



May 2017

# NATIONAL WEATHER SERVICE

Actions Have Been  
Taken to Fill  
Increasing Vacancies,  
but Opportunities  
Exist to Improve and  
Evaluate Hiring

# GAO Highlights

Highlights of [GAO-17-364](#), a report to congressional requesters

## Why GAO Did This Study

NWS has the critical responsibility of issuing weather forecasts and warnings to help protect life and property, especially as severe weather unfolds. Most NWS operational units across the nation operate 24 hours every day to issue forecasts and warnings. NOAA's WFMO processes NWS hiring requests and other actions related to human capital.

GAO was asked to review vacancies and hiring at NWS operational units. This report examines (1) information available on vacancies at NWS operational units for fiscal years 2010 through 2016, (2) any steps NWS operational unit management and staff have taken to address the impact of vacancies at their units, (3) the extent to which NOAA's WFMO makes information available to managers on the status of hiring requests, and (4) the extent to which NOAA's WFMO and NWS are taking actions to address the hiring backlog at operational units. GAO analyzed available vacancy data for fiscal years 2010 through 2016 and assessed the data's reliability; examined relevant documentation and interviewed NOAA, WFMO, and NWS officials; and visited a nongeneralizable sample of nine units selected to reflect geographic diversity and varying vacancy levels.

## What GAO Recommends

GAO recommends that NOAA (1) ensure that complete information on hiring requests is routinely communicated to NWS managers and (2) evaluate whether NWS actions to reduce the hiring backlog are achieving expected results. NOAA agreed with GAO's recommendations.

View [GAO-17-364](#). For more information, contact Anne-Marie Fennell at (202) 512-3841 or [FennellA@gao.gov](mailto:FennellA@gao.gov).

May 2017

## NATIONAL WEATHER SERVICE

# Actions Have Been Taken to Fill Increasing Vacancies, but Opportunities Exist to Improve and Evaluate Hiring

## What GAO Found

Available data from the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) indicate that the number of vacancies across its operational units has increased since fiscal year 2010. Specifically, agency data show that vacancies—unfilled positions at a point in time—increased from about 5 percent of the total number of positions at the end of fiscal year 2010 to about 11 percent in 2016. NWS officials reported that they did not have the resources to fill all of these vacancies and therefore developed additional data that factored in available resources. Based on these data, the vacancy rate across operational units was approximately 0.6 percent in fiscal year 2010 and increased to about 7 percent in fiscal year 2016.

NWS operational unit managers and staff GAO interviewed said they had taken several steps to address the impact of vacancies that remained unfilled for months, and in some cases, more than a year. These steps included managers and staff performing additional tasks to ensure forecasts and warnings were issued, staff adjusting their work and leave schedules, and managers requesting temporary staff from other units. However, taking these steps, according to managers and staff, at times led to their inability to complete other key tasks, such as providing severe weather information support to state and local emergency managers.

NOAA's Workforce Management Office (WFMO) makes limited information available to NWS managers on the status of their hiring requests. NWS managers said such information was critical for allocating resources and managing work, particularly in light of the length of the NWS hiring process. For example, agency data show that filling hiring requests selected for processing ranged from 64 to 467 days in fiscal year 2016. GAO found that complete information was often not available to managers, such as when the processing of a new hiring request was scheduled to begin. This is not consistent with federal internal control standards that call for management to communicate necessary quality information to achieve an entity's objectives. A WFMO official said the agency is working with the Department of Commerce to develop a new department-wide data system, potentially in 2017 that could provide improved tracking and reporting capabilities, but the design of the new system has not been finalized. In the interim, without complete information on the status of their requests, NWS operational unit managers are limited in their ability to plan for and distribute their unit's workload in the most efficient and effective manner.

