+14,584,000	-2,692,000
F.Gov.	1,810,341	1,852,825	2,100,802	+110,567	+179,052	+187,745	+59,779
USDA	107,709	105,488	90,382	-7,257	-10,070	+1,312	-16,412
DOI	73,038	73,126	66,750	-1,181	-5,107	-1,781	-5,870
EPA	19,242	18,248	14,457	-2,089	-2,695	-453	-3,340
FS	39,782	38,948	35,800	-2,819	-1,163	+1,422	-4,570
NRCS	13,374	12,636	9,717	-543	-3,114	-11	-2,906
BLM	10,641	11,386	10,426	+1	-216	+265	-1,273
USGS	10,411	8,819	7,973	-765	-1,673	+65	-929
NPS	22,384	22,258	21,065	-30	-1,289	-427	-1,887
FWS	8,530	9,252	8,476	+154	-208	+49	-864

**CLF data for the annual snapshots and change by gender were retrieved from the U.S. Bureau of Labor Statistics. CLF data for the change by race and ethnicity were retrieved from the U.S. Census Bureau. CLF estimates differ by no more than 1% between the two datasets.*

Gender

The number of both female and male employees decreased in most of the selected federal natural resource organizations from 1998 to 2018 but increased in the federal government overall and CLF (Table 1). All the selected organizations experienced a decrease in the number of male employees over the 21-year period, and all but the BLM and FS experienced a decrease in the number of female employees. The decrease in the number of male employees more than offset the change in the number of female employees from 1998 to 2018 for all the selected organizations except the FS. For example, over the 21-year period, the NRCS lost 3,114 male

employees but only lost 543 female employees, while the FS lost 2,819 female employees but only lost 1,163 male employees. In stark contrast to the selected federal natural resource organizations, the CLF and the federal government overall both increased the number of female and male employees from 1998 to 2018. Over the 21-year period, the relative change in the total number of female employees was -10% on average in the selected organizations, +14% in the federal government overall, and +19% in the CLF. The relative change in the total number of male employees from 1998 to 2018 was -15% on average in the selected organizations, +18% in the federal government overall, and +16% in the CLF.

From 1998 to 2018, the percentage of female employees in the selected federal natural resource organizations generally remained stable (Figure 1). The percentage of female employees changed by less than 3 percentage points over the 21-year period in the CLF, the federal government overall, and all the selected organizations except the NRCS and FS. The NRCS increased the percentage of female employees by 6 percentage points during this period, while the FS decreased by 4 percentage points. The stable percentage of female employees in most of the selected organizations over the 13-year period was primarily caused by changes in the workforce gender composition proportional to the 1998 population (Table 1). Most of the selected organizations experienced proportional decreases in male and female employees, while the CLF and federal government overall experienced proportional increases.

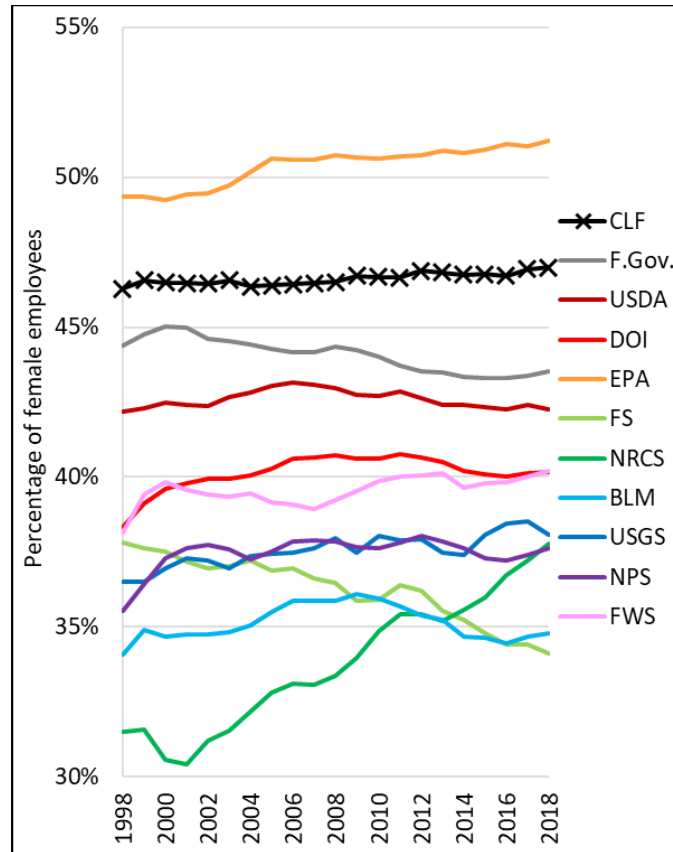


Figure 1. Change in female employment: 1998–2018

From 1998 to 2018, there were consistent differences in the percentage of female employees between the EPA, the CLF, the federal government overall, the two selected federal natural resource departments, and all the sub-agencies (Figure 1). The EPA consistently had the highest percentage of female employees over the 21-year period—the only selected organization to have a higher percentage of female employees than the CLF. Female employees averaged 50% of the EPA’s total workforce from 1998 to 2018, compared with 47% of the CLF, 44% of the federal government overall, 43% of the USDA, and 40% of the DOI. In all the sub-agencies under the two departments, female employees never averaged more than 40% of the total workforce during the 21-year period.

The female employment gap between the selected federal natural resource organizations and the CLF generally persisted from 1998 to 2018 (Figure 1). All the selected organizations except the NRCS and FS experienced similar rates of change in the percentage of female employees as the CLF over the 21-year period (from -0.1 to +0.1 percentage points per year), leading to a relatively stable, but persistent, female employment gap. The NRCS had a rate of increase of +0.3 percentage points per year from 1998 to 2018, thereby narrowing the female employment gap between it and the CLF. In contrast, the FS had a rate of decrease of -0.2 percentage points per year during the same period, thereby widening the female employment gap between it and the CLF.

Race and ethnicity

From 2006 to 2018, the selected federal natural resource organizations experienced variable change in the number of minority employees and a decrease in the number of white employees (Table 1). All the selected organizations and the CLF experienced a decrease in the number of white employees over the 13-year period while only the federal government overall experienced an increase. The number of minority employees also increased in some of the selected organizations (the USDA, FS, BLM, USGS, and FWS), as well as the CLF and the federal government overall, while decreasing in others (the DOI, EPA, NRCS, and NPS). For all the selected organizations, the decrease in the number of white employees was greater than the change (whether an increase or a decrease) in the number of minority employees during the 13-year period. For example, the USDA gained 1,312 minority employees but lost 16,412 white employees during this period. In contrast, the federal government overall and the CLF

experienced a greater increase in the number of minority employees than change in the number of white employees from 2006 to 2018. For example, the CLF's increase in minorities (+14,584,000) more than offset the decrease in white non-Hispanics (-2,692,000) over the 13-year period. From 2006 to 2018, the relative change in the total number of minority employees was +3% on average in the selected organizations and +32% in both the federal government overall and the CLF. The relative change in the total number of white employees over the 13-year period was -16% on average in the selected organizations, +5% in the federal government overall, and -3% in the CLF.

The percentage of minority employees increased across most of the selected federal natural resource organizations from 2006 to 2018 (Figure 2). The NPS and DOI were the only selected organizations to remain stable such that the percentage of minority employees changed by less than 2 percentage points over the 13-year period. All the other selected organizations, as well as the CLF and the federal government overall, experienced an increase in the percentage of minority employees over the same period. The general increase in the percentage of minority employees in the selected organizations from 2006 to 2018 was primarily caused by the loss of white employees, given that all the selected organizations experienced a larger decrease in the number of white employees than change in the number of minority employees (Table 1). In contrast, in the CLF and the federal government overall, the increase in the percentage of minority employees over the 13-year period was primarily caused by gains in the number of minority employees, given that they both experienced a larger increase in the number of minority employees than change in the number of white employees.

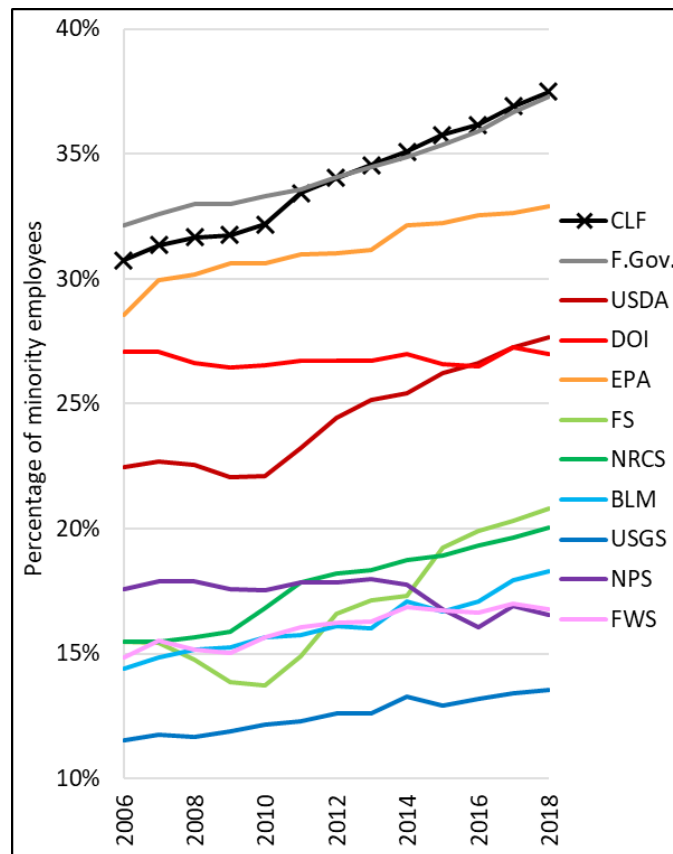


Figure 2. Change in minority employment: 2006–2018

For the NPS (and by extension, the DOI), the percentage of employees with an unspecified race/ethnicity increased dramatically starting in 2016. From 2006 to 2015, the composition of the NPS workforce remained steady with an average of 82% white employees, 18% minority employees (Figure 2), and 0% employees with an unspecified race/ethnicity. For that entire 10-year period, the NPS never had more than 5 employees with an unspecified race/ethnicity. Beginning in 2016, however, the number of NPS employees with an unspecified race/ethnicity sharply increased: there were 827 such employees in 2016, 762 in 2017, and 1,126 in 2018 (representing 63% of all federal employees with an unspecified race/ethnicity that year). None of

the other selected federal natural resource agencies ever had more than 250 employees with an unspecified race/ethnicity from 2006 to 2018. Comparing the NPS's 2015 workforce with its 2018 workforce, the percentage of white employees decreased from 83% to 78%, the percentage of minority employees stayed the same at 17%, and the percentage of employees with an unspecified race/ethnicity increased from 0% to 5%. It therefore appears that NPS employees with an unspecified race/ethnicity were primarily replacing white employees during this period, rather than minority employees. From 2006 to 2018, employees with an unspecified race/ethnicity never made up more than 1% of the workforces of the other selected organizations and the federal government overall.

From 2006 to 2018, there were consistent differences in the percentage of minority employees between the CLF and federal government overall, the EPA, the two selected federal natural resource departments, and all the sub-agencies (Figure 2). The CLF and the federal government overall both averaged 34% minority employees over the 13-year period—a higher percentage than all the selected federal natural resource organizations. From 2006 to 2018, the EPA averaged 31% minority employees, while the DOI and USDA averaged 27% and 25% minority employees respectively. In all the sub-agencies under these two departments, minority employees never averaged more than 20% of the workforce during this same period. Starting in 2015, the USDA sub-agencies consistently had a higher percentage of minority employees than any of the DOI sub-agencies as a result of their relatively higher rates of increase. The USGS persisted with the lowest percentage of minority employees for the entire 13-year period, with an average of 13%.

The minority employment gap between most of the selected federal natural resource organizations and the CLF grew larger from 2006 to 2018 (Figure 2). Most of the selected federal natural resource organizations did not keep pace with the CLF's rate of increase in the percentage of minorities over the 13-year period (+0.5 percentage points per year). The FS, USDA, and federal government overall came closest to the CLF's rate of increase from 2006 to 2018 (all +0.4 percentage points per year), thereby maintaining a relatively stable minority employment gap over time. The DOI and NPS had the lowest rate of change in the percentage of minority employees from 2006 to 2018 (0.0 and -0.1 percentage points per year, respectively) and therefore experienced the greatest divergence from the CLF during this time.

Change in workforce demographics by GS level

From 1998 to 2018, the selected federal natural resource organizations and the federal government overall experienced a decrease in the number of employees in the lower GS range (GS-1 to GS-8) and variable change in the number of employees in the higher GS range (GS-9 to GS-15) (Table 2). For the lower GS range, the greatest decrease in the number of employees occurred in the non-land management agencies (EPA, NRCS, and USGS) and the FWS, while the smallest decrease occurred in the FS, BLM, and NPS. For example, lower GS employees in the EPA decreased 90% from 1998 to 2018 but decreased by less than 12% in all the land management agencies (except the FWS). For the higher GS range, the selected organizations experienced variable change from 1998 to 2018: the DOI, NPS, BLM, and FWS, as well as the federal government overall, experienced a net increase in the number of GS-9 to GS-15 employees, while the USDA, EPA, FS, NRCS, and USGS experienced a net decrease. Most of the selected organizations experienced an initial increase in the number of higher GS employees from 1998 to 2006, followed by a subsequent decrease from 2006 to 2018. For the federal government overall and all the selected organizations except the EPA, the decrease in the number of GS-1 to GS-8 employees exceeded any change (increase or decrease) in the number of GS-9 to GS-15 employees from 1998 to 2018. For example, the USDA lost employees across both GS ranges over the 21-year period, but with much higher losses in the lower GS range (-11,786 employees) than the higher GS range (-2,169 employees).

Table 2. Change in the number and percentage of employees in lower and higher GS ranges

	Annual snapshots: number and percentage* of employees in each GS range						Change 1998–2018 by gender		Change 2006–2018 by race and ethnicity		
	1998		2006		2018		Female	Male	Minority	White	
GS-9 to GS-15	F.Gov.	851,867	62%	889,369	67%	1,075,127	73%	+134,695	+88,399	+128,597	+57,235
	USDA	54,214	54%	56,902	57%	52,045	60%	+5,376	-7,545	+2,294	-7,150
	DOI	34,647	61%	38,882	66%	38,403	70%	+4,960	-1,204	+1,361	-2,023
	EPA	15,648	86%	16,021	93%	13,229	98%	-284	-2,135	-28	-2,765
	FS	17,563	47%	18,114	48%	16,465	48%	+894	-1,992	+621	-2,269
	NRCS	8,295	62%	8,738	69%	7,091	73%	+817	-2,021	+78	-1,724
	BLM	6,344	64%	6,990	65%	6,524	66%	+749	-569	+208	-690
	USGS	7,121	70%	6,748	78%	5,975	76%	+156	-1,302	+77	-859
	NPS	7,908	52%	9,024	57%	8,863	57%	+951	+4	+81	-356
	FWS	4,719	63%	6,098	73%	6,233	80%	+1,093	+421	+216	-97
GS-1 to GS-8	F.Gov.	524,085	38%	446,332	33%	406,048	27%	-122,390	+4,056	+833	-41,571
	USDA	46,594	46%	43,842	44%	34,808	40%	-11,083	-703	-602	-8,427
	DOI	22,652	40%	19,781	34%	16,625	30%	-5,240	-787	-1,345	-2,468
	EPA	2,659	15%	1,215	7%	265	2%	-1,917	-477	-467	-481
	FS	20,207	54%	19,287	52%	18,123	52%	-3,544	+1,460	+800	-1,965
	NRCS	5,040	38%	3,857	31%	2,605	27%	-1,357	-1,078	-88	-1,163
	BLM	3,636	36%	3,773	35%	3,422	34%	-752	+538	+79	-460
	USGS	3,041	30%	1,905	22%	1,866	24%	-912	-263	-2	-46
	NPS	7,431	48%	6,955	44%	6,648	43%	-880	+97	-171	-720
	FWS	2,822	37%	2,227	27%	1,546	20%	-905	-371	-124	-574

**Values only represent employees on the GS scale or an equivalently graded pay plan. Employees on other pay plans are not included here.*

The distribution of employees by GS level in most of the selected federal natural resource organizations from 1998 to 2018 was increasingly skewed toward the higher GS range (GS-9 to GS-15) over the lower GS range (GS-1 to GS-8) (Table 2). Except for the FS, all the selected organizations, as well as the federal government overall, had a greater number of employees in the higher GS range than in the lower GS range for the entire 21-year period. The FS is notable as the only organization with more GS-1 to GS-8 employees than GS-9 to GS-15 employees from 1998 to 2018. Over the 21-year period, all the selected organizations and the federal

government overall increased their percentage of higher GS employees and decreased their percentage of lower GS employees, further skewing the distribution of employees toward the higher GS range. In general, the land management agencies (except the FWS) consistently had a more equal distribution of employees across both GS ranges than the non-land management agencies from 1998 to 2018. For example, in 2018, higher GS employees made up 48% of employees in the FS, 57% in the NPS, and 66% in the BLM, compared to 98% in the EPA, 80% in the FWS, 76% in the USGS, and 73% in the NRCS. Given the disparity between the selected organizations' less-populous lower GS range and the more-populous higher GS range, it could be argued that trends in the percentage of underrepresented employees in the higher GS range are more meaningful since they represent more of the total workforce.

Gender

Lower GS range

From 1998 to 2018, all the selected federal natural resource organizations experienced a decrease in the number of female employees in the lower GS range (GS-1 to GS-8), and a slight majority also experienced a decrease in the number of male GS-1 to GS-8 employees (Table 2). The number of female GS-1 to GS-8 employees decreased over the 21-year period in all the selected organizations and the federal government overall. The number of male GS-1 to GS-8 employees also decreased for many, but not all, of the selected organizations from 1998 to 2018; most of the land management agencies (the FS, BLM, and NPS) and the federal government overall increased the number of male GS-1 to GS-8 employees over the 21-year period. For all the selected organizations and the federal government overall, the decrease in the number of female GS-1 to GS-8 employees more than offset the change (increase or decrease) in the number of

male employees from 1998 to 2018. For example, the USDA experienced a decrease in both female and male GS-1 to GS-8 employees over the 21-year period, but the loss of 11,083 female employees dwarfed the loss of 703 male employees. Similarly, the federal government overall lost 122,390 female GS-1 to GS-8 employees from 1998 to 2018 compared with an increase of only 4,056 male GS-1 to GS-8 employees.