NOAA's WFMO and NWS have taken some actions to help address NWS's hiring backlog. For example, NWS has combined job announcements for similar positions into one announcement. NWS officials said they believe such actions have allowed them to streamline hiring, but they have not evaluated the extent to which their actions have achieved expected results, consistent with federal internal control standards. NWS intends to develop a strategic human capital plan, which officials said could provide a framework for evaluating its hiring actions, but does not have a time frame for its development. In the interim, by evaluating whether its actions are reducing the hiring backlog, NWS would have better assurance that its actions were achieving expected results, and the agency could better determine where to devote resources.

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### **Abbreviations**

ESO	Enterprise Services Organization
FTE	full-time equivalent
National Centers	National Centers for Environmental Prediction
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OPM	Office of Personnel Management
WFMO	Workforce Management Office

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May 24, 2017

The Honorable Suzanne Bonamici  
Ranking Member  
Subcommittee on Environment  
Committee on Science, Space, and Technology  
House of Representatives

The Honorable Don Beyer  
Ranking Member  
Subcommittee on Oversight  
Committee on Science, Space, and Technology  
House of Representatives

The Honorable Daniel Lipinski  
Ranking Member  
Subcommittee on Research and Technology  
Committee on Science, Space, and Technology  
House of Representatives

The United States regularly faces a variety of severe weather events, including tornadoes, hurricanes, winter storms, and flooding, all of which can have major economic, environmental, health, and safety impacts—and the potential to devastate communities. In 2015, for example, severe weather events adversely affected agriculture, manufacturing, and energy production, resulting in at least \$15 billion dollars in damages.<sup>1</sup>

The National Weather Service (NWS), an agency within the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), is the nation's official government authority charged with issuing weather forecasts and warnings for the protection of life and property.<sup>2</sup> NWS does so, in part, through its 168 operational units, including local weather forecast offices, river forecast centers, tsunami warning centers, and the National Hurricane Center, among others. Most of NWS's operational units operate 24 hours a day, every day, with at least two

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<sup>1</sup>National Oceanic and Atmospheric Administration, National Centers for Environmental Information, *U.S. Billion-Dollar Weather & Climate Disasters 1980-2016*, accessed on November 14, 2016, <https://www.ncdc.noaa.gov/billions/events>.

<sup>2</sup>A warning is issued when a hazardous weather or hydrologic event that poses a threat to life or property is occurring, is imminent, or has a very high probability of occurring.

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staff—generally meteorologists—working each forecasting shift. In response to severe weather events, additional staff may also be called in to provide forecasting support and to work with NWS’s core partners, including state and federal emergency managers and the media, to help ensure that the public takes appropriate precautions.<sup>3</sup> Most NWS employees are considered essential emergency employees, meaning that they must report to work during severe weather, emergency events, or when the government might otherwise be shutdown.<sup>4</sup>

Several studies have highlighted concerns with staffing levels and vacancies at NWS’s operational units. For instance, a 2012 review by the National Academy of Sciences concluded that “the quality of the NWS’s warning capability corresponds with its capability to muster an ample, fully trained local staff at its [weather forecast offices] as severe weather unfolds.”<sup>5</sup> The review identified several challenges facing the NWS workforce, such as meeting the expanding public need to access weather information through mobile technology, and recommended actions related to “evolving” the NWS workforce to ensure that it is fully able to respond to changing needs. In 2013, the National Academy of Public

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<sup>3</sup>NWS’s core partners are government and nongovernment entities directly involved in the preparation, dissemination, and discussions involving hazardous weather or other emergency information put out by NWS, according to NWS documents. Examples of core partners include the Federal Emergency Management Agency, state governors’ offices, and the media.

<sup>4</sup>Department of Commerce guidance describes an “emergency employee” as one who occupies a position that has been determined to be critical—i.e., a job that may be vital to public health, safety, welfare, national defense, or the operation of essential facilities or functions. Office of Personnel Management guidance defines “emergency employees” as those who must report for work in emergency situations—e.g., severe weather conditions, interruption of public transportation, and other situations in which significant numbers of employees are prevented from reporting for work or that require agencies to close all or part of their operations. NWS sometimes refers to these employees as “excepted” or “emergency-essential.” For the purposes of this report, we refer to such employees as “essential emergency employees.”