The percentage of female employees in the lower GS range (GS-1 to GS-8) decreased across the selected federal natural resource organizations from 1998 to 2018 (Figure 3). All the selected organizations and the federal government overall experienced a decrease in the percentage of female GS-1 to GS-8 employees over the 21-year period, falling 10 percentage points on average. This is in stark contrast to the CLF where the total percentage of women remained fairly stable during this period, only changing from 46% in 1998 to 47% in 2018 (Figure 1). The decrease in the percentage of female GS-1 to GS-8 employees in all the selected organizations from 1998 to 2018 was primarily caused by the loss of female employees, given that all the selected organizations experienced a larger decrease in the number of female employees than change in the number of male employees (Table 2). The EPA is somewhat of an exception in that the difference between its 1998 and 2018 percentages of female GS-1 to GS-8 employees is only 2 percentage points (relatively stable). However, the difference between its 1998 and 2017 percentages of female GS-1 to GS-8 employees is 6 percentage points (decreasing). The large fluctuations in the EPA's percentage of employees in the lower GS range were likely due to the small number of GS-1 to GS-8 EPA employees during this time: by 2012 the EPA had fewer than 1,000 employees in the lower GS range, dropping to fewer than 500 employees in 2017 and 2018.

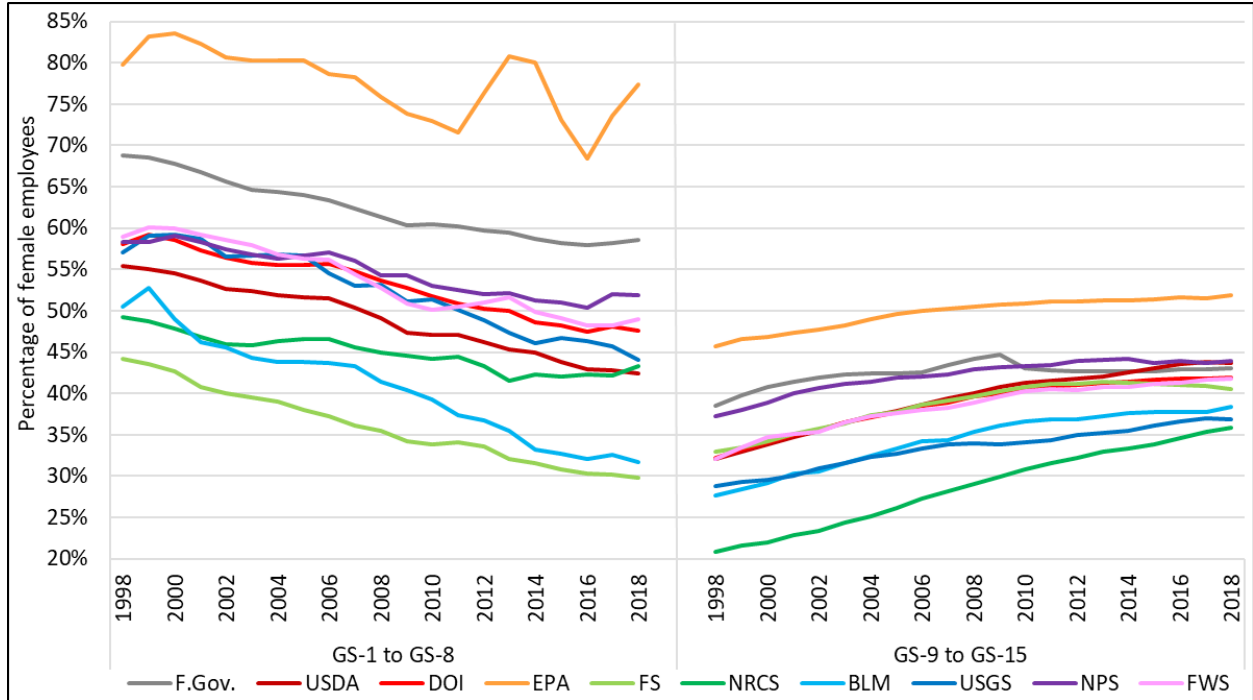


Figure 3. Change in female employment by GS level: 1998–2018

There were consistent differences from 1998 to 2018 in the percentage of female employees in the lower GS range (GS-1 to GS-8) between the EPA, the federal government overall, the DOI and its sub-agencies, and the USDA and its sub-agencies (Figure 3). Throughout the 21-year period, the EPA consistently had the highest percentage of female GS-1 to GS-8 employees (as well as the lowest total number of GS-1 to GS-8 employees [Table 2]) of all selected organizations. Female employees averaged 78% of the EPA’s lower GS workforce from 1998 to 2018, compared with 62% of the federal government overall, 54% of the DOI and its sub-agencies (excluding the BLM), and 43% of the USDA and its sub-agencies plus the BLM. The FS consistently retained the lowest percentage of female GS-1 to GS-8 employees of all the selected federal natural resource organizations during this period. This is particularly notable

given that the FS was the only one of the selected organizations with more employees in the lower GS range than the higher GS range for the 21-year period, and given that by 2018 the FS had a larger GS-1 to GS-8 workforce (18,123 employees) than the entire DOI (16,625 employees). The differences between the selected organizations were maintained as their percentage of female GS-1 to GS-8 employees decreased from 1998 to 2018. The total percentage of women in the CLF remained relatively stable during the 21-year period such that it did not maintain a consistent position relative to the selected organizations (Figure 1).

The female employment gap between the lower GS range (GS-1 to GS-8) of the selected federal natural resource organizations (Figure 3) and the total CLF (Figure 1) generally shrank from 1998 to 2018. In 1998, all the selected organizations except the FS had a higher percentage of female GS-1 to GS-8 employees than the total percentage of women in the CLF. Over the 21-year period, the percentage of female GS-1 to GS-8 employees decreased in all the selected organizations and the federal government overall at an average rate of -0.5 percentage points per year, while the total percentage of women in the CLF remained stable. By 2018, therefore, only half of the selected organizations still had a higher percentage of female employees than the CLF, and all but the NRCS, FS, and BLM had reduced the female employment gap in the lower GS range. The USDA and USGS were unique in that they reduced the size and reversed the direction of the lower GS female employment gap from 1998 to 2018. For example, in 1998 the USGS's lower GS workforce was 57% female—11 percentage points higher than the total CLF (46%); by 2018, it was 44% female—3 percentage points lower than the CLF (47%). A similar reversal occurred in the NRCS's lower GS workforce, but with an equivalent female employment gap in both 1998 (3 percentage points between the NRCS and the CLF) and 2018 (4

percentage points between the CLF and the NRCS). For the BLM and FS, the female employment gap between the lower GS range and the total CLF grew over the 21-year period as the agencies became increasingly male dominated: by 2018, the lower GS workforce was only 32% female in the BLM, and 30% female in the FS.

Higher GS range

From 1998 to 2018, most of the selected federal natural resource organizations experienced an increase in the number of female employees in the higher GS range (GS-9 to GS-15) and a decrease in the number of male employees (Table 2). Over the 21-year period, all the selected organizations except the EPA, NPS, and FWS experienced a concurrent increase in the number of female GS-9 to GS-15 employees and a decrease in the number of male GS-9 to GS-15 employees. For example, from 1998 to 2018 the NRCS gained 817 female GS-9 to GS-15 employees but lost 2,021 male employees. During the same period, the DOI gained 4,960 female GS-9 to GS-15 employees and only lost 1,204 male employees. In contrast, the FWS, NPS, and the federal government overall experienced an increase in the number of both female and male GS-9 to GS-15 employees from 1998 to 2018, although all three gained more female employees than male employees. The federal government overall gained a higher relative number of male employees than any of the selected organizations during this period, gaining 88,399 male GS-9 to GS-15 employees and 134,695 female employees. The EPA was the only selected organization to experience a decrease in the number of both female and male GS-9 to GS-15 employees from 1998 to 2018, although it lost more male employees than female employees during this time.

In the higher GS range (GS-9 to GS-15), the selected federal natural resource organizations experienced an increase in the percentage of female employees from 1998 to 2018 (Figure 3). The percentage of female GS-9 to GS-15 employees increased in all the selected organizations and the federal government overall by an average of 9 percentage points over the 21-year period. This is in stark contrast to the CLF where the total percentage of women remained fairly stable during this period, only changing from 46% in 1998 to 47% in 2018 (Figure 1). The increase in the percentage of female GS-9 to GS-15 employees in all the selected organizations from 1998 to 2018 was generally caused by both the increase in the number of female employees as well as the decrease in the number of male employees (Table 2).

From 1998 to 2018 there were consistent differences in the percentage of female employees in the higher GS range (GS-9 to GS-15) between the EPA, the total CLF (Figure 1), most of the selected federal natural resource organizations and the federal government overall, and the BLM, USGS, and NRCS (Figure 3). Over the 21-year period, the average percentage of female GS-9 to GS-15 employees was 50% in the EPA. In comparison, the total percentage of women in the CLF averaged 47% from 1998 to 2018, and the average percentage of female GS-9 to GS-15 employees in all the selected organizations except the EPA was 37% during this period. The EPA was the only one of the selected organizations to exceed the total percentage of women in the CLF, which it did from 2000 to 2018. The BLM, USGS, and NRCS consistently retained the lowest percentage of female GS-9 to GS-15 employees from 1998 to 2018, with 21-year averages of 34%, 33%, and 29% respectively.

The female employment gap between the higher GS range (GS-9 to GS-15) of the selected

federal natural resource organizations (Figure 3) and the total CLF (Figure 1) generally shrank from 1998 to 2018. Over the 21-year period, the percentage of female GS-9 to GS-15 employees increased in all the selected organizations and the federal government overall at an average rate of +0.4 percentage points per year, while the total percentage of women in the CLF remained stable. In 1998, the average percentage of female GS-9 to GS-15 employees in all the selected organizations except the EPA was 30%—16 percentage points lower than the total CLF (46%); by 2018, the average had increased to 40%—only 7 percentage points lower than the total CLF (47%). Over the 21-year period, therefore, the federal government overall and all the selected organizations except the EPA generally reduced the female employment gap in the higher GS range by more than half. For example, the NRCS had the highest rate of increase from 1998 to 2018 (+0.7 percentage points per year) and reduced the female employment gap between it and the total CLF from 25 percentage points in 1998 to 11 percentage points in 2018. In contrast to the other selected organizations, the EPA enlarged the female employment gap over the 21-year period by increasing the percentage of female GS-9 to GS-15 employees above the total percentage of women in the CLF. In 1998, the EPA’s higher GS workforce and the total CLF were both 46% female; by 2018, the EPA was 52% female while the total CLF was only 47% female.

All GS ranges

From 1998 to 2018, the percentage of women generally decreased in the lower GS range (GS-1 to GS-8) and increased in the higher GS range (GS-9 to GS-15) of the selected federal natural resource organizations (Figure 3) primarily due to consistent decreases in the number of male employees and larger losses of female lower GS employees than gains in female higher GS

employees (Table 2). The selected organizations generally lost employees across all gender and GS range combinations over the 21-year period except for an increase in the number of female higher GS employees. The selected organizations' large loss of female lower GS employees offset this increase, however, leading to a net loss of women (as well as men) from 1998 to 2018. Over the 21-year period, the selected organizations' percentage of women decreased in the lower GS range (-11 percentage points on average) due to larger losses of female than male employees, but increased in the higher GS range (+10 percentage points on average) due to the simultaneous increase in female employees and decrease in male employees. In contrast to the selected organizations, the federal government overall gained employees across all gender and GS range combinations over the 21-year period except female lower GS employees. The federal government overall's increase in the number of male higher GS employees is particularly notable juxtaposed with the selected organizations' decrease in that population from 1998 to 2018. The increase in the federal government overall's percentage of women in the higher GS range over the 21-year period was therefore a result of larger gains in the number of female employees—not the loss of male employees.

The workforce gender composition in both the lower GS range (GS-1 to GS-8) and higher GS range (GS-9 to GS-15) of the selected federal natural resource organizations became increasingly similar to that of the total CLF (Figure 1) from 1998 to 2018 (Figure 3). In 1998, women made up the majority of the selected organizations' lower GS workforce (57% on average) but a minority of their higher GS workforce (32% on average), compared to 46% of the total CLF. By 2018, workforce composition in the selected organizations had shifted such that women were a minority in both the lower GS workforce (46% on average) and higher GS workforce (42% on

average), compared to 47% of the total CLF. In the higher GS range, all the selected organizations (except the EPA) retained a lower percentage of female employment than the total CLF from 1998 to 2018, thereby reducing (but not eliminating) the female employment gap. In contrast, in the lower GS range in 2018 the selected organizations had levels of female employment that were evenly split above and below the total percentage of women in the CLF—that is, the selected organizations generally reduced the female employment gap but some also flipped the direction of the gap from a female majority to a male majority. In both GS ranges over the 21-year period, the EPA and federal government overall generally had a higher percentage of women than the other selected organizations, while the BLM and NRCS (and to a lesser extent the FS and USGS) usually had the lowest percentage.

Race and ethnicity

Lower GS range

From 2006 to 2018, most of the selected federal natural resource organizations experienced a decrease in the number of both white and minority employees in the lower GS range (GS-1 to GS-8) (Table 2). The number of white GS-1 to GS-8 employees decreased over the 13-year period in all the selected organizations and the federal government overall. The number of minority GS-1 to GS-8 employees also decreased for many, but not all, of the selected organizations from 2006 to 2018; the FS, BLM, and the federal government overall experienced an increase in the number of minority GS-1 to GS-8 employees over the 13-year period. For all the selected organizations and the federal government overall, the decrease in the number of white GS-1 to GS-8 employees more than offset the change (increase or decrease) in the number of minority employees from 2006 to 2018. For example, the USDA experienced a decrease in

both minority and white GS-1 to GS-8 employees over the 13-year period, but the loss of 8,427 white employees far exceeded the loss of 602 minority employees. Similarly, the federal government overall lost 41,571 white GS-1 to GS-8 employees from 2006 to 2018 compared with an increase of only 833 minority GS-1 to GS-8 employees.

The percentage of minority employees in the lower GS range (GS-1 to GS-8) increased for a slight majority of the selected federal natural resource organizations from 2006 to 2018 (Figure 4). The EPA, USDA, FS, NRCS, and BLM all experienced an increase in the percentage of minority GS-1 to GS-8 employees over the 13-year period, as did the federal government overall and the CLF (Figure 2). During the same period, the DOI and NPS experienced a decrease in the percentage of minority GS-1 to GS-8 employees, and the USGS and FWS remained relatively stable (the percentage of minority GS-1 to GS-8 employees changed by less than 2 percentage points from 2006 to 2018). The increase in the percentage of minority GS-1 to GS-8 employees in all the selected organizations from 2006 to 2018 was primarily caused by the loss of white employees, given that all the selected organizations experienced a larger decrease in the number of white employees than change in the number of minority employees (Table 2). The large fluctuations in the EPA's percentage of minority employees in the lower GS range were likely due to the small number of GS-1 to GS-8 EPA employees during this time: by 2012 the EPA had fewer than 1,000 employees in the lower GS range, dropping to fewer than 500 employees in 2017 and 2018.

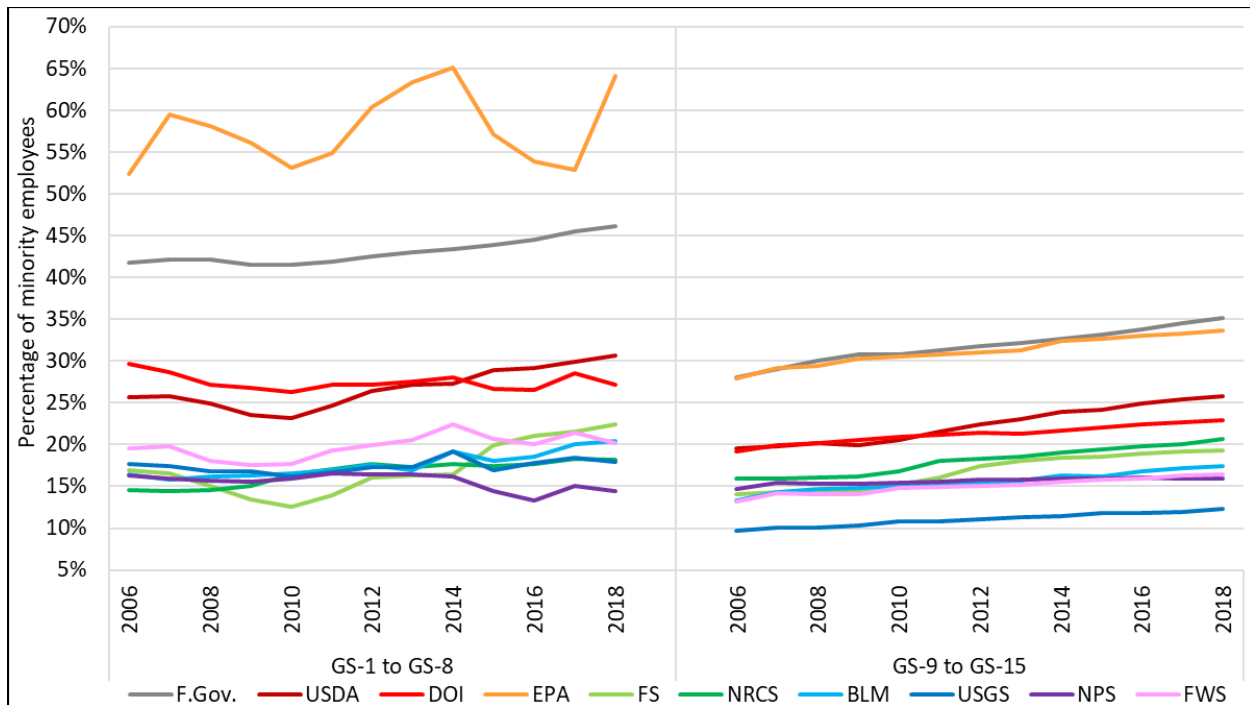


Figure 4. Change in minority employment by GS level: 2006–2018

For the NPS (and by extension, the DOI), the percentage of employees in the lower GS range (GS-1 to GS-8) with an unspecified race/ethnicity experienced a large increase beginning in 2016. From 2006 to 2018, the number of lower GS employees with an unspecified race/ethnicity in the NPS increased from 2 employees to 586 employees (+584). This is in stark contrast with the number of minority and white GS-1 to GS-8 employees in the NPS which both decreased over the 13-year period (-171 and -720, respectively) (Table 2). Comparing the NPS’s lower GS workforce from 2015 (just before the sharp increase in employees with an unspecified race/ethnicity) to 2018, the percentage of white NPS employees decreased from 86% to 77%, the percentage of minority NPS employees stayed the same at 14% (Figure 4), and the percentage of NPS employees with an unspecified race/ethnicity increased from 0% to 9%. It therefore appears that, in the NPS’s lower GS workforce, employees with an unspecified race/ethnicity were

primarily replacing white employees during this period, rather than minority employees. The only other selected organizations in which employees with an unspecified race/ethnicity made up more than 1% of the lower GS workforce over the 13-year period were the EPA (2% or more from 2009 to 2011, with a maximum of 3% in 2010) and the NRCS (2% in 2009). Neither of these agencies had more than 60 employees with an unspecified race/ethnicity during those years, nor more than 4,000 total lower GS employees.