<sup>5</sup>National Academy of Sciences, Committee on the Assessment of the National Weather Service’s Modernization Program, *The National Weather Service Modernization and Associated Restructuring: A Retrospective Assessment* (Washington, D.C.: National Academies Press, 2012). See also National Academy of Sciences, Committee on the Assessment of the National Weather Service’s Modernization Program, *Weather Services for the Nation: Becoming Second to None* (Washington, D.C.: National Academies Press, 2012). These studies were requested by Congress to evaluate the execution and impacts of NWS’s Modernization and Associated Restructuring—an estimated \$4.5 billion effort occurring from 1989 to 2000—and to identify lessons learned to support future improvements to NWS capabilities.

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Administration published a report assessing NWS operations that found that, among other things, for 3 consecutive years NWS had experienced staffing losses at a greater rate than that at which it had been hiring.<sup>6</sup> The report went on to state that, should the trend continue, NWS will be “in danger of losing a significant segment of the workforce and will not be able to renew itself at a sustainable rate unless it revises staff functions and allocations across programs and offices.” The report also made several recommendations, including that NWS conduct a workforce analysis and assess staff alignment and functions across the agency.

In part to address the National Academy of Public Administration’s recommendations, NWS hired a contractor in 2015 to conduct a comprehensive analysis of the size, location, and skillsets of its workforce. The contractor analyzed, among other things, the skills meteorologists need to communicate the risks and potential impacts of severe weather in ways the public can understand and respond to appropriately. The contractor’s analysis found that the agency’s workforce structure did not always allow operational unit staff sufficient time to deliver “impact-based decision support services” to their core partners.<sup>7</sup>

On the basis of this analysis, NWS developed a strategy in September 2016 for “evolving” the NWS. As part of this strategy, NWS is exploring, among other things, ways to utilize new technologies, including nationally integrated weather prediction computer models, to develop forecasts to free up operational unit staff so they can spend more time delivering impact-based decision support services to core partners.<sup>8</sup> NWS began testing and evaluating such ways to optimize staff time in fiscal year 2017. NWS officials said that they do not plan to make any changes until testing and evaluation are complete, which could extend beyond 2018. Additionally, officials said that any proposed changes will involve input from stakeholders, including NWS’s core partners, the NWS Employees

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<sup>6</sup>National Academy of Public Administration, *Forecast for the Future: Assuring the Capacity of the National Weather Service* (Washington, D.C.: May 2013).

<sup>7</sup>Impact-based decision support services are “the provision of relevant information and interpretative services to enable core partners’ decisions when weather, water, or climate has a direct impact on the protection of lives and livelihoods,” according to NWS documentation.

<sup>8</sup>According to NWS officials, the nationally integrated weather prediction computer models—known as the National Blend of Models—will deliver a more consistent, common starting point for the development of forecasts, which could free up meteorologists’ time from working on initial weather forecast parameters.



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Organization, and Congress.<sup>9</sup> In the interim, questions continue to be raised about staffing and vacancies at NWS's operational units.<sup>10</sup>

Addressing complex challenges, such as responding to disasters, incorporating changing technologies, and accurately identifying and preparing for severe weather events, requires a high-quality federal workforce able to work seamlessly with other agencies and levels of government and across sectors.<sup>11</sup> Since 2001, given staffing and other workforce challenges federal agencies have faced governmentwide, strategic human capital management—including acquiring and developing a workforce whose size, skills, and deployment meet agency needs—has been on our list of high-risk areas.<sup>12</sup> The combined effect of workforce challenges has potentially put at risk agencies' ability to effectively accomplish their missions, manage critical programs, and adequately serve the American people. Individual federal agencies have made improvements since 2001, but strategic human capital management has remained a high risk area, particularly given mission-critical skills gaps we have identified across the federal workforce that could hinder agencies from cost-effectively serving the public and achieving results.<sup>13</sup>

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<sup>9</sup>The NWS Employees Organization is the labor organization representing NWS employees, including meteorologists, technicians, and support personnel. Since 2001, NWS and the NWS Employees Organization have had a single collective bargaining agreement that calls for both parties to commit to "pre-decisional involvement" and for management to solicit employee input through the labor organization prior to making final decisions.