From 2006 to 2018, there were consistent differences in the percentage of minority employees in the lower GS range (GS-1 to GS-8) between the EPA, the federal government overall, the total CLF (Figure 2), the two selected federal natural resource departments, and all the sub-agencies (Figure 4). Throughout the 13-year period, the EPA consistently had the highest percentage of minority GS-1 to GS-8 employees (as well as the lowest total number of GS-1 to GS-8 employees [Table 2]). From 2006 to 2018, minority employees averaged 58% of the GS-1 to GS-8 workforce in the EPA and 43% in the federal government overall, compared to an average of 34% minorities in the total CLF. The remaining selected organizations had a lower level of minority GS-1 to GS-8 employment than the total CLF for the entire 13-year period, with the USDA and DOI both averaging 27% minority GS-1 to GS-8 employees and all the sub-agencies under the two departments collectively averaging 17% minority GS-1 to GS-8 employees. None of the sub-agencies exceeded a high of 22% minority GS-1 to GS-8 employment from 2006 to 2018 (attained by the FWS in 2014 and the FS in 2017 and 2018). The FS's relatively low levels of minority employment in the lower GS workforce are notable given that it was the only one of the selected organizations with more employees in the lower GS range than the higher GS range for the 13-year period, and given that by 2018 the FS had a larger GS-1 to GS-8 workforce (18,123 employees) than the entire DOI (16,625 employees).

The minority employment gap between the lower GS range (GS-1 to GS-8) of the selected federal natural resource organizations (Figure 4) and the total CLF (Figure 2) generally grew larger from 2006 to 2018. Over the 13-year period, the total percentage of minorities in the CLF experienced a higher rate of increase (+0.5 percentage points per year) than all the selected organizations except the EPA, and thereby expanded the minority employment gap in most of the selected organizations. The DOI and NPS experienced the largest growth in the minority employment gap by decreasing their percentage of minority GS-1 to GS-8 employees at rates of -0.2 and -0.1 percentage points per year, respectively, from 2006 to 2018. The EPA's high rate of increase in the percentage of GS-1 to GS-8 minorities (+0.9 percentage points per year, albeit with large fluctuations over time) also resulted in a net enlargement of the minority employment gap over the 13-year period since the EPA's lower GS workforce had a consistently higher percentage of minorities than the total CLF. The USDA and FS were the only selected organizations to have a similar rate of increase in the percentage of minority GS-1 to GS-8 employees as the total CLF from 2006 to 2018 (both +0.4 percentage points per year), and therefore maintained a relatively stable minority employment gap over time. In contrast to all the selected organizations, the federal government overall shrank the minority employment gap slightly as its lower GS workforce had a slower rate of increase than the total CLF (+0.3 percentage points per year) but a higher percentage of minority employees for the entire 13-year period.

Higher GS range

In the higher GS range (GS-9 to GS-15), all the selected federal natural resource organizations except the EPA experienced an increase in the number of minority employees and a decrease in the number of white employees from 2006 to 2018 (Table 2). The EPA was the only selected organization to experience a decrease in the number of both minority and white GS-9 to GS-15 employees over the 13-year period, although its loss of 2,765 white employees far exceeded its loss of 28 minority employees. For all the other selected organizations except the FWS, the loss of white employees from 2006 to 2018 more than offset gains in the number of minority employees, leading to a net decrease in the total number of GS-9 to GS-15 employees. For example, the NRCS gained 78 minority GS-9 to GS-15 employees from 2006 to 2018, but lost 1,724 white GS-9 to GS-15 employees. The FWS was the only selected organization to experience a net increase in the number of GS-9 to GS-15 employees from 2006 to 2018, gaining 216 minority employees and losing only 97 white employees. In stark contrast to all the selected federal natural resource organizations, the federal government overall experienced an increase in the number of white GS-9 to GS-15 employees from 2006 to 2018 (+57,235), in addition to a larger increase in the number of minority GS-9 to GS-15 employees (+128,597).

From 2006 to 2018, most of the selected federal natural resource organizations experienced an increase in the percentage of minority employees in the higher GS range (GS-9 to GS-15) (Figure 4). The NPS was the only selected organization to maintain a relatively stable percentage of minority GS-9 to GS-15 employees, increasing by only 1 percentage point over the 13-year period. Minority GS-9 to GS-15 employees increased in all the other selected organizations and the federal government overall by an average of 5 percentage points over the 13-year period.

This is similar to the CLF where the total percentage of minorities increased 7 percentage points from 2006 to 2018 (Figure 2). The increase in the percentage of minority GS-9 to GS-15 employees in all the selected organizations from 2006 to 2018 was primarily caused by the large decrease in the number of white employees, as well as the more modest increase in the number of minority employees (Table 2). Over the 13-year period, employees with an unspecified race/ethnicity never made up more than 1% of the higher GS workforces of the selected organizations and the federal government overall.

There were consistent differences from 2006 to 2018 in the percentage of minority employees in the higher GS range (GS-9 to GS-15) between the total CLF (Figure 2), the federal government overall and the EPA, the two selected federal natural resource departments, the USDA sub-agencies, and the DOI sub-agencies (Figure 4). The total percentage of minorities in the CLF was higher than the percentage of minority GS-9 to GS-15 employees in all the selected organizations and the federal government overall for the entire 13-year period. Minorities made up 34% of the total CLF on average from 2006 to 2018, while over the same period minority GS-9 to GS-15 employees averaged 32% of the federal government overall and 31% of the EPA. None of the other selected organizations ever reached 30% minority employment in the higher GS range during the 13-year period: the USDA and DOI respectively averaged 22% and 21% minority GS-9 to GS-15 employees during this period, the USDA sub-agencies averaged 17%, and the DOI sub-agencies averaged 14%. The USGS consistently retained the lowest percentage of minority GS-9 to GS-15 employees from 2006 to 2018 with an average of 11% minority employees in the higher GS range. The sub-agencies of the USDA and DOI (except the USGS) had relatively similar percentages of minority GS-9 to GS-15 employees in 2006 (ranging from

13% to 16%) but diverged over time. By 2018, the USDA sub-agencies had a higher percentage of minority GS-9 to GS-15 employees (19% in the FS and 21% in the NRCS) than any of the DOI sub-agencies (17% in the BLM, 16% in the NPS and FWS, and 12% in the USGS).

From 2006 to 2018, the minority employment gap between the higher GS range (GS-9 to GS-15) of the selected federal natural resource organizations (Figure 4) and the total CLF (Figure 2) grew larger in the DOI and its sub-agencies but remained stable in the EPA, USDA, and the USDA sub-agencies. Over the 13-year period, the total percentage of minorities in the CLF increased at a rate of +0.5 percentage points per year. The USDA, FS, NRCS, and EPA, as well as the federal government overall, experienced a similar rate of increase in the percentage of minority GS-9 to GS-15 employees from 2006 to 2018 (+0.5 percentage points per year for the federal government overall and the USDA, and +0.4 percentage points per year for the EPA, FS, and NRCS) and thereby maintained a relatively stable minority employment gap over time. In contrast, the DOI and all its sub-agencies had a lower rate of increase in the percentage of minority GS-9 to GS-15 employees than the total CLF (ranging from +0.1 to +0.3 percentage points per year), and thereby enlarged the minority employment gap over the 13-year period. For example, in 2006 the percentage of minority GS-9 to GS-15 employees in the USGS was 10%—21 percentage points lower than the total CLF (31%); by 2018, it had increased to 12%—25 percentage points lower than the total CLF (37%).

All GS ranges

In both the lower GS range (GS-1 to GS-8) and higher GS range (GS-9 to GS-15) of the selected federal natural resource organizations, the percentage of minorities generally increased from

2006 to 2018 (Figure 4) primarily due to large decreases in the number of white employees (Table 2). The selected organizations generally lost employees across all racial/ethnic and GS range combinations over the 13-year period except for a small increase in the number of minority higher GS employees. In both GS ranges, the loss of white employees exceeded the change in the number of minority employees, leading to an increase in the percentage of minority employees in the selected organizations from 2006 to 2018 (+3 and +4 percentage points on average in the lower and higher GS ranges respectively). In contrast to the selected organizations, the federal government overall gained employees across all racial/ethnic and GS range combinations over the 13-year period except white lower GS employees. The federal government overall's increase in the number of white higher GS employees is particularly notable juxtaposed with the selected organizations' large decrease in that population from 2006 to 2018. The increase in the federal government overall's percentage of minorities in the higher GS range over the 13-year period was therefore a result of larger gains in the number of minority employees—not the loss of white employees.

The workforce racial/ethnic composition in both the lower GS range (GS-1 to GS-8) and higher GS range (GS-9 to GS-15) of the selected federal natural resource organizations became increasingly dissimilar to that of the total CLF (Figure 2) from 2006 to 2018 (Figure 4). In both GS ranges, the EPA and federal government overall generally had a higher percentage of minorities than the total CLF over the 13-year period, while the selected sub-agencies generally had a lower percentage of minorities than their departments and all other selected organizations. In 2006, minorities averaged 23% of the selected organizations' lower GS workforce and 16% of their higher GS workforce, compared to 31% of the total CLF. By 2018, the percentage of

minorities in the selected organizations had increased to an average of 26% of the lower GS workforce and 20% of the higher GS workforce, compared to an even larger increase to 37% of the total CLF. The rate of increase in the percentage of minorities from 2006 to 2018 was 0.5 percentage points per year in the total CLF, but only averaged 0.3 and 0.2 percentage points per year in the selected organization's higher and lower GS workforces respectively. Therefore, in both GS ranges, almost all the selected organizations had a consistently lower percentage of minorities and a lower rate of increase than the total CLF over the 13-year period, resulting in the enlargement of the minority employment gap over time. In sharp contrast to the selected organizations, the federal government overall shrank the minority employment gap in the lower GS range and kept it stable in the higher GS range from 2006 to 2018.

Change in workforce demographics by age

From 1998 to 2018, the selected federal natural resource organizations, as well as the CLF and federal government overall, generally experienced an increase in the number of older employees (50 and above) and decreases in the number of both middle-aged employees (30 to 49) and young employees (under 30) (Table 3). All the selected organizations, as well as the CLF and federal government overall, experienced a net increase in the number of older employees over the 21-year period. The CLF and federal government overall experienced greater relative increases in the number of older employees from 1998 to 2018 (+82% and +58%, respectively) than all the selected organizations except the FWS (+25% on average, excluding the FWS). In the middle age range, the number of employees decreased over the 21-year period in all selected organizations, the federal government overall, and the CLF. The CLF and federal government overall experienced smaller relative decreases in the number of middle-aged employees from

1998 to 2018 (-3% and -6% respectively) than all the selected organizations (-31% on average).

The number of young employees decreased in all the selected organizations except the BLM over the 21-year period (-25% on average, excluding the BLM), but increased in the federal government overall and the CLF (+13% and +6%, respectively). The EPA is notable for experiencing large relative changes in all three age ranges over the 21-year period: the number of older EPA employees increased by 50%, while the number of middle-aged and young EPA employees decreased by 52% and 68% respectively.

Table 3. Change in the number and percentage of employees in young, middle, and older age ranges

	Annual snapshots: number and percentage of employees in each age range						Change 1998–2018 by gender		Change 2006–2018 by race and ethnicity		
	1998		2006		2018		Female	Male	Minority	White	
≥ 50 years old	CLF*	29,507,000	21%	41,808,000	28%	53,825,000	33%	+11,811,000	+12,506,000	+6,229,000	+6,568,000
	F.Gov.	588,217	33%	769,008	42%	927,344	44%	+174,881	+164,054	+118,279	+39,943
	USDA	31,527	29%	43,473	41%	38,532	43%	+7,043	-38	+2,461	-7,408
	DOI	21,643	30%	31,852	44%	28,072	42%	+4,708	+1,721	+232	-4,288
	EPA	5,448	28%	7,920	43%	8,157	56%	+1,852	+857	+777	-543
	FS	9,769	25%	14,640	38%	11,584	32%	+2,291	-476	+357	-3,416
	NRCS	3,416	26%	5,057	40%	3,919	40%	+673	-170	+65	-1,201
	BLM	3,227	30%	5,055	44%	3,683	35%	+590	-134	+45	-1,426
	USGS	2,962	29%	3,902	44%	3,199	40%	+245	-8	+47	-752
	NPS	5,938	27%	9,086	41%	8,407	40%	+1,493	+976	+31	-960
FWS	2,161	25%	3,418	37%	3,519	42%	+759	+599	+174	-75	
30–49 years old	CLF*	70,465,000	51%	70,589,000	47%	68,374,000	42%	-901,000	-1,190,000	+4,923,000	-7,245,000
	F.Gov.	1,077,450	60%	905,630	49%	1,010,379	48%	-60,227	-7,347	+72,555	+32,196
	USDA	62,176	58%	46,439	44%	40,231	45%	-12,198	-9,747	-642	-5,557
	DOI	42,745	59%	32,873	45%	31,235	47%	-5,110	-6,400	-1,640	-486
	EPA	11,965	62%	9,137	50%	5,715	40%	-3,143	-3,107	-1,051	-2,370
	FS	23,171	58%	16,145	42%	17,475	49%	-4,720	-976	+835	+497
	NRCS	8,232	62%	5,799	46%	4,684	48%	-834	-2,714	-64	-1,051
	BLM	6,207	58%	4,518	40%	5,251	50%	-584	-372	+208	+505
	USGS	6,075	58%	4,033	46%	3,767	47%	-857	-1,451	+5	-281
	NPS	13,031	58%	9,937	45%	9,483	45%	-1,402	-2,146	-441	-422
FWS	5,260	62%	4,915	53%	4,194	50%	-473	-593	-128	-612	
< 30 years old	CLF*	37,702,000	27%	39,031,000	26%	39,877,000	25%	+1,354,000	+822,000	+3,433,000	-2,016,000
	F.Gov.	144,668	8%	178,184	10%	163,076	8%	-4,086	+22,344	-3,091	-12,358
	USDA	14,006	13%	15,576	15%	11,619	13%	-2,102	-285	-507	-3,447
	DOI	8,650	12%	8,401	12%	7,443	11%	-779	-428	-373	-1,096
	EPA	1,828	10%	1,191	7%	585	4%	-798	-445	-179	-427
	FS	6,842	17%	8,163	21%	6,741	19%	-390	+289	+230	-1,651
	NRCS	1,726	13%	1,780	14%	1,114	12%	-382	-230	-12	-654
	BLM	1,207	11%	1,813	16%	1,492	14%	-5	+290	+12	-352
	USGS	1,374	13%	884	10%	1,007	13%	-153	-214	+13	+104
	NPS	3,415	15%	3,235	15%	3,175	15%	-121	-119	-17	-505
FWS	1,109	13%	919	10%	763	9%	-132	-214	+3	-177	

*CLF data for the annual snapshots and change by gender were retrieved from the U.S. Bureau of Labor Statistics. CLF data for the change by race and ethnicity were retrieved from the U.S. Census Bureau. CLF estimates differ by no more than 1% between the two datasets.

Across the young age range (under 30), middle age range (30 to 49), and older age range (50 and above), many of the selected federal natural resource organizations experienced reversals in their trend direction from 1998 to 2018, rather than a continuous increase or decrease in the number of employees (Table 3). This pattern of trend reversals was especially prevalent in the older age range, where most of the selected organizations experienced a large initial increase in the number of employees (1998–2006) followed by a smaller decrease (2006–2018). For example, the BLM initially gained 1,828 older employees from 1998 to 2006 but lost 1,372 employees from 2006 to 2018, ultimately resulting in a net increase of 456 older employees for the entire 21-year period. This is in stark contrast to the CLF and federal government overall which both experienced continuous increases in the number of older employees from 1998 to 2018. For the middle age range, most of the selected organizations experienced a consistent decrease in the number of employees over the 21-year period, albeit with greater losses in the earlier period (1998–2006). The FS, BLM, and federal government overall, however, experienced an initial decrease in the number of middle-aged employees (1998–2006), followed by a slight increase (2006–2018). In the young age range, most of the selected organizations experienced variable change in the number of employees in the initial period (1998–2006) followed by a decrease in the later period (2006–2018). The USDA, FS, NRCS, BLM, and USGS, as well as the federal government overall, experienced reversals in the trend direction of young employees over the 21-year period.

The distribution of employees by age range in the selected federal natural resource organizations and the federal government overall skewed toward the middle age range (30 to 49), then the older age range (50 and above), with the fewest employees in the young age range (under 30) from 1998 to 2018 (Table 3). In 1998, the workforce of the selected organizations was composed

of, on average, 28% older employees, 59% middle-aged employees, and 13% young employees. Over the 21-year period, all the selected organizations as well as the federal government overall and the CLF experienced an increase in the percentage of older employees, a decrease in the percentage of middle-aged employees, and a relatively stable percentage of young employees. By 2018, the average workforce of the selected organizations had shifted to a distribution of 41% older employees, 47% middle-aged employees, and 12% young employees. From 1998 to 2018, the CLF consistently had a higher percentage of young people than the selected organizations, as well as slightly lower percentages of middle-aged and older people. In contrast, the federal government overall consistently had a slightly lower percentage of young employees than the selected organizations over the 21-year period, as well as slightly higher percentages of middle-aged and older employees. In 1998, for example, the percentage of young people was 27% in the CLF, 13% on average in the selected organizations, and 8% in the federal government overall. Given the disparity between the selected organizations' less-populous young age range and more-populous middle and older age ranges, it could be argued that the latter's employment trends are more meaningful since they represent more of the total workforce.

Gender

Young age range

From 1998 to 2018, most of the selected federal natural resource organizations experienced a decrease in the number of female and male employees in the young age range (under 30) (Table 3). Over the 21-year period, all the selected organizations except the FS and BLM experienced a concurrent decrease in the number of female and male young employees, generally with greater losses of female young employees than male young employees. For example, from 1998 to 2018,

the USDA's loss of 285 male young employees was dwarfed by the loss of 2,102 female young employees. Unlike most of the selected organizations, the FS and BLM, as well as the federal government overall, increased the number of male young employees over the 21-year period while losing female young employees. For example, in the federal government overall from 1998 to 2018, the loss of 4,086 female young employees was more than offset by the increase of 22,344 male young employees. In the young age range of the CLF, the number of both men and women increased over the 21-year period, with a larger increase in the number of women than men. In sharp contrast to the federal government overall and the CLF, all the selected organizations except the BLM experienced a net decrease in the number of young employees from 1998 to 2018.

For the young age range (under 30), the selected federal natural resource organizations generally experienced a decrease in the percentage of female employees from 1998 to 2018 (Figure 5). Over the 21-year period, the percentage of female young employees decreased by an average of 6 percentage points in all the selected organizations except the USGS, NPS, and FWS. Similarly, the federal government overall also experienced a decrease in the percentage of female young employees of 8 percentage points from 1998 to 2018. In contrast, the percentage of female young employees in the USGS, NPS, and FWS, as well as the young age range of the CLF, remained relatively stable over time, with changes of less than 3 percentage points from 1998 to 2018. The decrease in the percentage of female young employees in most of the selected organizations over the 21-year period was primarily caused by the loss of female employees, given that most of the selected organizations experienced a larger decrease in the number of female young employees than male young employees (Table 3). Many of the selected organizations also had noticeable

fluctuations in the percentage of female young employment over time, likely due to the low total number of young employees: by 2018, both the EPA and FWS had fewer than 1,000 young employees, while the NRCS, BLM, and USGS had fewer than 1,500 young employees.

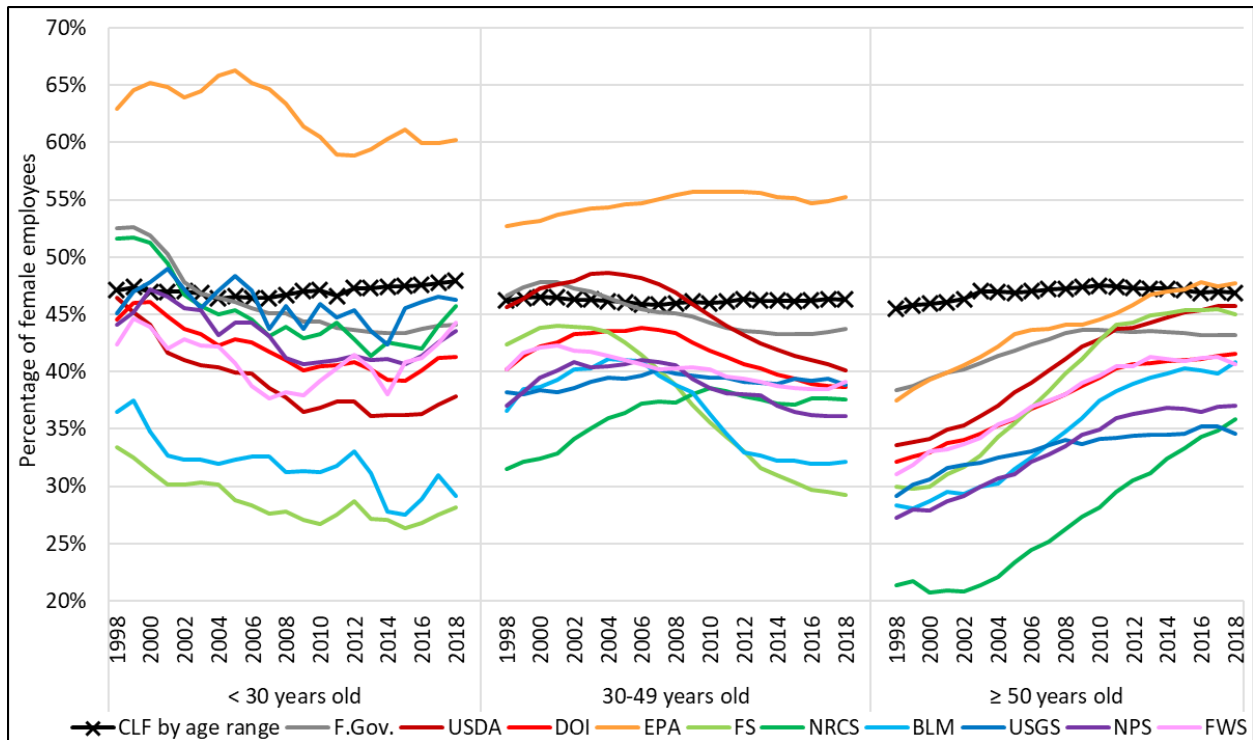


Figure 5. Change in female employment by age: 1998–2018

There were consistent differences from 1998 to 2018 in the percentage of female employees in the young age range (under 30) between the EPA, the CLF, most of the selected federal natural resource organizations and the federal government overall, the BLM, and the FS (Figure 5). The EPA was the only selected organization to have a higher percentage of women in the young age range than the CLF for the entire 21-year period. Female young employees averaged 62% in the EPA from 1998 to 2018, compared with 47% in the CLF. The BLM and FS consistently had the lowest percentages of female young employees of all the selected organizations, with 21-year

averages of 32% and 29% respectively. The FS's low level of female young employment is notable given that it consistently had a higher proportion of young employees than any of the other selected organizations during this period, and by 2018 had almost as many young employees (6,741) as the entire DOI (7,443) (Table 3). Over the 21-year period, the remaining selected organizations (excluding the EPA, FS, and BLM) and the federal government overall had middling levels of female young employment. The federal government overall generally had a higher percentage of female young employees than most of the selected organizations from 1998 to 2018 (46% on average), while the two departments generally had a lower percentage (41% on average). The land management agencies also had lower levels of female young employment over the 21-year period (36% on average, or 42% excluding the outlying FS and BLM) than the non-land management agencies (51% on average, or 46% excluding the outlying EPA).

The female employment gap between the young age range (under 30) of the selected federal natural resource organizations and the CLF generally persisted or grew larger from 1998 to 2018 (Figure 5). Over the 21-year period, the percentage of female employees in the young age range decreased in the federal government overall and most of the selected organizations while remaining stable in the CLF. For the USDA, DOI, FS, and BLM, this resulted in an enlargement of the female employment gap from 1998 to 2018 as their percentage of female young employees fell further below the level of the CLF. The NRCS and the federal government overall reversed the direction of the female employment gap over the 21-year period, from levels of female young employment that were respectively 5 and 6 percentage points higher than the CLF in 1998 to levels that were respectively 2 and 4 percentage points lower than the CLF in 2018.

For the federal government overall, this ultimately resulted in a stable (albeit reversed) female employment gap from 1998 to 2018. For the NRCS, in contrast, the female employment gap both reversed and shrank slightly over the 21-year period. The EPA was the only other selected organization to slightly shrink the female employment gap in the young age range over the 21-year period as it decreased from 63% female young employment in 1998 (16 percentage points higher than the CLF) to 60% female employment in 2018 (12 percentage points higher than the CLF). The USGS, NPS, and FWS retained a stable percentage of female young employment from 1998 to 2018 thereby maintaining a persistent female employment gap with the CLF.

Middle age range

In the middle age range (30 to 49), all the selected federal natural resource organizations experienced large decreases in the number of female and male employees from 1998 to 2018 (Table 3). Across all the selected organizations, the average percent change in the number of female middle-aged employees was -37% over the 21-year period, while the average percent change in the number of male middle-aged employees was -30%. The USDA and the FS generally lost more female middle-aged employees from 1998 to 2018 while the DOI and most of its sub-agencies generally lost more male middle-aged employees. For example, the FS lost 4,720 female employees compared with 976 male employees in the middle age range over the 21-year period while the NPS lost only 1,402 female employees compared with 2,146 male employees. Both the CLF and federal government overall also experienced a decreased in the number of middle-aged employees from 1998 to 2018. The federal government overall is notable for losing many more female middle-aged employees (-60,227) than male middle-aged employees (-7,347) over the 21-year period.

The percentage of female employees in the middle age range (30 to 49) of the selected federal natural resource organizations generally followed a non-linear trend pattern from 1998 to 2018 (Figure 5). Over the 21-year period, most of the selected organizations experienced an initial increase in the percentage of female middle-aged employees that was offset by a subsequent decrease. For example, by 2008 all the selected organizations except the NRCS and EPA had already reached their 21-year maximum percentage of female middle-aged employees and begun to decrease. This non-linear pattern was due to variation in the proportions of male and female middle-aged employees lost from 1998 to 2018. The USDA's middle-aged workforce, for example, lost a greater number of male employees from 1998 to 2002, followed by relatively even losses of male and female employees from 2002 to 2007, and then a greater loss of female employees from 2007 to 2018. Over the 21-year period, the DOI, USGS, NPS, and FWS experienced a net change of less than 3 percentage points (remaining relatively stable). The USDA, FS, and BLM, as well as the federal government overall, experienced a net decrease in the percentage of female middle-aged employees from 1998 to 2018, with the largest decrease in the FS (-13 percentage points). The EPA and NRCS were the only selected organizations to increase the percentage of female middle-aged employees over the 21-year period (+3 and +6 percentage points respectively). In contrast to the non-linear trend pattern in the selected organizations and federal government overall, the middle age range of the CLF experienced a stable trend in the percentage of women (46%) for the 21-year period.

There were consistent differences from 1998 to 2018 in the percentage of female employees in the middle age range (30 to 49) between the EPA, CLF, and all the other selected federal natural

resource organizations (Figure 5). As with the young age range, the EPA was the only selected organization to have a higher percentage of female middle-aged employees than the CLF for the entire 21-year period. Female employees made up an average of 55% of the EPA's middle-aged workforce from 1998 to 2018, compared to 46% of the CLF. The remaining selected organizations all had a lower percentage of female middle-aged employees than the CLF for the 21-year period (except the USDA, which had a higher percentage than the CLF from 1999 to 2009), with a collective average of 39%. The federal government overall and the two selected departments generally had a higher percentage of female middle-aged employees than the other selected organizations from 1998 to 2018 (averaging 45% in the USDA and the federal government overall and 42% in the DOI). None of the sub-agencies under the USDA and DOI averaged more than 40% female middle-aged employment for the 21-year period, and the FS and BLM had the lowest percentage of female middle-aged employment from 2010 onward. The decreasing percentage of female middle-aged employees in the FS is notable given that it had more total middle-aged employees than any of the other selected agencies, and half as many as the entire DOI, from 1998 to 2018.

The female employment gap between the middle age range (30 to 49) of the selected federal natural resource organizations and the CLF generally persisted or grew larger from 1998 to 2018 (Figure 5). Over the 21-year period, the DOI, EPA, USGS, NPS, and FWS, as well as the federal government overall, had similar rates of change in the percentage of female middle-aged employees as the CLF (-0.1 to 0.1 percentage points per year) and therefore maintained stable female employment gaps. In contrast, the USDA, FS, and BLM enlarged the middle age range female employment gap from 1998 to 2018 with a net rate of decrease from -0.2 (BLM) to -0.6

(FS) percentage points per year. The NRCS was the only selected organization to shrink the female employment gap over the 21-year period by increasing the percentage of female middle-aged employees +0.3 percentage points per year. However, most of the selected organizations did not experience a uniform change over the 21-year period but rather an initial shrinking of the female employment gap and a subsequent enlargement. For example, the percentage of female middle-aged employees in the BLM was 37% in 1998, 39% in 2008, and 32% in 2018, compared to a consistent 46% in the CLF over the 21-year period. Ultimately, therefore, the BLM experienced a net enlargement of the female employment gap in the middle age range from a 9-percentage point deficit in 1998 to a 14-percentage point deficit in 2018, despite initially shrinking the female employment gap to 7 percentage points in 2008.

Older age range

From 1998 to 2018, the selected federal natural resource organizations generally experienced an increase in the number of female employees in the older age range (50 and above) and variable change in the number of male employees (Table 3). All the selected organizations, as well as the CLF and federal government overall, increased the number of female older employees over the 21-year period. The CLF and the federal government overall also increased the number of male older employees from 1998 to 2018, as did half of the selected organizations. For all the selected organizations and the federal government overall, the change in the number of male older employees (increasing or decreasing) was not as great as the increase in the number of female employees over the 21-year period. For example, the USDA lost 38 male employees in the older age range from 1998 to 2018 but gained 7,043 female employees. Likewise, the DOI gained 1,721 male older employees over the 21-year period compared with an increase of 4,708 female

older employees. In contrast to the selected organizations, the older age range of the CLF experienced a greater increase in the number of men (12,506,000) than the number of women (11,811,000) from 1998 to 2018.

The percentage of female employees in the older age range (50 and above) increased for all the selected federal natural resource organizations from 1998 to 2018 (Figure 5). Among the selected organizations, the FS and NRCS experienced the largest increases in the percentage of female older employees over the 21-year period (+15 and +14 percentage points, respectively) while the USGS experienced the smallest increase (+6 percentage points). The federal government overall experienced a lower increase in the percentage of female older employees than any of the selected organizations, rising only 5 percentage points from 1998 to 2018. The increase in the percentage of female older employees in all the selected organizations over the 21-year period was primarily caused by the larger increases in the number of female older employees than change in the number of male employees (Table 3). In sharp contrast to the selected organizations and the federal government overall, the older age range of the CLF remained stable over the 21-year period, increasing only 2 percentage points from 45% in 1998 to 47% in 2018.

There were consistent differences from 1998 to 2018 in the percentage of female employees in the older age range (50 and above) between the CLF, the EPA, the federal government overall and most of the selected federal natural resource organizations, and the NRCS (Figure 5). The percentage of women in the older age range of the CLF was higher than that of the selected organizations for the entire 21-year period (except for the EPA from 2015 to 2018). Women made up an average of 47% of the older age range of the CLF from 1998 to 2018, compared to

44% of the EPA and a collective average of 35% of all other selected organizations except the NRCS. The federal government overall had a higher percentage of female older employees than most of the selected organizations over the 21-year period (with an average of 42%), although it was surpassed by the EPA in 2002 and by the USDA and FS in 2011. The USDA and FS generally had a higher percentage of female older employees than the DOI and its sub-agencies (the USDA for the entire 21-year period, and the FS from 2007 onward). The NRCS consistently had the lowest percentage of female older employees, despite experiencing the largest increase in female employment from 21% in 1998 to 36% in 2018.

The female employment gap between the older age range (50 and above) of the selected federal natural resource organizations and the CLF shrank from 1998 to 2018 (Figure 5). Over the 21-year period, the percentage of women in the older age range increased at a rate of +0.1 percentage points per year in the CLF and +0.2 percentage points per year in the federal government overall. All the selected organizations had a higher rate of increase in the percentage of female older employees than the CLF and federal government overall from 1998 to 2018, thereby shrinking the female employment gap. For example, the USGS had a lower rate of increase in the percentage of female older employees over the 21-year period than all the selected organizations (+0.3 percentage points per year) but still had a higher rate of increase than the CLF. The FS and NRCS had the highest rates of increase in the percentage of female older employees of all the selected organizations at a rate of +0.7 percentage points per year from 1998 to 2018. None of the selected organizations except the EPA were able to entirely close the female employment gap in the older age range over the 21-year period given their initial low levels of female older employment. For example, the NRCS's high rate of increase in

the percentage of female older employees was not sufficient to counteract an initial employment level of 21% in 1998; by 2018, the NRCS had increased female older employment to 36%—still 11 percentage points lower than the CLF (47%).

All age ranges

The percentage of women in the selected federal natural resource organizations generally decreased in the young age range (under 30), remained stable (but non-linear) in the middle age range (30 to 49), and increased in the older age range (50 and above) from 1998 to 2018 (Figure 5), primarily due to changes in the number of female employees rather than male employees (Table 3). Over the 21-year period, the selected organizations generally experienced a decrease in the number of female and male employees in the young and middle age ranges, variable change in male employees in the older age range, and an increase in female employees in the older age range. For most of the selected organizations, the increase in the number of older employees (if any) was more than offset by the decreases in young and middle-aged employees, leading to a net loss of both female and male employees from 1998 to 2018. In both the young and older age ranges of the selected organizations, the change in the number of female employees (decreasing and increasing respectively) was greater than that of male employees over the 21-year period. Consequently, the selected organizations' percentage of women decreased by -3 percentage points in the young age range and increased by +11 percentage points in the older age range from 1998 to 2018. The middle age range of the selected organizations had a non-linear trend pattern with relatively even losses of female and male employees over the 21-year period, resulting mainly in a net stable or net decreasing percentage of women (-2 percentage points on average).

The change in the number (Table 3) and percentage (Figure 5) of people in the young age range (under 30), middle age range (30 to 49), and older age range (50 and above) from 1998 to 2018 in the CLF and federal government overall contrasted with the changes in the selected federal natural resource organizations. Over the 21-year period, the number of men and women in the CLF increased in the young and older age ranges and decreased in the middle age range. The federal government overall had the same patterns of change as the CLF from 1998 to 2018 except it also experienced a decrease in the number of women in the young age range. Both the CLF and the federal government overall therefore experienced a net increase in the number of women and men from 1998 to 2018 (due mainly to increases in the older age range), in contrast to the net decrease in female and male employees experienced by most of the selected organizations. The increase in men in the young age range in both the federal government overall and the CLF is particularly notable juxtaposed with the selected organizations' decrease in that population over the 21-year period. The federal government overall's decrease in the percentage of female young employees from 1998 to 2018 was therefore due to an increase in the number of male employees—not a greater loss of female employees (as in the selected organizations). In contrast to the federal government overall and the selected organizations, the CLF experienced a stable percentage of women over the 21-year period in all three age ranges.

The gender composition in the older age range (50 and above) of the selected federal natural resource organizations became increasingly similar to that of the CLF from 1998 to 2018 while the young age range (under 30) and middle age range (30 to 49) remained dissimilar (Figure 5). Across all age ranges, the percentage of women in the CLF was consistently higher than in the

federal government overall and the selected organizations over the 21-year period (except young and middle-aged EPA employees). Among the selected organizations, the EPA and USDA (and federal government overall) generally had a higher percentage of female employees from 1998 to 2018, while the BLM, NRCS, and FS generally had a lower percentage. In 1998, the average percentage of women in the selected organizations was 45%, 40%, and 30% in the young, middle, and older age ranges respectively, compared with 47%, 46%, and 45% in the CLF. By 2018, the average percentage of women in the selected organizations was 42%, 39%, and 41% in the young, middle, and older age ranges respectively, compared with 48%, 46%, and 47%, in the CLF. Over the 21-year period, therefore, the gender composition of the selected organizations' workforces became more similar across the three age ranges as the percentage of female employees decreased slightly in the young and middle age ranges and increased considerably in the older age range, while remaining stable in the CLF in all three age ranges. Consequently, from 1998 to 2018 the female employment gap between the selected organizations and the CLF persisted or grew in the young and middle age ranges and shrank in the older age range.

Race and ethnicity

Young age range

From 2006 to 2018, most of the selected federal natural resource organizations experienced a decrease in the number of white employees and variable change in the number of minority employees in the young age range (under 30) (Table 3). Except for the USGS, all the selected organizations as well as the CLF and federal government overall experienced a decrease in the number of white young employees over the 13-year period. For the federal government overall and all the selected organizations except the USGS, the decrease in the number of white young

employees from 2006 to 2018 exceeded the change (increasing or decreasing) in the number of minority young employees. For example, the NRCS lost 12 minority young employees over the 13-year period, compared to a decrease of 654 white young employees. In contrast, the young age range of the CLF experienced a greater increase in minorities (+3,433,000) than decrease in the number of white non-Hispanics (-2,016,000) from 2006 to 2018. The USGS was unique among the selected organizations in that it gained 104 white young employees over the 13-year period, compared with an increase of 13 minority young employees.