<sup>10</sup>For example, a NWS service assessment after the October 2015 historic South Carolina floods, completed in July 2016, stated that because of vacancies, the ability of a weather forecast office to provide impact-based decision support services during severe weather events was challenged. NWS generally conducts service assessments after severe weather events to identify and share best practices in operations and procedures, recommend service enhancements, and address service deficiencies.

<sup>11</sup>GAO, *High-Risk Series: An Update*, [GAO-15-290](#) (Washington, D.C.: Feb. 11, 2015).

<sup>12</sup>GAO, *High-Risk Series: An Update*, [GAO-01-263](#) (Washington, D.C.: Jan. 1, 2001). Our high risk areas focus attention on government operations that are at high risk because of their greater vulnerabilities for fraud, waste, abuse, and mismanagement, or that are in need of attention to address economy, efficiency, or effectiveness challenges. We identified human capital management—the government's approach to managing its people—after finding that many federal agencies were experiencing serious human capital challenges, such as skills imbalances, succession planning challenges, outdated performance management systems, and understaffing.

<sup>13</sup>[GAO-15-290](#).

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NOAA's Workforce Management Office (WFMO) provides support to NWS on human capital issues. In particular, WFMO is responsible for processing hiring requests for NWS as well as completing other personnel actions, such as promotions.<sup>14</sup> However, according to NOAA documentation and officials, resources to recruit, retain, and develop staff to support NWS and other NOAA agencies have not kept pace with mission activities, which has resulted in a decreased capacity to deliver hiring-related services and, beginning in 2013, a hiring backlog at NWS.<sup>15</sup>

You asked us to examine vacancies and hiring at NWS operational units. This report examines (1) information available on vacancies at NWS operational units for fiscal years 2010 through 2016; (2) steps, if any, NWS operational unit management and staff have taken to address the impact of vacancies at their units; (3) the extent to which NOAA's WFMO makes information available to operational unit managers on the status of hiring requests; and (4) the extent to which NOAA's WFMO and NWS are taking actions to address the hiring backlog at operational units.

To conduct our work, we reviewed relevant laws and NOAA, WFMO, and NWS policies, directives, and other documentation. We defined NWS operational units for the purposes of this report based on our review of relevant documents and interviews with knowledgeable NWS officials. Specifically, we defined NWS operational units as all units in any category of units (e.g. weather forecast offices) where at least one of the units met at least two of the following three criteria: (1) issue forecasts, (2) issue warnings, and (3) has personnel that are essential emergency employees. Using this definition, we identified 168 individual operational units grouped under 6 operational unit categories: 6 NWS regional headquarters, 122 weather forecast offices, 15 weather service offices, 13 river forecast centers, 2 tsunami warning centers, and 9 National Centers for Environmental Prediction (National Centers) and 1 director's office of the National Centers.

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<sup>14</sup>WFMO provides workforce management services for all NOAA agencies, including the National Environmental Satellite, Data, and Information Service; National Marine Fisheries Service; National Ocean Service; Office of Marine & Aviation Operations; and Office of Oceanic & Atmospheric Research.

<sup>15</sup>See also, Kathryn Sullivan, National Oceanic and Atmospheric Administration Administrator, *National Oceanic and Atmospheric Administration's Fiscal Year 2017 Budget Request*, testimony before the U.S. House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation, 114th Cong., 2nd sess., March 15, 2016.

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To examine the information available on vacancies (i.e., unfilled positions) at NWS operational units for fiscal years 2010 through 2016, we obtained data for the end of those fiscal years from the agency's organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each one is filled.<sup>16</sup> We considered a vacancy to be any unfilled position on the organizational table. We then calculated the vacancy rates for operational units and position types. To assess the reliability of these data, we reviewed relevant documentation and interviewed knowledgeable NWS and NOAA officials about how data are entered and maintained. We also conducted a review of the organizational table data for obvious errors and completeness. On the basis of this review, we determined that the data were sufficiently reliable for the purposes of reporting available information on vacancies across NWS operational units.