The percentage of minority employees in the young age range (under 30) increased for a slight majority of the selected federal natural resource organizations from 2006 to 2018 (Figure 6). Over the 13-year period, the USDA, FS, NRCS, BLM, and FWS all experienced an increase in the percentage of minority employees in the young age range (by an average of +5 percentage points), as did the CLF (+7 percentage points). During the same period, the EPA, USGS, and NPS, as well as the federal government overall, retained a relatively stable percentage of minority young employees (changing less than 2 percentage points). The DOI was the only selected organization to experience a decrease in the percentage of minority young employees from 2006 to 2018 (-2 percentage points). The increase in the percentage of minority young employees in most of the selected organizations over the 13-year period was primarily caused by the loss of white employees, given that most of the selected organizations experienced a larger decrease in the number of white employees than change in the number of minority employees (Table 3). Many of the selected organizations also had noticeable fluctuations in the percentage of minority young employment over time, likely due to the low total number of young employees: by 2018, both the EPA and FWS had fewer than 1,000 young employees, while the

NRCS, BLM, and USGS had fewer than 1,500 young employees.

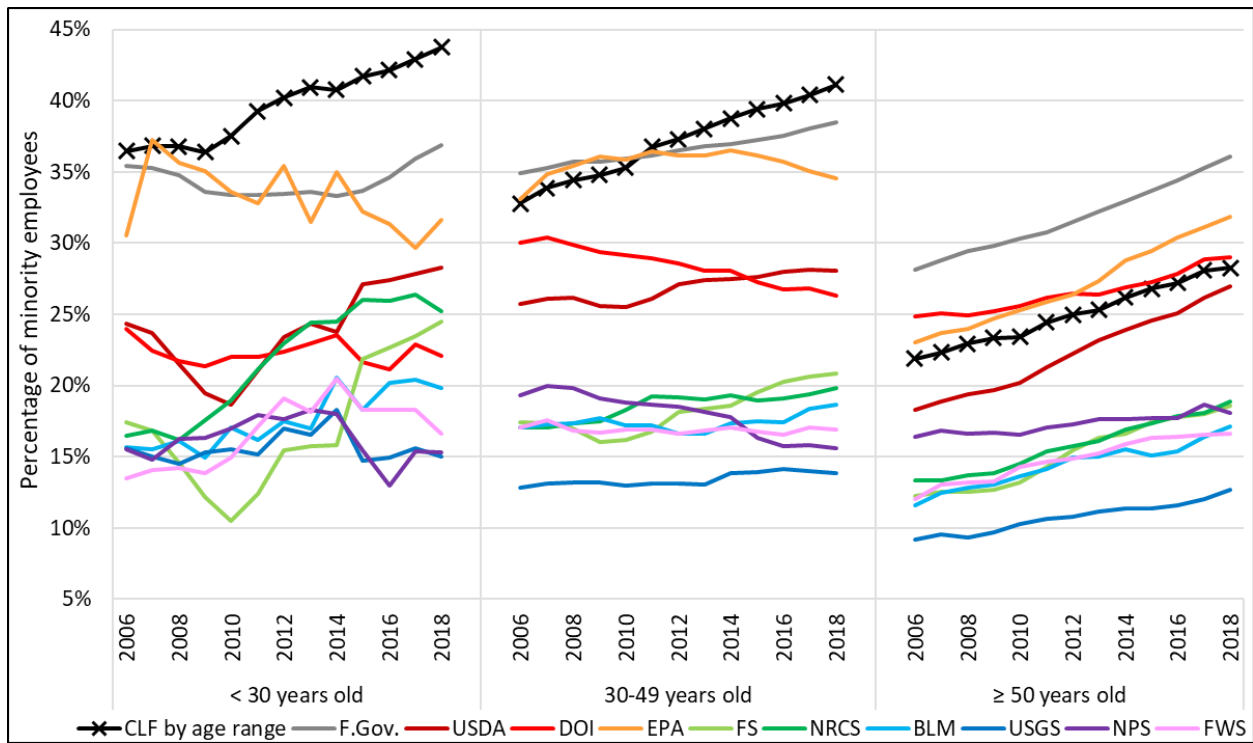


Figure 6. Change in minority employment by age: 2006–2018

For the NPS (and by extension, the DOI), the percentage of employees in the young age range (under 30) with an unspecified race/ethnicity experienced a large increase beginning in 2016. From 2006 to 2018, the number of young employees with an unspecified race/ethnicity in the NPS increased from 1 employee to 463 employees (+462). This is in stark contrast with the number of minority and white young employees in the NPS which both decreased over the 13-year period (-17 and -505, respectively) (Table 3). Comparing the NPS’s young workforce from 2015 (just before the sharp increase in employees with an unspecified race/ethnicity) to 2018, the percentage of white NPS employees decreased from 85% to 70%, the percentage of minority NPS employees stayed the same at 15% (Figure 6), and the percentage of NPS employees with

an unspecified race/ethnicity increased from 0% to 15%. It therefore appears that, in the NPS's young age range, employees with an unspecified race/ethnicity were primarily replacing white employees during this period, rather than minority employees. It is also particularly notable that the NPS's young workforce had equal percentages of minority employees and employees with an unspecified race/ethnicity in 2018 (both 15%). The only other selected organizations in which employees with an unspecified race/ethnicity made up more than 1% of the young workforce over the 13-year period were the FWS (2% in 2017 and 2018), the NRCS (3% in 2009), and the EPA (2% or more from 2007 to 2013, with a maximum of 5% in 2010). None of these agencies had more than 70 employees with an unspecified race/ethnicity during those years, nor more than 1,500 total young employees.

From 2006 to 2018, there were consistent differences in the percentage of minority employees in the young age range (under 30) between the CLF, the federal government overall and the EPA, and all other selected organizations (Figure 6). The CLF had the highest percentage of minorities throughout the 13-year period (except in 2007 when the EPA briefly exceeded it). From 2006 to 2018, minorities averaged 40% of the young age range of the CLF, compared with 34% of the federal government overall and 33% of the EPA. None of the other selected organizations averaged more than 25% minority young employees over the 13-year period. Among the selected organizations (excluding the EPA), the two departments initially had a higher percentage of minority young employees than any of their sub-agencies (with respective averages of 24% and 16% in 2006, for example). In later years, however, the USDA and its sub-agencies had a higher percentage of minority young employees than the DOI and its sub-agencies (with respective averages of 26% and 18% in 2018, for example). The FS is particularly illustrative as it had the

lowest level of minority young employment of all selected organizations from 2009 to 2014 (reaching a minimum of 10% in 2010), but a higher level than the DOI and all its sub-agencies from 2015 onward (reaching a maximum of 24% in 2018). The FS's changing levels of minority employment over the 21-year period are notable given that it consistently had a greater relative number of young employees than any of the other selected organizations, and by 2018 had almost as many young employees (6,741) as the entire DOI (7,443) (Table 3).

The minority employment gap between the young age range (under 30) of the selected federal natural resource organizations and the CLF generally grew larger from 2006 to 2018 (Figure 6). Over the 13-year period, the percentage of minorities in the young age range of the CLF experienced a higher rate of increase (+0.6 percentage points per year) than the federal government overall and most of the selected organizations. The NRCS and FS were the only selected organizations to keep pace with the rate of increase in the CLF in the young age range, respectively increasing +0.7 and +0.5 percentage points per year from 2006 to 2018.

Consequently, the NRCS and FS were the only selected organizations to maintain a persistent (not growing) minority employment gap in the young age range over the 13-year period. None of the other selected organizations, nor the federal government overall, had a rate of increase in the percentage of minority young employees above +0.3 percentage points per year (half the rate of the CLF) from 2006 to 2018. Therefore, the minority employment gap in the young age range widened over the 13-year period between most of the selected organizations and the CLF.

Middle age range

In the middle age range (30 to 49), a majority of the selected federal natural resource

organizations experienced a decrease in the number of both minority and white employees from 2006 to 2018 (Table 3). Over the 13-year period, the CLF and all the selected organizations except the FS and BLM experienced a net decrease in the total number of middle-aged employees. Most of these experienced a smaller decrease in the number of minority employees and a larger decrease in the number of white employees in the middle age range from 2006 to 2018 (although the CLF and USGS both gained minorities but still lost a greater number of white non-Hispanics). For example, the USDA only lost 642 minority middle-aged employees over the 13-year period compared to the loss of 5,557 white middle-aged employees. The NPS and DOI were the only selected organizations to lose a greater number of minority middle-aged employees than white middle-aged employees over the 13-year period. For example, the DOI lost 1,640 minority employees but only 486 white employees in the middle age range from 2006 to 2018. In contrast to most of the selected organizations, the FS and BLM, as well as the federal government overall, experienced an increase in the number of both white and minority middle-aged employees over the 13-year period. The FS and federal government overall gained more minority employees than white employees in the middle age range from 2006 to 2018, while the BLM gained more white employees than minority employees.

The percentage of minority employees in the middle age range (30 to 49) generally increased or remained stable for most of the selected federal natural resource organizations from 2006 to 2018 (Figure 6). Over the 13-year period, the USDA, FS, NRCS, and BLM all experienced a small increase in the percentage of minority middle-aged employees of 2 to 3 percentage points. In comparison, both the federal government overall and the CLF experienced a larger increase in the percentage of minorities in the middle age range than the selected organizations, increasing

by 4 and 8 percentage points respectively from 2006 to 2018. The EPA, USGS, and FWS retained a relatively stable percentage of minority middle-aged employees over the 13-year period (changing less than 2 percentage points). The NPS and DOI were the only selected organizations to experience a decrease in the percentage of minority middle-aged employees from 2006 to 2018 (-4 percentage points each). The decrease in the percentage of minority middle-aged employees in the NPS and DOI over the 13-year period was primarily caused by a greater loss of minority employees than white employees in the middle age range (Table 3). For most of the other selected organizations, the stable or increasing percentages of minority middle-aged employees from 2006 to 2018 were caused by larger decreases in the number of white middle-aged employees than change in the number of minority middle-aged employees. In the FS and BLM, the increasing percentage of minority middle-aged employees over the 13-year period was due to the larger or proportional (respectively) increase in minority employees compared to white employees in the middle age range.

For the NPS (and by extension, the DOI), the percentage of employees in the middle age range (30 to 49) with an unspecified race/ethnicity experienced a large increase beginning in 2016. From 2006 to 2018, the number of middle-aged employees with an unspecified race/ethnicity in the NPS increased from 4 employees to 413 employees (+409). This is in stark contrast with the number of minority and white middle-aged employees in the NPS which both decreased over the 13-year period (-441 and -422, respectively) (Table 3). Comparing the NPS's middle-aged workforce from 2015 (just before the sharp increase in employees with an unspecified race/ethnicity) to 2018, the percentage of white NPS employees decreased from 84% to 80%, the percentage of minority NPS employees decreased from 16% to 16% (Figure 6), and the

percentage of NPS employees with an unspecified race/ethnicity increased from 0% to 4%. It therefore appears that, in the NPS's middle age range, employees with an unspecified race/ethnicity were primarily replacing white employees during this period, rather than minority employees. Over the 13-year period, employees with an unspecified race/ethnicity never made up more than 1% of the middle-aged workforces of the selected organizations and the federal government overall.

There were consistent differences from 2006 to 2018 in the percentage of minority employees in the middle age range (30 to 49) between the CLF, federal government overall, and EPA, the two selected federal natural resource departments, most of their sub-agencies, and the USGS (Figure 6). The CLF, federal government overall, and EPA had higher percentages of minority middle-aged employees than the other selected organizations throughout the 13-year period, with the CLF exceeding all others from 2011 to 2018. On average, minorities made up 37% of the middle age range in both the CLF and federal government overall and 36% in the EPA from 2006 to 2018. In contrast, the percentage of minority employees in the middle age range of the two departments never exceeded 30%, with averages of 24% in the USDA and 22% in the DOI over the 13-year period. The sub-agencies had a lower percentage of minority middle-aged employees than the two departments from 2006 to 2018, with a collective average of 17% and a maximum of 21% (attained by the FS in 2017 and 2018). The USGS consistently had the lowest percentage of minority middle-aged employees with an average of 13% for the entire 13-year period. In addition, the USDA sub-agencies increased their level of minority middle-aged employment over time such that they had a higher percentage than all DOI sub-agencies from 2013 onward. The relatively low (albeit increasing) percentage of minority middle-aged employees in the FS is

notable given that it had more total middle-aged employees than any of the other selected agencies, and half as many as the entire DOI, over the 13-year period.

The minority employment gap between the middle age range (30 to 49) of all the selected federal natural resource organizations and the CLF grew larger from 2006 to 2018 (Figure 6). Over the 13-year period, the percentage of minorities in the middle age range of the CLF experienced a higher rate of increase (+0.6 percentage points per year) than the federal government overall and all selected organizations. None of the selected organizations, nor the federal government overall, had a rate of increase in the percentage of minority middle-aged employees above +0.3 percentage points per year (half the rate of the CLF) from 2006 to 2018. Therefore, the minority employment gap in the middle age range widened over the 13-year period between all the selected organizations and the CLF. The NPS and DOI experienced the greatest enlargement of the minority employment gap in the middle age range given that their percentage of minority middle-aged employees decreased at a rate of -0.3 percentage points per year from 2006 to 2018. The federal government overall reversed the direction of the minority employment gap in the middle age range over the 13-year period, from levels of minority middle-aged employment that 2 percentage points higher than the CLF in 2006 to levels that were 3 percentage points lower than the CLF in 2018. Therefore, in contrast with all the selected organizations, the federal government overall retained a stable (albeit reversed) minority employment gap in the middle age range from 2006 to 2018.

Older age range

From 2006 to 2018, the selected federal natural resource organizations all experienced an

increase in the number of minority employees in the older age range (50 and above) and a decrease in the number of white employees (Table 3). All the selected organizations, as well as the CLF and federal government overall, increased the number of minority older employees over the 13-year period. All the selected organizations also experienced a decrease in the number of white older employees from 2006 to 2018, in contrast to the CLF and the federal government overall which both experienced an increase. For all the selected organizations except the EPA and FWS, the increase in minority older employees was more than offset by the decrease in white older employees, resulting in a net decrease in the total number of older employees over the 13-year period. For example, the BLM gained 45 minority employees in the older age range from 2006 to 2018 but lost 1,426 white employees. Similarly, the FS gained 357 minority older employees but lost 3,416 white older employees over the 13-year period. In contrast to most of the selected organizations, the CLF and federal government overall both experienced a net increase in the number of older employees from 2006 to 2018. The older age range of the CLF gained relatively even numbers of white non-Hispanics and minorities over the 13-year period, while the federal government overall gained many more minority older employees than white older employees.

The percentage of minority employees in the older age range (50 and above) increased for all the selected federal natural resource organizations from 2006 to 2018 (Figure 6). Among the selected organizations, the USDA and EPA experienced the largest increases in the percentage of minority older employees over the 13-year period (both +9 percentage points) while the NPS experienced the smallest increase (+2 percentage points). The percentage of minorities also increased in both the federal government overall (+8 percentage points) and the CLF (+6

percentage points) from 2006 to 2018. The increase in the percentage of minority older employees over the 13-year period in all the selected organizations was primarily caused by the larger decrease in the number of white older employees, rather than the increase in the number of minority older employees (Table 3). In sharp contrast to the selected organizations, the federal government overall's increase in the percentage of minority older employees from 2006 to 2018 was due to the larger increase in the number of minority employees, rather than a change in the number of white employees. In the CLF, the increasing percentage of minorities in the older age range was the result of relatively proportional increases in the number of minorities and white non-Hispanics over the 13-year period (that is, only a slightly greater increase in the number of white non-Hispanics than the number of minorities).

For the NPS (and by extension, the DOI), the percentage of employees in the older age range (50 and above) with an unspecified race/ethnicity experienced a large increase beginning in 2016. From 2006 to 2018, the number of older employees with an unspecified race/ethnicity in the NPS increased from 0 employees to 250 employees. This is in stark contrast with the number white older employees in the NPS which decreased considerably over the 13-year period (-960) (Table 3). The increase in the number of NPS employees with an unspecified race/ethnicity in the middle age range from 2006 to 2018 (+250) also exceeded the increase in the number of minority middle-aged employees (+31). Comparing the NPS's older workforce from 2015 (just before the sharp increase in employees with an unspecified race/ethnicity) to 2018, the percentage of white NPS employees decreased from 84% to 79%, the percentage of minority NPS employees increased from 16% to 18% (Figure 6), and the percentage of NPS employees with an unspecified race/ethnicity increased from 0% to 3%. It therefore appears that, in the NPS's older

age range, employees with an unspecified race/ethnicity were primarily replacing white employees during this period, rather than minority employees. Over the 13-year period, employees with an unspecified race/ethnicity never made up more than 1% of the middle-aged workforces of the selected organizations and the federal government overall.

There were consistent differences from 2006 to 2018 in the percentage of minority employees in the older age range (50 and above) between the federal government overall, the EPA and DOI, the CLF, the USDA, most of the selected federal natural resource sub-agencies, and the USGS (Figure 6). In the older age range, the federal government overall, EPA, and DOI all had a higher percentage of minorities than the CLF for the entire the 13-year period. From 2006 to 2018, minorities made up an average of 32% of the older age range of the federal government overall, 27% of the EPA, and 26% of the DOI, compared to 25% of the CLF and 22% of the USDA. In contrast, none of the selected sub-agencies exceeded 19% minority older employment at any point during the 13-year period. The USGS is particularly notable for consistently having the lowest percentage of minority older employees, with an average of 11% from 2006 to 2018. In addition, as in the young and middle age ranges, the USDA sub-agencies increased their level of minority older employment over time such that they attained a higher percentage than all DOI sub-agencies by 2018 (and all but the NPS from 2013 onward).

The minority employment gap between the older age range (50 and above) of the selected federal natural resource organizations and the CLF generally persisted or grew larger from 2006 to 2018 (Figure 6). Over the 13-year period, the percentage of minorities in the older age range of the CLF increased at a rate of +0.5 percentage points per year. The FS, NRCS, BLM, and FWS

experienced a similar rate of increase in the percentage of minority older employees as the CLF from 2006 to 2018 (+0.5 percentage points per year for the FS, and +0.4 percentage points per year for the NRCS, BLM, and FWS), and thereby maintained a relatively stable minority employment gap. In contrast, the minority employment gap widened over the 13-year period in the USGS, NPS, EPA, and federal government overall: the USGS and NPS had a lower rate of increase and lower percentage of minorities in the older age range than the CLF, while the EPA and federal government overall had a higher rate of increase and a higher percentage of minorities than the CLF. The two departments were the only selected organizations to shrink the minority employment gap in the older age range from 2006 to 2018. In 2006 the percentage of minorities in the older age range was 18% in the USDA and 25% in the DOI—respectively 4 percentage points lower and 3 percentage points higher than the CLF (22%). By 2018, the percentage of minorities in the older age range was 27% in the USDA and 29% in the DOI—both only 1 percentage point different than the CLF (28%).