We also reviewed data NWS provided that adjusted information from the organizational table to factor in the number of positions the agency indicated it had resources to support. NWS developed these data for us because, according to NWS officials, the organizational table does not reflect the resources the agency had available to fill many of the vacancies. However, the additional data the agency developed did not identify which positions listed on the organizational table would remain unfilled because of a lack of resources. Rather, NWS developed these data by proportionally distributing vacancies across the operational units to show the number of positions the agency had resources to fill, according to NOAA and NWS officials. At an agencywide level (across all operational units collectively), these data were helpful to see the vacancy levels NWS estimated having, based on its resource levels. However, we determined that the additional data did not provide an accurate reflection of vacancies for a particular unit or position type and did not reflect how NWS has been managing its staffing levels or vacancies. Given these limitations, we did not use these data for reporting vacancy rates at the operational unit level, but instead we report data directly from the organizational table as described above.

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<sup>16</sup>For fiscal years 2014 through 2016, NWS provided data at the operational unit level by position title, grade, and series. For fiscal years 2010 through 2013, NWS could not provide that same level of detailed data while maintaining confidence in their reliability; and therefore NWS provided data for these fiscal years generally aggregated at the regional and National Centers' levels.

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To examine any steps NWS operational unit management and staff have taken to address the impact of vacancies at their units, we conducted interviews and obtained documentation when available from officials from the six NWS regional headquarters, all nine National Centers, and the director's office of the National Centers. In addition, we visited a nongeneralizable sample of nine operational units across the United States that were selected to represent a range in (1) the number of vacancies in the operational unit as of March 5, 2016; (2) the types of weather typical for the operational unit's area of coverage, as demonstrated by types of forecasts produced; and (3) the size of the population in the warning area covered by the operational unit, among other criteria. During our site visits we conducted separate interviews with management and staff and analyzed available documentation to corroborate steps they described having taken to address the impact of vacancies at their units. The results from our interviews and site visits cannot be generalized to those operational units and employees we did not interview but rather provide illustrative examples of steps being taken to address vacancies.

To examine the extent to which NOAA's WFMO makes information available to operational unit managers on the status of hiring requests and the extent to which NOAA's WFMO and NWS are taking actions to address the hiring backlog at operational units, we collected and analyzed documentation from, and interviewed officials from, NWS headquarters and NOAA's WFMO. We also interviewed managers and staff at NWS operational units (as described above), as well as managers at the regional headquarters and the director's office of the National Centers, regarding their experiences with the hiring process. For additional context on actions taken to address the hiring backlog, we collected and analyzed available data on attrition across NWS and WFMO, the number and types of hiring actions completed by WFMO for NWS, and available data on the amount of time it took to complete NWS hiring actions for fiscal years 2010 through 2016. To assess the reliability of these data, we reviewed relevant documentation and interviewed knowledgeable NWS and NOAA officials. On the basis of this review, we determined that the data were sufficiently reliable for the purposes of our analysis. In addition, we compared activities related to information WFMO makes available to operational unit managers, as well as information on actions NWS and WFMO are taking to address the hiring backlog, with federal standards for

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internal control.<sup>17</sup> Appendix I provides further details about our objectives, scope, and methodology.

We conducted this performance audit from November 2015 to May 2017, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

NWS is the nation's official and authoritative source for watches and warnings during severe weather and is responsible for providing weather and climate data and issuing forecasts and warnings for the protection of life and property and enhancement of the national economy.<sup>18</sup> Through its operational units nationwide, NWS issues many types of forecasts and warnings including weather, river, flood, and aviation. It issues approximately 1.5 million forecasts and 50,000 warnings annually. NWS also supports the national infrastructure that collects and processes worldwide weather data and climate observations from the air, land, and sea. This infrastructure includes technologies such as Doppler weather radar; satellites operated by NOAA's National Environmental Satellite, Data, and Information Service; marine data buoys; surface observing systems; and instruments for monitoring space weather. Across this infrastructure, NWS collects billions of weather and climate observations annually, which are fed into its supercomputer forecasting models. In fiscal year 2016, NWS had 4,218 employees, of whom 3,629 were in

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<sup>17</sup>GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

<sup>18</sup>A watch is used when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location, and/or timing is uncertain.