All age ranges

In the young age range (under 30), middle age range (30 to 49), and older age range (50 and above) of the selected federal natural resource organizations, the percentage of minorities generally increased from 2006 to 2018 (Figure 6) primarily due to large decreases in the number of white employees (Table 3). Over the 13-year period, the selected organizations generally experienced a large decrease in the number of white employees in all three age ranges, and variable change or a slight decrease in the number of minority young and middle-aged employees. Minority older employees were the only racial/ethnic and age range combination that increased in the selected organizations from 2006 to 2018. In all three age ranges, the loss of

white employees exceeded the change in the number of minority employees, leading to an increasing percentage of minority employees in most of the selected organizations over the 13-year period (+3, +1, and +5 percentage points on average in the young, middle, and older age ranges respectively). All of the selected organizations experienced an increase in the percentage of minority employees in the older age range from 2006 to 2018, while in young and middle age ranges over half of the selected organizations experienced an increase and one third maintained a stable percentage of minority employees.

The change in the number (Table 3) and percentage (Figure 6) of people in the young age range (under 30), middle age range (30 to 49), and older age range (50 and above) from 2006 to 2018 in the CLF and federal government overall contrasted with changes in the selected federal natural resource organizations. From 2006 to 2018 the CLF experienced an increase across all racial/ethnic and age range combinations except for a decrease in the number of white non-Hispanics in the young and middle age ranges. The federal government overall likewise experienced an increase across all racial/ethnic and age range combinations over the 13-year period except for a decrease in the number of white and minority employees in the young age range. Both the CLF and the federal government overall therefore experienced a larger net increase in the number of minorities than change in the number of white non-Hispanics from 2006 to 2018, while the selected organizations all experienced a greater net decrease in white employees than change in minority employees. The increase in white non-Hispanics in the older age range in both the federal government overall and the CLF is particularly notable juxtaposed with the selected organizations' large decrease in that population over the 13-year period. The federal government overall's increase in the percentage of white older employees from 2006 to

2018 was therefore a result of a larger increase in the number of minority employees—not a greater loss of white employees (as in the selected organizations). In all three age ranges, the percentage of women increased in both the federal government overall and the CLF over the 13-year period.

The workforce racial/ethnic composition in the young age range (under 30), middle age range (30 to 49), and older age range (50 and above) of the selected federal natural resource organizations became increasingly dissimilar to that of the CLF from 2006 to 2018 (Figure 6). Across all age ranges, the percentage of minorities was highest in the CLF, federal government overall, and EPA (and the DOI in the older age range) over the 13-year period; among the remaining selected organizations, the percentage of minorities was generally lower in the USGS, higher in the two departments, and—by 2018—higher in the USDA sub-agencies than the DOI sub-agencies. In 2006, the selected organizations' average percentage of minorities was 19%, 21%, and 16% in the young, middle, and older age ranges respectively, compared with 36%, 33%, and 22% in the CLF. By 2018, the selected organizations' average percentage of minorities was 22%, 22%, and 21% in the young, middle, and older age ranges respectively—a more even distribution than the CLF with 44%, 41%, and 28%. Compared with the CLF, the selected organizations had lower percentages of minorities and lower rates of increase in all age ranges (averaging +0.2, 0.0, and +0.4 percentage points per year in the young, middle, and older age ranges respectively, versus +0.6, +0.6, and +0.5 percentage points per year in the CLF) over the 13-year period. Almost all the selected organizations enlarged the minority employment gap in the young and middle age ranges (and a third did so in the older age range), while just under half maintained the minority employment gap in the older age range from 2006 to 2018.

Summary of workforce demographic changes

The following subsections provide a synthesis of the results across all analyzed employment categories: the total workforce, lower GS range (GS-1 to GS-8), higher GS range (GS-9 to GS-15), young age range (under 30), middle age range (30 to 49), and older age range (50 and above). The summary for the gender data is presented first, followed by the summary for the race/ethnicity data.

Gender

Across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 1998 to 2018, the number of female and male employees generally decreased in the selected federal natural resource organizations while increasing in the federal government overall and the CLF (Tables 1, 2, and 3). Over the 21-year period, the selected organizations generally experienced a decrease in the number of men in all employment categories (although only half decreased in the older age range). In contrast, the CLF and federal government overall increased the number of men in all employment categories except the middle age range from 1998 to 2018. The number of women in the selected organizations generally decreased over the 21-year period with the notable exceptions of the higher GS and older age ranges. However, the selected organizations' increase in higher GS and older women did not offset their losses in other employment categories, leading to a net decrease in the total number of women from 1998 to 2018. In contrast, both the CLF and federal government overall increased the number of women in at least half of employment categories, including the total workforce, over the 21-year period. The CLF only experienced a decrease in the number of women in the middle age range, while

the federal government overall experienced a decrease in the lower GS, young age, and middle age ranges from 1998 to 2018. Therefore, across the six employment categories, the selected organizations experienced decreases in the number of men and women in more employment categories than the CLF and federal government overall over the 21-year period.

From 1998 to 2018, the percentage of women varied over time in the selected federal natural resource organizations and the federal government overall while remaining stable in the CLF across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) (Figures 1, 3, and 5). In most of the selected organizations and federal government overall over the 21-year period, the percentage of female employees remained stable in the total workforce and middle age range, decreased in the lower GS and young age range, and increased in the higher GS and older age range. The middle age range was the only employment category with an apparent non-linear trend in the percentage of women and with variability across the selected organizations: half the selected organizations retained a stable percentage of female employees and a third (as well as the federal government overall) experienced a decrease from 1998 to 2018. In contrast, the percentage of women in the CLF remained stable over the 21-year period in all employment categories. The CLF's stable percentage of women was due to proportional changes in the numbers of men and women from 1998 to 2018, whereas the selected organizations' increases and decreases in the percentage of women were often driven by larger changes in the number of women than the number of men (Tables 1, 2, and 3). For example, the selected organizations' decreasing percentage of women in the lower GS and young age ranges was driven by larger losses of women than men over the 21-year period, while the increasing percentage in the older age range was driven by larger gains in women than men.

There were consistent differences in the percentage of women in the CLF, federal government overall, and selected federal natural resource organizations across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 1998 to 2018 (Figures 1, 3, and 5). The selected organizations generally had a lower percentage of women than the CLF in all employment categories (except the lower GS range) over the 21-year period. The EPA was a notable exception as the only selected organization to consistently have both a higher percentage of women than the CLF and a majority female workforce in all employment categories except the lower GS and older age ranges from 1998 to 2018. The federal government overall generally had a lower percentage of women than the EPA and CLF over the 21-year period, but a higher percentage than most of the selected organizations. Among the selected organizations (excluding the EPA), the USDA and DOI often had relatively higher percentages of women from 1998 to 2018 in many employment categories (but not in the lower GS or young age ranges), while the FS, NRCS, and BLM consistently had the lowest percentage of women in all employment categories. From 1998 to 2018, the NRCS generally had the lowest percentage of women in the higher GS and older age ranges (and initially in the middle age range, from 1998 to 2009), while the BLM and FS generally had the lowest percentage of women in the lower GS and young age ranges (and later on in the middle age range, from 2009 to 2018).

The female employment gap between the selected federal natural resource organizations and the CLF shrank or persisted across most analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 1998 to 2018 (Figures 1, 3, and 5). Over the 21-year period, most of the selected organizations experienced a shrinking female employment gap in the

lower GS, higher GS, and older age ranges, and a persistent gap in the total workforce. In the two remaining employment categories, the selected organizations generally widened or maintained a persistent female employment gap from 1998 to 2018: in the young age range, half the selected organizations widened the gap and a third maintained it, while in the middle age range half the selected organizations maintained a persistent gap and a third widened it. The CLF retained a stable percentage of women over the 21-year period in all employment categories resulting in the selected organizations being the primary drivers of the female employment gap. For example, from 1998 to 2018 the selected organizations shrank the female employment gap in the higher GS and older age ranges by increasing their percentage of women toward the CLF's stable percentage. The lower GS range was unique in that the selected organizations initially had a higher percentage of women than the total CLF and half the selected organizations reversed the direction of the female employment gap by decreasing below the level of the CLF. In contrast to the other selected organizations, the NRCS shrank the female employment gap in all employment categories except the lower GS range (where the gap reversed but remained stable) from 1998 to 2018.

Race and ethnicity

The selected federal natural resource organizations generally experienced a decrease in the number of white employees and variable change in the number of minority employees across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 2006 to 2018, in contrast to the federal government overall and CLF (Tables 1, 2, and 3). The number of white employees in the selected organizations decreased in all employment categories over the 13-year period. In the CLF, the number of white non-Hispanics similarly decreased in

total and in the young and middle age ranges, but notably increased in the older age range from 2006 to 2018. In contrast, the federal government overall increased the number of white employees in all employment categories except the lower GS and young age ranges over the 13-year period. The number of minority employees in the selected organizations increased and decreased in almost equal measure from 2006 to 2018: generally increasing in the higher GS and older age ranges (and in the total workforce for a slight majority of selected organizations) and decreasing in the lower GS and middle age ranges (and in the young age range for a slight majority). In contrast, the number of minorities in the CLF and federal government overall increased in all employment categories over the 13-year period (except for the federal government overall in the young age range). The selected organizations therefore experienced decreases in the number of white non-Hispanics and minorities in more employment categories than the CLF and federal government overall from 2006 to 2018.

From 2006 to 2018, the percentage of minorities generally increased in the selected federal natural resource organizations, federal government overall, and CLF across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) (Figures 2, 4, and 6). Over the 13-year period, almost all the selected organizations increased the percentage of minorities in the total workforce and higher GS and older age ranges, and half the selected organizations increased the percentage of minorities in the lower GS, young age, and middle age ranges. For the lower GS, young age, and middle age ranges, the remaining half of the selected organizations mostly maintained a stable percentage of minorities from 2006 to 2018 although some decreased. The percentage of minorities also increased across all employment categories in the federal government overall (except the young age range where it remained stable) and in the

CLF over the 13-year period. For all employment categories, the increasing percentage of minorities in the selected organizations from 2006 to 2018 was driven by larger decreases in the number of white employees than change (increasing or decreasing) in the number of minority employees (Tables 1, 2, and 3). This was also the case for the federal government in the lower GS and young age ranges and for the CLF in the middle age range over the 13-year period. However, in most employment categories, the federal government and CLF increased the percentage of minorities as a result of larger increases in the number of minorities than change in the number of white non-Hispanics from 2006 to 2018.

The percentage of employees with an unspecified race/ethnicity increased sharply in the NPS (and by extension the DOI) across almost all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 2015 to 2018. In none of the other selected federal natural resource organizations (excluding the NPS and DOI) did employees with an unspecified race/ethnicity made up more than 1% of the total workforce from 2006 to 2018. In the NPS, the number of employees with an unspecified race/ethnicity increased from 0 in 2015 to 1,126 in 2018 (comprising 63% of all federal employees with an unspecified race/ethnicity). The number of NPS employees with an unspecified race/ethnicity increased most in the lower GS, young age, and middle age ranges over this 4-year period, with a smaller increase in the higher GS and older age ranges. In 2015, the percentage of NPS employees with an unspecified race/ethnicity was 0% in all employment categories; by 2018, the percentage of NPS employees with an unspecified race/ethnicity was 5% of the total workforce, 9% and 1% of the lower and higher GS ranges respectively, and 15%, 4%, and 3% of the young, middle, and older age ranges respectively. The NPS's young age range is particularly notable for having the

same percentage of employees with an unspecified race/ethnicity as minority employees in 2018 (15%). Across all employment categories from 2015 to 2018, the increase in the percentage of NPS employees with an unspecified race/ethnicity exclusively offset the decrease in the percentage of white employees, while the percentage of minority employees remained the same (Figures 2, 4, and 6).

There were consistent differences in the percentage of minorities in the CLF, federal government overall, and selected federal natural resource organizations across all analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 2006 to 2018 (Figures 2, 4, and 6). The selected organizations generally had a lower percentage of minorities than the CLF and federal government overall in all employment categories over the 13-year period. In most employment categories from 2006 to 2018, the CLF generally had the highest percentage of minorities, followed by the federal government overall, then the EPA, the two departments, and all the sub-agencies. The lower GS and older age ranges were exceptions to this general pattern: in the lower GS range, the EPA had the highest percentage of minorities over the 13-year period (followed by the federal government overall and then the CLF), while in the older age range, the federal government overall had the highest percentage (followed by the EPA and DOI and then the CLF). The USDA and DOI had a higher percentage of minorities than their sub-agencies from 2006 to 2018 in all employment categories except the young age range (where the percentage of minorities in the USDA sub-agencies exceeded that of the DOI). The USDA sub-agencies often had a higher percentage of minorities than the DOI sub-agencies over the 13-year period. Among all the sub-agencies, in almost all employment categories from 2006 to 2018, the NRCS generally had the highest percentage of minorities while the USGS consistently had the

lowest percentage.

The minority employment gap between the selected federal natural resource organizations and the CLF grew larger across most analyzed employment categories (the total workforce, two GS ranges, and three age ranges) from 2006 to 2018 (Figures 2, 4, and 6). Almost all of the selected organizations enlarged the minority employment gap in all employment categories, except the older age range (where only a third of the selected organizations did so), over the 13-year period. In the higher GS and older age ranges, half of the selected organizations maintained a persistent (not growing) minority employment gap from 2006 to 2018. Unlike most of the selected organizations, the USDA, FS, and NRCS (and federal government overall) maintained a persistent minority employment gap in at least half of the employment categories over the 13-year period, with the FS doing so in all but the middle age range. Across all employment categories, the only selected organizations to shrink the minority employment gap from 2006 to 2018 were the USDA and DOI in the older age range, as well as the federal government overall in the lower GS range. The widening minority employment gap in almost all selected organizations and employment categories over the 13-year period was primarily due to the selected organizations' lower rate of increase in the percentage of minorities compared to the CLF. For example, in the middle age range, the selected organizations had a lower rate of increase in the percentage of minorities than the CLF by an average of 0.6 percentage points per year from 2006 to 2018, resulting in the growth of the minority employment gap by an average of 7 percentage points.

Discussion

The purpose of this analysis was to assess the selected federal natural resource organizations' trends in gender and race/ethnicity workforce demographics in the context of "provid[ing] the people of the United States with a...Federal work force reflective of the Nation's diversity" (Civil Service Reform Act, 1978, 5 U.S.C. § 1101 notes). The results indicate that the selected federal natural resource organizations generally lagged behind the federal government overall and the CLF in their employment of women and minorities across most employment categories (the total workforce, two GS ranges, and three age ranges) over the study periods (from 1998 to 2018 for gender, and from 2006 to 2018 for race/ethnicity). The following subsections present four key findings from this analysis in detail. First, the selected federal natural resource organizations experienced large losses of employees across almost all employment categories, in contrast to gains in the number of employees in the federal government overall and the CLF. Second, the percentage of female and minority employees increased even as the number of employees decreased. Third, the selected federal natural resource organizations had lower percentages of female and minority employees than the federal government overall and CLF. And fourth, the female and minority employment gaps between the selected federal natural resource organizations and the CLF have not decreased over time but generally remained stable or grew larger.

Widespread loss of federal natural resource employees

The selected federal natural resource organizations all experienced a net decrease in workforce size from 1998 to 2018 and 2006 to 2018, in contrast to the federal government overall and the

CLF. The selected organizations generally experienced a decrease in the number of female, male, minority, and white employees across all employment categories (the total workforce, two GS ranges, and three age ranges) over the study periods (Tables 1, 2, and 3). The only exceptions were increases in the number of female and minority employees in both the higher GS and older age ranges, and—for half the selected organizations—an increase in the total number of minorities. All the selected organizations lost a greater number of male employees than female employees, and a greater number of white employees than minority employees. In contrast, over the same study periods the federal government overall experienced an increase in the number of female, male, minority, and white employees across most employment categories (except for decreases in the number of lower GS female and white employees; young female, minority, and white employees; and middle-aged female and male employees). Similarly, the CLF experienced an increase in the number of men, women, and minorities across most employment categories (except for decreases in the number of middle-aged women and men), but decreased the number of white non-Hispanics in most employment categories (except for an increase in the older age range). Both external factors (including demographic shifts, national events, and ongoing federal employment trends) and internal pressures likely affected the number of employees in the selected organizations, federal government overall, and CLF over the study periods.

Demographic shifts in the United States' population correspond with increases in the number of older employees and the number of minorities in the CLF, federal government overall, and the selected federal natural resource organizations from 1998 to 2018 and 2006 to 2018. As the large baby boom generation (those born from approximately 1946 to 1964) aged over the study periods (Toossi, 2002), both the CLF and federal government overall experienced a

corresponding increase in the number of people in the older age range. Similarly, as the number of minorities in the United States increased over time, and the number of white non-Hispanics decreased (Toossi, 2002), the CLF and federal government overall experienced a corresponding increase in the number of minorities across most employment categories. The CLF also experienced a corresponding decrease in the number of white non-Hispanics in most employment categories, although the federal government overall did not. For the selected organizations, the few exceptions to their general decreases in workforce size are consistent with these larger trends in national demographics: most of the selected organizations increased the number of female and minority employees in the older age range (and higher GS range), and a slight majority increased the total number of minority employees. These rare increases in the selected organizations may therefore be partially due to demographic shifts in the United States' population as a whole. However, the minimal effect in the selected federal natural resource organizations indicate that other forces likely had a larger impact on workforce size compared to the federal government overall and CLF.

Large national events—such as 9/11 and the Great Recession—and subsequent federal responses had a noticeable effect on total workforce size in the selected federal natural resource organizations, federal government overall, and CLF from 1998 to 2018 and 2006 to 2018. The federal government and selected organizations generally experienced two peaks and one notable decline in the size of their workforces over the study periods. The first peak occurred around 2002–2003 and corresponded with post-9/11 government restructuring and increases in discretionary domestic spending (Austin, 2014). The second peak occurred around 2009–2011 and corresponded with stimulus responses to the Great Recession, including the Economic

Stimulus Act of 2008 and American Recovery and Reinvestment Act of 2009. Finally, a sharp decline began in 2013 corresponding with the start of ongoing federal sequestration (spending cuts) (Austin, 2014). In comparison to the selected organizations, the federal government overall generally experienced relatively smaller and shorter declines in workforce size in response to these national events: federal workforce size did not decrease after the 2002–2003 peak, and by 2018 the federal workforce had almost recovered from the 2013 decline. This difference from the selected organizations was likely due to substantial increases in funding for federal defense and homeland security organizations following 9/11 and the War on Terror (Austin, 2014).

Irrespective of the peaks and valleys, the total number of female, male, minority, and white employees therefore increased in the federal government overall but generally decreased in the selected organizations over the study periods. In contrast, the total CLF grew continuously throughout the study periods except for a brief pause from 2009 to 2011 during the Great Recession.

Ongoing federal employment trends across GS levels affected both the federal government overall and the selected federal natural resource organizations from 1998 to 2018 and 2006 to 2018. Over both study periods, the selected organizations and federal government overall generally experienced greater losses of lower GS employees than higher GS employees. Even the slight increases in male and minority lower GS employees in the federal government overall were dwarfed by their greater increases in the higher GS range. This is consistent with a decades-long shift from a “government of clerks” (OPM, 2002) to a more specialized and knowledge-based federal workforce. In 1950—shortly after the 1949 establishment of the GS system—lower GS employees comprised over 75% of the federal workforce (OPM, 2002). By 2018, lower GS

employees comprised less than 20% of the federal government overall. Among occupational categories, from 1998 to 2018 the percentage of federal employees in higher GS professional and administrative positions increased by 11 percentage points, mainly at the expense of lower GS clerical positions (-5 percentage points), as well as technical and blue-collar positions (Partnership for Public Service, 2019). The large decrease in historically female clerical positions also explains the greater loss of female lower GS employees in both the federal government overall and the selected organizations. For example, 85% of clerical staff were women in 1988, as were 69% in 2007 (U.S. Government Accountability Office, 2009). In contrast, the increase in male lower GS employees in the FS, BLM, and NPS from 1998 to 2018 was likely due to the land management agencies' prevalence of historically male field-going positions (e.g., wildland firefighters, park rangers, etc.).

These types of external forces interacted with existing correlations between age and GS range in the selected federal natural resource organizations and federal government overall. From 1998 to 2018 and 2006 to 2018, the selected organizations and federal government overall experienced similar trends in the higher GS and older age ranges (generally increasing the number of employees), and the lower GS and young age ranges (generally decreasing). These correlations were primarily due to age-associated career advancement since higher GS positions typically require more years of experience or education. For example, in 2018, most older employees in the federal government overall (76%) and the selected organizations (81% on average) occupied higher GS positions, while most young employees (58% in the federal government overall and 74% on average in the selected organizations) occupied lower GS positions (OPM, n.d.-h). In the FS, BLM, and NPS, young employees were skewed even further toward lower GS positions

(90% on average in 2018) (OPM, n.d.-h), likely due to the land management agencies' greater need for field-going personnel. External factors incidentally compounded or contradicted these corresponding trends in age and GS range. For example, shifting population demographics and federal employment trends respectively contributed to simultaneous increases in older and higher GS employees. In contrast, post-9/11 growth in defense and security sectors likely contributed to the federal government overall's substantial increase in the number of male young employees (+33%) and male lower GS employees (+2%)—notable exceptions to the pattern of decreasing young and lower GS employees. For example, by 2018, the departments of the Airforce, Army, Navy, and Homeland Security employed half of all young federal employees, of which two thirds were men (OPM, n.d.-h).

Beyond external factors and existing correlations, the primary difference between the selected federal natural resource organizations and both the federal government overall and CLF was the former's large decreases in the number employees across almost all combinations of employment category and gender or race/ethnicity from 1998 to 2018 and 2006 to 2018. The selected organizations' substantial decrease in employees is likely due, at least in part, to workforce attrition resulting from efforts to reduce the federal domestic (non-defense) budget. Federal organizations can take several actions to decrease workforce spending, including: providing early retirement options, offering buyouts for voluntary separation, laying off employees, and limiting federal hiring (OPM, 2017). Some of these actions, such as early retirement offers, are generally more applicable to older employees and therefore likely had a greater impact on the higher GS and older age ranges. Actions to limit hiring and not backfill positions, however, likely had a greater impact on the lower GS and young age ranges—the primary categories for entry-level

employees. Given that male and white employees made up the majority of the selected organizations' workforces in all employment categories (except for female lower GS employees) at the beginning of the study periods—even more so than in the federal government overall—any of these actions to reduce the existing workforce would proportionally fall more heavily on those groups. Conversely, given the lower initial numbers of underrepresented employees in the selected organizations, especially the low number of minorities, proportional decreases in workforce size would naturally result in fewer numerical losses of underrepresented employees in comparison to majority populations.

Of all employee losses in the selected federal natural resource organizations, decreases in the number of male and white employees across all employment categories contrasted most starkly with employment trends in the federal government overall (increasing numbers of male and white employees) and CLF (increasing number of men) from 1998 to 2018 and 2006 to 2018. The selected organizations likely did not target male and white employees for separation deliberately since that is illegal under the 1964 Civil Rights Act as amended (Equal Employment Opportunity Act, 1972). Nevertheless, the substantial losses of male and white employees caused seismic shifts in the selected organizations' workforce composition and led to pervasive resentment of diversification efforts. Diversity backlash in response to workforce reductions is not new. For example, following the 1979 Bernardi consent decree (which required the FS to increase female employment) and 1985 workforce cuts (Balanced Budget and Emergency Deficit Control Act), FS men filed multiple lawsuits alleging “reverse discrimination”—all were dismissed (Lewis, 2005). Similarly, in 1995 the Clinton administration predicted that, “as the federal government shrinks, tensions [over previously non-controversial affirmative action] will

likely increase” and noted “efforts to improve affirmative action performance have been met with heightened resentment due to sharply declining [full-time equivalent] ceilings” (Stephanopoulos & Edley, 1995, section 8.3). In the selected organizations, all but the USGS demonstrated decreasing support for diversity from 2002 to 2018, with the NPS consistently exhibiting the least support over time (Partnership for Public Service, n.d.). Amplified fears of “reverse discrimination” in the NPS (and DOI) could also have deterred white employees from disclosing demographic information, thus explaining the increase in employees with an unspecified race/ethnicity from 2015 to 2018.

The decreases in underrepresented female and minority employees from 1998 to 2018 and 2006 to 2018 raise questions about whether and how the selected federal natural resource organizations prioritized workforce diversification efforts. Over the study periods, the selected organizations generally experienced a decrease in the number of women and minorities in most employment categories, with a few exceptions: most selected organizations increased female and minority employees in the higher GS and older age ranges, and half increased the total number of minority employees. The selected organizations’ net losses of underrepresented (and overrepresented) employees naturally limited which diversification strategies were feasible and effective during these periods. For example, diversification efforts focused on recruiting new underrepresented employees were unlikely to offset the decrease in existing employees, especially considering the large losses in entry-level categories (the lower GS and young age ranges). Similarly, efforts to retain existing underrepresented employees may have been inhibited by the lower initial numbers of those employees. The selected organizations’ rare increases in female and minority employees in some employment categories suggest that diversification

efforts may not have been entirely ineffective; however, it is also possible that these increases were more incidental than intentional. For example, the selected organizations may plausibly have targeted the higher GS and older age ranges for remedial diversification efforts since those categories had the largest initial majorities of male and white employees. Conversely, the increases in female and minority employees could also be attributable to existing underrepresented employees advancing or aging into the higher GS or older age ranges, as well as greater proportions of minorities in applicant pools due to national demographic shifts in the population of the United States.

Overall, the loss of employees in the selected federal natural resource organizations from 1998 to 2018 and 2006 to 2018 bring up practical implications for ensuring their workforces reflect the diversity of the United States' population. Over the study periods, it appears that the directive to ensure a diverse workforce was overshadowed in the selected organizations by pressure to reduce budgets and personnel. Under a conservative projection where workforce reductions persist for the foreseeable future, it can be assumed the selected organizations will remain limited in which diversification strategies are viable and will continue to experience growing internal resistance to and resentment of diversification efforts. In such circumstances, the results suggest that the selected organizations will need to become more intentional about which diversification strategies they prioritize in order to achieve a nationally representative workforce. To do so, they will need to address two critical questions. First, assuming hiring restrictions remain, what other long-term diversification strategies would be most effective for maintaining, if not increasing, workforce diversity over time? Second, to ensure the selected organizations are a desirable place for underrepresented employees to work, rather than unwelcoming or hostile,

what actions would create a more inclusive culture and minimize diversity backlash? These questions would still be important to address even under a more optimistic future projection where workforce size stabilizes and opportunities for hiring increase, in which case the selected organizations' workforce diversification efforts presumably would become more feasible and less resented. In such circumstances, the context of these questions could shift to strategic planning: prioritizing actions that increase workforce diversity and inclusion in the present, and also safeguard workforce diversity against future downturns.

Decreasing numbers, increasing percentages

In the selected federal natural resource organizations, the percentage of female and minority employees generally remained stable or increased from 1998 to 2018 and 2006 to 2018 (Figures 1–6) while the number of employees decreased substantially during the same periods (Tables 1, 2, and 3). The total percentage of female employees remained stable in most of the selected organizations and the federal government overall from 1998 to 2018, as the decreasing percentage of women in the lower GS and young age ranges was offset by the increasing percentage in the higher GS and older age ranges. The percentage of women in the CLF also remained stable in total and in all three age ranges over the 21-year period. The percentage of minority employees increased across all employment categories from 2006 to 2018 in most of the selected organizations, the federal government overall (except in the young age range where it remained stable), and the CLF. Trends in the percentages of both female and minority employees were fairly linear in all employment categories except female middle-aged employees (although many of the selected organizations displayed fluctuations in the young age range, as did the EPA in the lower GS range, due to the low number of total employees in those

categories). As described in the previous subsection, during the same periods the number of female, male, minority, and white employees in all employment categories generally decreased in the selected organizations (except for female and minority employees in the higher GS and older age ranges and, for half the selected organizations, minority employees in the total workforce) and increased in the federal government overall and CLF.

In the selected federal natural resource organizations, stable and increasing trends in the percentages of female and minority employees were primarily driven by the loss of overrepresented white and male employees, rather than gains in underrepresented employees. For women, the stable trend in the total workforce of the selected organizations was due to proportional decreases in the number of male and female employees—that is, a greater net loss of men than women—from 1998 to 2018. This was not the case in other employment categories, however, where changes in the number of women were often greater than decreases in the number of men. Nevertheless, as the selected organizations transposed female employees across categories (losing women in the lower GS and young age ranges while gaining women in the higher GS and older age ranges), it was the consistent loss of male employees across all employment categories that ultimately produced the stable percentage of women in the total workforce. The increasing trend in the selected organizations' percentage of minority employees was even more strongly influenced by the large losses of white employees from 2006 to 2018. In all employment categories, the selected organizations experienced greater decreases in the number of white employees than changes in the number of minority employees. Stable and increasing trends in the selected organizations' percentages of female and minority employees therefore most often represented a decrease in the number of overrepresented employees, rather

than an increase in underrepresented employees. This is in stark contrast to the federal government overall and CLF where increases in the number of women and minorities led to positive trends in the percentages of both.

Even during rare periods of workforce growth from 1998 to 2018 and 2006 to 2018, the percentages of female and minority employees in the selected federal natural resource organizations were only minimally affected. As discussed in the previous subsection, the selected organizations experienced two peaks in the total number of employees (2002–2003 and 2009–2011). The percentages of female and minority employees, however, remained fairly stable during these times. For most of the selected organizations it therefore appears that the brief periods of increasing workforce size had a minimal impact on the percentages of underrepresented employees. This suggests that when workforce size grew larger, increases in the total number of female and male employees, and minority and white employees, were proportional to their initial totals—that is, the selected organizations gained more male and white employees than female and minority employees. For the few exceptions in which the percentages of underrepresented employees noticeably responded to increases in workforce size, this pattern was most often exacerbated with even larger increases in the number of male and white employees leading to decreases in the percentages of women and minorities. For example, in the FS, growth in the total number of employees from 2006 to 2010 corresponded with decreasing percentages of both female and minority employees (while the subsequent decline in the total number of employees after this period corresponded with increasing percentages of underrepresented employees). That is, during this fleeting period of increasing workforce size,

the FS added many more male and white employees than female and minority employees, thus causing the percentage of underrepresented employees in the FS to decrease.

The combined analysis of the number of employees and the percentages of underrepresented employees raises further questions about whether and how diversification efforts were prioritized in the selected federal natural resource organizations from 1998 to 2018 and 2006 to 2018.

During the study periods, changes in the number of overrepresented employees (both large losses during workforce reductions and proportionate gains during workforce growth) appear to have had a greater impact on the percentages of underrepresented employees than changes in the number of underrepresented employees themselves. These results suggest that efforts by the selected organizations to diversify their workforces were largely ineffective, despite positive trends in the percentages of underrepresented employees. As discussed in the previous subsection, workforce reductions can hinder diversification efforts by limiting what strategies are feasible. However, even during rare periods of workforce growth, the selected organizations did not seem to capitalize on those opportunities to hire more underrepresented employees but instead maintained the status quo by adding more male and white employees. It therefore appears that the selected organizations either did not adapt their diversification approaches as circumstances changed or did not prioritize diversifying their workforces even during periods in which there were seemingly greater opportunities to do so. Given that the federal government overall achieved positive trends in the percentages of underrepresented employees by increasing the number of female and minority employees, it would appear the problem is not a lack of effective diversification strategies but rather the selected organizations' lack of effective implementation. Therefore, to progress toward a representative workforce, the selected

organizations must consider how they can prioritize and adapt diversification strategies to capitalize on all potential opportunities.

One notable exception to the lack of progress in workforce diversification in the selected federal natural resource organizations was the increasingly equitable distribution of female employees across the GS scale from 1998 to 2018. In 1998, women in the selected organizations comprised, on average, 57% of lower GS employees and 32% of higher GS employees—a 25 percentage point difference. That is, while women held most of the selected organizations’ lower GS positions in 1998—with lower salaries, less authority, and less prestige—men occupied most of the higher GS positions. By 2018, however, the average percentage of female employees had decreased to 46% in the lower GS range and increased to 42% in the higher GS range. This shift can also be seen in the selected organizations’ changing number of employees: on average over the 21-year period, the number of men decreased 17% and 14% in the lower and higher GS ranges respectively, while the number of women decreased 48% in the lower GS range but increased 32% in the higher GS range. These results suggest that, although most of the selected organizations were not able to increase net gender diversity in their total workforces, they were able to make the distribution of female employees more equitable across the GS scale by hiring or promoting more women into higher level positions. (This pattern was not seen for minority employees in the selected organizations largely because their distribution across the GS scale was not as unequal: on average, the percentage of minorities was consistently 4 to 7 percentage points greater in the lower GS range than the higher GS range from 2006 to 2018.)

The juxtaposition of positive trends in the percentages of underrepresented employees and declining trends in workforce size also emphasizes the need for multiple metrics to assess whether and how effectively the selected federal natural resource organizations endeavored to achieve a diverse workforce. If one were to examine only the percentages of underrepresented employees, it would appear that most of the selected organizations maintained their levels of female employment from 1998 to 2018 and improved their levels of minority employment from 2006 to 2018. From these positive trends in the percentage data, one could conclude that efforts to hire or retain underrepresented employees were largely successful. However, this idea is belied by the selected organizations' substantial decreases in total employees during these same periods. When one also examines the numerical data, it becomes apparent that the positive trends in the percentages of underrepresented employees were primarily due to decreases in male and white employees rather than successful hiring or retention of female and minority employees. Furthermore, the selected organizations' increasing percentage of female employees in the higher GS and older age ranges was merely a consequence of redistributing women across employment categories, while the total number of women continued to decrease. These results suggest that percentage data alone are insufficient for understanding trends and quantifying progress in workforce diversification in the selected organizations; trends in the percentages of underrepresented employees are not necessarily accurate indicators of the efficacy of diversification efforts. Instead, the use of multiple metrics provides a more complete understanding of workforce diversity and allows for more comprehensive assessments of the effectiveness of diversification policies and programs.

Less diverse workforces than the federal government overall and CLF

The selected federal natural resource organizations—except for the EPA—had lower percentages of women and minorities than the CLF and federal government overall in all employment categories from 1998 to 2018 and 2006 to 2018 (Figures 1–6). Across most employment categories, the percentages of both women and minorities were usually highest in the CLF, federal government overall, and EPA. (For women, the EPA had the highest percentage of female employees, followed by the CLF and then the federal government overall. For minorities, the CLF and then the federal government overall had the highest percentage of minority employees, followed by the EPA.) All other selected organizations besides the EPA typically had lower percentages of both women and minorities than the CLF and federal government overall in most employment categories (except in the lower GS range where many of the selected organizations initially had a higher percentage of women than in the total CLF likely due to high numbers of women employed in clerical positions). In most employment categories, the two departments had relatively higher percentages of both female and minority employees than their selected sub-agencies. Within the sub-agencies, the percentage of female employees was often lowest in the FS, NRCS, and BLM, while the percentage of minority employees was consistently lowest in the USGS. For minority employees, the USDA sub-agencies frequently had higher percentages than the DOI sub-agencies, with the NRCS often having the highest percentage of minorities among all selected sub-agencies. These results suggest that, regardless of trends in the percentages and numbers of underrepresented employees, the selected organizations were consistently less effective than the federal government overall at striving towards a workforce reflective of the nation’s diversity.

The consistently lower percentages of women and minorities in the selected federal natural resource organizations (except the EPA) suggest that, as a whole, these organizations were uniquely remedial in their levels of workforce diversity from 1998 to 2018 and 2006 to 2018. The higher percentages of underrepresented employees in the CLF and federal government overall indicate that a lack of diversity was not ubiquitous across the labor pool or federal workforce. Likewise, the higher percentages of underrepresented employees in the two departments relative to their natural resource sub-agencies indicate there were greater levels workforce diversity in their other, less natural-resource-focused sub-agencies during these periods. For example, in 2018, of the thirty USDA sub-agencies, the FS and NRCS had lower percentages of female employees than all but one other sub-agency (the Office of the Chief Information Officer), and lower percentages of minority employees than all but three (the Farm Service Agency, Office of the Chief Economist, and Office of the Secretary of Agriculture) (OPM, n.d.-e, n.d.-h). Similarly, of the twelve DOI sub-agencies, in 2018 the BLM, USGS, NPS, and FWS had lower percentages of female employees than all but two other sub-agencies (the Bureau of Reclamation and Bureau of Safety and Environmental Enforcement), and the lowest percentage of minorities of all DOI sub-agencies (OPM, n.d.-e, n.d.-h). On the departmental level, of the eighteen cabinet-level federal departments in 2018, the USDA and DOI had near-median percentages of female employees, but lower percentages of minority employees than all but the Department of Energy (OPM, n.d.-e, n.d.-h). It therefore appears that a lack of workforce diversity was not universal across the federal government, departments, or sub-agencies, but rather a particularly egregious feature of natural resource organizations.

The legacy of discrimination in natural resource management may partially explain the

persistently lower percentages of female and minority employees in the selected federal natural resource organizations. Women were actively discouraged from participating in natural resource fieldwork for decades, which consequently limited their advancement opportunities. For example, the FS opposed hiring women into field positions until the 1970s, despite having hired office-based female employees since the 1910s (Lewis, 2005). The 1931 *Forest Rangers' Catechism* explicitly stated that “women are not appointed by the [FS] as members of the field force even if they pass the civil service examination,” while a 1950s-era employment leaflet declared “the field work of the [FS] is strictly a man’s job because of the physical requirements, the arduous nature of the work, and the work environment” (Lewis, 2005, p. 174). Racial discrimination has also been prevalent in natural resource management for many years. Some examples of this history include: federal lands were frequently obtained through the forced removal of Native Americans and denial of rights; southwestern federal lands were also acquired by denying Hispanic citizens’ land and resource claims; natural resource government assistance programs systematically discriminated against minority farmers; minorities faced segregation and discrimination in outdoor recreation; many early leaders of the conservation movement—whose ideas still influence current land management paradigms—were casually or enthusiastically racist (Aldo Leopold, John Muir, Madison Grant, etc.); and land managers have routinely ignored minority groups’ histories, traditional ecological knowledge, and values related to natural resources (Schelhas, 2002). Discrimination and ethnocentrism in natural resource management—often perpetuated or supported by the federal government—has systematically harmed, excluded, and disenfranchised minority communities.