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operational units, and NOAA's budget for NWS was approximately \$1.1 billion, according to NWS documentation.<sup>19</sup>

NWS headquarters, led by the Director of NWS, is responsible for overall agency management, including overseeing operations and conducting budgetary formulation, analysis, and reporting.<sup>20</sup> NWS's Chief Operating Officer, based out of NWS's headquarters, oversees six regional offices—referred to as regional headquarters—and the director's office of the National Centers. NWS's regional headquarters and the director's office of the National Centers, in turn, oversee various local operational units. Together, these units constitute six categories of operational units, with a total of 168 individual operational units as follows.

- **Regional headquarters.** Six regional headquarters are led by regional directors who provide administrative and operational support, including managing the regions' budgets and hiring efforts, to the following offices and centers:<sup>21</sup>
  - **Weather forecast offices.** One hundred and twenty-two offices operate 24 hours a day, 7 days a week, to monitor local weather and issue local forecasts and warnings.
  - **Weather service offices.** Fifteen offices, mostly located in Alaska, operate on various schedules to collect weather observations that assist with the development of local, national, and global forecasts and warnings.
  - **River forecast centers.** Thirteen centers operate 16 hours a day, 7 days a week, to monitor major river systems and aquifers to produce river and flood forecasts and coordinate warnings with

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<sup>19</sup>The number of NWS employees excludes fully reimbursable positions for which the agency receives funding from other federal agencies, students hired through the Pathways internship program (a federal internship program that provides employment opportunities to current students or recent graduates), and temporary positions. We excluded fully reimbursable positions and Pathways student positions because NWS does not include those positions in its request for appropriations. We also excluded temporary positions because the agency creates these positions to temporarily promote staff into vacant positions after which the temporary positions are eliminated.

<sup>20</sup>The Director of NWS is also known as the NOAA Assistant Administrator for Weather Services.

<sup>21</sup>NWS regional headquarters are also responsible for managing NWS's 21 center weather service units, which provide aviation weather forecast support to the Federal Aviation Administration. We excluded these units from our review because they are funded through a reimbursable agreement with the Federal Aviation Administration.

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local weather forecast offices. These centers increase their service hours as needed when flooding is predicted or is occurring.