In addition to historical discrimination, the slow pace of integration in the selected federal

natural resource organizations may also contribute to their lower percentages of female and minority employees. For example, it took the NPS 54 years after its establishment to appoint its first Black superintendent (Robert Stanton) in 1970 (McDonnell, 2006). Similarly, the FS didn't hire its first Black and female district rangers (Chip Cartwright and Wendy Herrett) until 1979 (Lewis, 2005). Even in more recent years, Gloria Brown—who in 1999 became the first Black woman hired as a FS forest supervisor—has described how “a lot of times [she] was the only Black woman at the table” (Oregon State University Press, 2020, 34:42). Being one of the first people to integrate a field can be daunting and unpleasant, and many underrepresented employees may choose not to enter or remain in a workforce where they are the only woman or person of color and where very few people in leadership look like them. For those who do stay, there can be immense pressure to be a faultless representative of their entire gender or race/ethnicity in order to ensure decision-makers do not use their performance as an excuse to curtail future opportunities for women or minorities. For example, Gloria Brown described her concern that any mistakes she made would “[keep] other African American women from being a forest supervisor” (Oregon State University Press, 2020, 36:32). In addition to the challenges of isolation, low levels of integration may be self-perpetuating if they reinforce cultural beliefs that the field of natural resources is primarily for white men and unwelcoming to women or minorities.

For minorities, lower levels of employment in the selected federal natural resource organizations may also be due to practical and cultural challenges associated with careers conducting fieldwork in remote locations. The prevalence of fieldwork in natural resource jobs may be a deterrent for communities with recent cultural histories of escaping such work for better opportunities. For

example, Chip Cartwright's college professors actively discouraged him from pursuing forestry because "agricultural careers carried the stigma of field labor during slavery" (Lewis, 2005, p. 179). For field or office work, the remote locations of many natural resource jobs can pose unique financial challenges which, due to historical wealth and income inequality, may be a greater constraint for minority employees. For example, Robert Stanton described securing a loan to cover travel and initial expenses for his first job, stating: "I'm sure there were a lot of youngsters who wanted to [work for the NPS], but just didn't have the disposable income" (McDonnell, 2006, p. 7). Employees—and their families—can also suffer immense social costs when moving to a rural area, including losing local support networks, abandoning familial obligations (which may preclude moving altogether), and experiencing cultural isolation. For example, Gloria Brown, who moved to Missoula, Montana to advance her FS career, described the challenges her three children faced as they "doubled the population for African American children in the school" (Oregon State University Press, 2020, 6:51). Similarly, Lewis (2005) noted that: "working in some remote locations meant being the only [B]lack person in the entire community. Those who came from urban backgrounds could experience culture shock and isolation when transplanted to rural, predominantly white towns, and some left" (p. 184).

For women, incidents of sexual harassment and assault are still disturbingly prevalent in natural resources and may further explain the lower percentages of female employees in the selected federal natural resource organizations. In 2016, for example, major news stories broke about patterns of sexual harassment and assault in the NPS and FS, prompting multiple congressional hearings by the House Committee on Oversight and Government Reform. Interviews with victims revealed a longstanding "boys will be boys" culture where harassment was widespread,

misconduct ignored, perpetrators protected, and victims retaliated against (*Examining Misconduct*, 2016; *Examining Sexual Harassment*, 2016; Flock & Barajas, 2018; Joyce, 2016). The NPS subsequently conducted a survey in 2017 that found, in the previous 12 months, many female NPS employees had experienced gender harassment (35%), sexual harassment (18%), or sexual assault (1%), most often perpetrated by older male NPS employees (Federal Consulting Group & CFI Group, 2017). These problems are not restricted to the selected organizations but are common across many natural resource disciplines. For example, Clancy et al. (2014) found that 71% of female field scientists had been harassed and 26% had been assaulted—primarily by senior male employees. In general, natural resources have numerous characteristics known to increase the likelihood of sexual harassment, including: male-dominated workplaces, organizational tolerance for sexual harassment, hierarchical power structures that foster dependent relationships, and isolating environments in the field or laboratory (National Academies of Sciences, Engineering, and Medicine, 2018). As representative Jackie Speier described: “this has been going on for 40 years. And lawsuits are filed, they are settled, there are consent decrees...and then the behavior reoccurs again and again and again” (*Examining Sexual Harassment*, 2016, p. 52).

These barriers to the employment of women and minorities in natural resources appear to have had less of an impact on the EPA than the other selected federal natural resource organizations. From 1998 to 2018 and 2006 to 2018, the EPA’s levels of workforce diversity were similar to the CLF and federal government overall and consistently higher than the other selected organizations. A key difference is that the EPA’s workforce was generally more urban, more educated, and employed in higher GS levels than the other selected organizations. In 2018, for

example, the EPA and the other selected organizations (on average) respectively had workforces composed of 98% and 66% higher GS employees, 85% and 57% employees with a college degree, and 25% and 3% employees based in Washington D.C. (OPM, n.d.-h). These factors often corresponded with higher pay and prestige, more welcoming academic fields, and more desirable work locations, likely making the EPA more appealing to underrepresented employees. Additionally, since the EPA was established in 1970, its early growth occurred during an era of greater legal protections against discrimination following the 1964 Civil Rights Act and 1972 Equal Employment Opportunity Act. The EPA was therefore obliged to diversify its workforce from its inception, in contrast to the other selected organizations—established from 1879 (USGS) to 1946 (BLM)—which had decades of discriminatory history and culture to overcome. For example, the EPA had higher total percentages of women (48%) and minorities (25%) in 1989 than almost all the other selected organizations in 2018 (with highs of 42% USDA women and 28% USDA minorities, and, strikingly, a sub-agency high of 21% FS minorities) (Office of Human Resources Management, 1989).

Overall, the consistently lower percentages of female and minority employees in most of the selected federal natural resource organizations from 1998 to 2018 and 2006 to 2018 raise practical implications for ensuring the federal natural resource workforce is as diverse as the nation. The lower percentages of female and minority employees in most of the selected organizations compared to the federal government overall, and in the selected sub-agencies compared to their departments, suggest that there are opportunities for these organizations to learn from and adopt already successful diversification strategies used by non-natural-resource federal organizations. These results also emphasize the importance of counteracting unique

barriers to natural resource employment to improve the recruitment and retention of underrepresented employees in the selected organizations. For example, perhaps it would be more feasible for the selected organizations to increase employee diversity in non-field positions (such as regional offices) before attempting to increase employee diversity in field positions. Similarly, perhaps there are opportunities to change organizational norms around promotion, such as expectations around rural field experience and needing to move across the country to advance. Arguably the most important change the selected organizations could attempt would be to make their organizational cultures more welcoming to women and minorities. This could potentially include concerted efforts by leadership to make employee diversity a central organizational value (not just in name only but in practice), to openly acknowledge (and apologize for) the ways in which the selected organizations perpetuated and institutionalized discrimination, to expand recruitment from diverse communities (such as minority serving institutions), and to eliminate organizational tolerance for sexual harassment and assault.

Persistent or widening gaps in female and minority employment over time

The female and minority employment gaps between the selected federal natural resource organizations and the CLF generally persisted or widened from 1998 to 2018 and 2006 to 2018 (Figures 1–6). For women in the selected organizations, the female employment gap in the total workforce persisted over the 21-year period for all but the NRCS (where the gap shrank) and FS (where it widened). On average from 1998 to 2018, the percentage of women in the selected organizations' total workforces was 9 percentage points below that of the CLF (excluding the EPA, which averaged 4 percentage points *above* the CLF). In other employment categories, the selected organizations shrank the female employment gap in the higher GS and older age ranges

and widened or maintained the female employment gap in the young and middle age ranges. The lower GS range was unique in that the female employment gap was inverted (the selected organizations generally had a higher percentage of women than the total CLF) such that the female employment gap shrank even though the selected organizations decreased the percentage of women. For minorities in the selected organizations, the minority employment gap widened across most employment categories from 2006 to 2018. In the total workforce, the average gap size between the CLF's and the selected organizations' percentage of minorities grew from 12 percentage points in 2006 to 16 percentage points in 2018. Only the USDA and FS maintained a persistent, not widening, minority employment gap in their total workforces over the 13-year period. Similarly, the higher GS and older age ranges were the only employment categories where half the selected organizations maintained a persistent, not widening, minority employment gap over time.

From 1998 to 2018 the size of the female employment gap between the selected federal natural resource organizations and the CLF was primarily driven by changes in the selected organizations. Since the CLF maintained a stable percentage of women across all employment categories over the 21-year period, changes in the selected organizations' percentage of female employees were the determining factor in whether the female employment gap shrank, persisted, or widened. As described in previous subsections, from 1998 to 2018 the selected organizations transposed female employees across employment categories—increasing the number and percentage of women in the higher GS and older age ranges and decreasing the number and percentage of women in the lower GS and young age ranges—while maintaining a stable percentage of women in their total workforces. Accordingly, the selected organizations' female

employment gaps followed the same pattern: the gap shrank in the higher GS and older age ranges, but widened, persisted, or was inverted in the young age, middle age, and lower GS ranges. The selected organizations' apparent progress in closing the female employment gap in the higher GS and older age ranges was therefore offset by stagnation or regression in other employment categories, resulting in persistent female employment gaps in their total workforces. The NRCS was the only selected organization to shrink the female employment gap in its total workforce as it increased the total percentage of female employees over the 21-year period. In contrast, the FS was the only selected organization to widen the female employment gap in its total workforce as it decreased the total percentage of female employees over the study period.

In contrast to the female employment gap, changes in the minority employment gap between the selected federal natural resource organizations and the CLF were primarily driven by differing rates of increase in the percentage of minorities from 2006 to 2018. Although the selected organizations and CLF all increased their percentage of minorities over the 13-year period, the CLF had a higher rate of increase than the selected organizations across all employment categories. For example, in the selected organizations' total workforces, the percentage of minority employees increased by 3 percentage points on average over the 13-year period (a rate of +0.2 percentage points per year) while the CLF's total percentage of minorities increased by 7 percentage points (+0.5 percentage points per year). Strikingly, the CLF's rate of increase in the total percentage of minorities was more than double the average rate of increase in the selected organizations' total workforces. For all employment categories, therefore, the selected organizations' increases in minority employment were outpaced by the CLF, thus causing the minority employment gap to grow larger from 2006 to 2018. The FS and USDA (in addition to

the federal government overall) were the only selected organizations to maintain persistent, rather than widening, minority employment gaps in their total workforces over time: both organizations increased their total percentage of minority employees by 5 percentage points over the 13-year period (a rate of +0.4 percentage points per year). Notably, the USDA and FS were still slightly outpaced by the CLF's increase in the percentage of minorities, despite their experiencing larger increases in total minority employment than any other selected organization from 2006 to 2018.

For both women and minorities, the higher GS and older age ranges showed the most progress of all employment categories in closing (or simply not widening) the female and minority employment gaps between the selected federal natural resource organizations and the CLF from 1998 to 2018 and 2006 to 2018. All of the selected organizations shrank the female employment gap in the higher GS and older age ranges over the study period (except the EPA's inverted gap in the higher GS range which grew larger as the EPA increased the percentage of female employees). The higher GS and older age ranges were also the only employment categories in which half of the selected organizations maintained a persistent minority employment gap from 2006 to 2018. Additionally, the older age range was the only employment category in which any of the selected organizations shrank the minority employment gap (achieved by the USDA; the DOI also shrank their inverted gap as the CLF's percentage of minorities increased toward the DOI's). This is consistent with trends in the number and percentage of underrepresented employees increasing more in those two employment categories (as discussed in the subsections above). The divergence of trends in both the female and minority employment gaps across employment categories suggests diversification may not be progressing equally across all sectors

of the workforce. For example, while the female and minority employment gaps shrank or persisted in the older age range over the study periods, they both grew larger in the young age range, raising questions about their strategies for recruiting and retaining underrepresented young (and often entry level) employees.

Overall, both the persistent female employment gap and widening minority employment gap between the selected federal natural resource organizations and the CLF from 1998 to 2018 and 2006 to 2018 suggest that progress has stalled in achieving a federal natural resource workforce representative of the nation's diversity. The selected organizations generally did not make headway in closing the female employment gap in their total workforces over the 21-year period. Although the selected organizations increased gender diversity in some employment categories over the study period, other employment categories stagnated or regressed. For minorities, the results demonstrate that the selected organizations became even less diverse than the CLF from 2006 to 2018 as the minority employment gap grew larger over time. Although the selected organizations increased their percentage of minority employees over the study period, they failed to keep up with the pace of diversification in the CLF (and the United States' population at large). For both women and minorities, it therefore appears that the selected organizations' diversification policies during the study periods were insufficient in scope or speed for achieving a representative workforce. In particular, the growth in the minority employment gap from 2006 to 2018 raises questions about whether and how the selected organizations prioritized racial/ethnic diversification efforts. Given that the federal government overall was able to maintain a persistent minority employment gap during this same period, it would appear the problem was not a generalized lack of successful strategies or opportunities for federal

workforce diversification. In the future, to progress toward closing both the female and minority employment gaps, the selected organizations must consider how to expand their diversification efforts to meet or exceed the pace of the CLF.

The juxtaposition of an increasing percentage of minority employees in the selected federal natural resource organizations and a growing minority employment gap between the selected organizations and the CLF from 2006 to 2018 underscores the need for a standard of comparison for assessing workforce diversification. If one were only to examine trends in the percentage of minority employees, it would appear the selected organizations generally increased minorities across most employment categories from 2006 to 2018. From those results alone, one could infer that the selected organizations were progressing toward a nationally representative workforce. However, the widening minority employment gap between the selected organizations and the CLF during the same period belies this conclusion. When one also studies the trend in the minority employment gap—placing the selected organizations’ percentage of minorities in context with that of the CLF—it becomes apparent that the selected organizations’ increasing percentage of minorities was actually inadequate for achieving a workforce that reflects the country’s diversity. Even in the older age range—the CLF’s least diverse employment category with the lowest average percentage of minorities over the 13-year period (25%), the smallest initial gap size with the selected organizations (6 percentage points on average), and the smallest increase in the percentage of minorities over time (+6 percentage points)—the minority employment gap still widened in a third of the selected organizations. These results demonstrate the importance of contextualizing trends in the percentage of underrepresented employees against demographic change. Comparing the selected organizations against a national diversity

metric thus allows for a more complete understanding of whether diversification efforts are enabling their workforces to truly reflect the country's diversity.

Limitations and future work

Although the goal of this analysis was to provide a comprehensive study of workforce diversity in federal natural resource organizations, it was intentionally limited in scope. Only nine federal natural resource organizations were selected for inclusion in this analysis, even though there are other federal agencies that have some responsibility for managing natural resources as part of their administrative mandates. Similarly, the departments and agencies selected for inclusion also contain staff whose jobs are not primarily focused on natural resource management (such as clerical staff, legal counsel, etc.). In addition, this analysis only examined trends in workforce diversity across the total workforce, two GS ranges, and three age ranges. The OPM federal workforce data used for this analysis contain rich possibilities for future studies that expand beyond the scope of this paper. For example, opportunities for future research using the OPM data could include assessing workforce diversity by job code (foresters, biologists, etc.), salary level, and type of appointment (permanent or temporary/seasonal).

This analysis was also limited in which identities were represented. The OPM federal workforce data used for this analysis separated gender and race/ethnicity such that it was not possible to assess the intersection of these identities. Intersectionality would be important to examine in future studies to determine who specifically has benefitted from diversification efforts and who has fallen through the cracks. For example, women of color can often be overlooked in non-intersectional analyses if white women and/or men of color have been the primary beneficiaries

of diversification efforts. This analysis also examined only two forms of workforce diversity—gender and race/ethnicity. To ensure the federal natural resource workforce is representative of the nation, it would also be important to analyze other forms of diversity (for example, disability, sexual orientation, etc.). In addition, this analysis grouped all employees not identifying as white non-Hispanic into a single category of “minorities” and did not examine specific underrepresented racial/ethnic identities individually. As with intersectionality, it is important to assess workforce diversity through a more nuanced lens to ensure that diversification efforts progress equitably across all underrepresented racial/ethnic identities.

Finally, this analysis was limited to a quantitative assessment of the numbers and percentages of female and minority employees. While this metric was useful for comparing federal natural resource organizations against the CLF to assess representative bureaucracy, this is not the only valid metric of diversity. For example, a diversity management approach could examine employee perceptions of equality and organizational fairness, in addition to assessing a broader definition of diversity (including, for example, class, regionality, beliefs, etc.) (Naff & Kellough, 2001). Inclusion and equity are also essential aspects of workforce diversification that are distinct from the question of representative bureaucracy. As a quantitative analysis, this paper also did not examine employee perceptions of workforce diversity or evaluate the effectiveness of specific diversity management policies or programs. Future research on workforce diversity in federal natural resource organizations could include, for example, qualitative analyses of attitudes toward diversity and diversification efforts among federal natural resource employees and agency or departmental leadership, as well as comprehensive policy analysis or program

evaluation assessing the efficacy of diversification strategies in use by federal natural resource organizations.

Conclusions

The goal of this analysis was to address the research question: what do federal natural resource organizations' trends in gender and race/ethnicity workforce demographics reveal about their progress towards achieving a "federal work force reflective of the Nation's diversity" (Civil Service Reform Act, 1978, 5 U.S.C. § 1101 notes) when examined intra-organizationally over time and inter-organizationally in comparison with the federal government overall and the CLF? The results show that, over the last two decades, federal natural resource organizations have continued to experience remedial levels of workforce diversity compared to the federal government overall and the CLF, their efforts to diversify have been ineffective and/or overshadowed by budget and workforce reductions, and their progress toward achieving a representative workforce has stalled. These results are consistent with broader trends in natural resource and environmental organizations wherein, despite small increases in the percentages of women and minorities, the status quo of underrepresentation continues to be maintained (Green 2.0, 2019; Taylor, 2014, 2018). In the future, federal natural resource organizations must become more intentional about their diversification strategies, allow flexibility to adapt as contexts change, ensure the scope and pace of diversification is sufficient to keep up with the CLF, seek methods to counteract the unique barriers of natural resource employment, and ensure their organizational cultures prioritize and value a diverse workforce. Given the importance of federal natural resource organizations as major environmental employers and policymakers, and given the legal, demographic, and moral imperatives for a diverse and inclusive federal workforce,

there is still much more work to be done to ensure federal natural resource organizations have workforces that represent the people they serve.

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