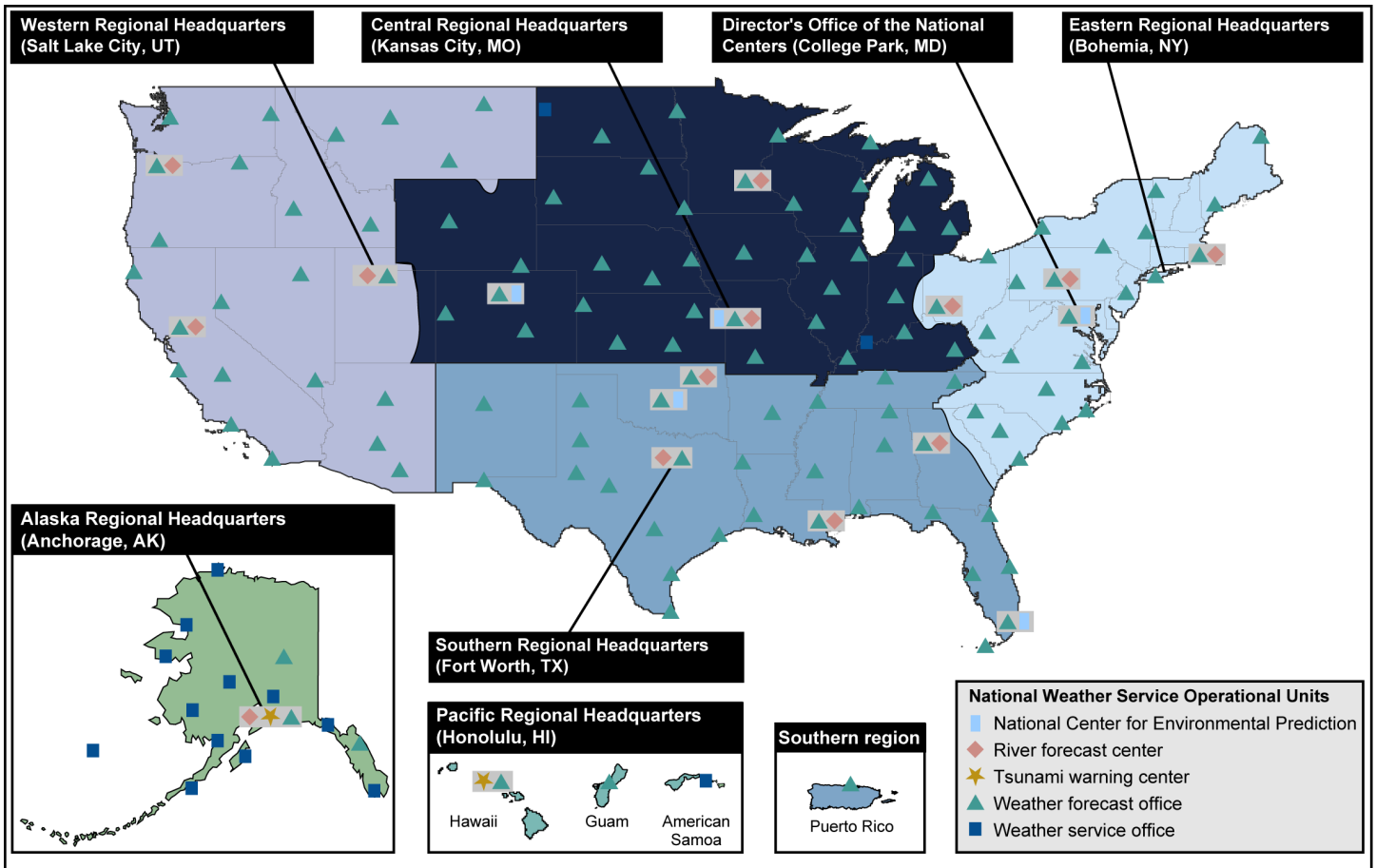
- **Tsunami warning centers.** Two centers generally operate 24 hours a day, 7 days a week to monitor seismic and sea level activity and issue tsunami forecasts and warnings for the United States and its territories.
- **National Centers and the director's office.** The director's office of the National Centers oversees nine National Centers and provides them administrative and operational support, including managing their hiring efforts. The National Centers generate products and services to support other NWS operational units, as well as private sector partners, other governmental agencies, and the public. Most centers operate 24 hours a day, 7 days a week and some issue forecasts and warnings related to a particular area of focus (e.g., the National Hurricane Center issues forecasts and warnings for hurricanes and other tropical weather). The nine centers are the: (1) Aviation Weather Center, (2) Climate Prediction Center, (3) Environmental Modeling Center, (4) National Centers for Environmental Prediction Central Operations, (5) National Hurricane Center, (6) Ocean Prediction Center, (7) Space Weather Prediction Center, (8) Storm Prediction Center, and (9) Weather Prediction Center.<sup>22</sup>

Figure 1 shows the location of NWS's six regions and 168 operational units. (App. II provides information on NWS's 168 operational units by operational unit category and location.)

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<sup>22</sup>The Environmental Modeling Center and National Centers for Environmental Prediction Central Operations do not issue forecasts or warnings. The Environmental Modeling Center develops models with research partners, and the National Centers for Environmental Prediction Central Operations implements these models. These model simulations serve as forecast guidance for the public, private, and global forecasting communities, including NWS meteorologists and hydrologists.

**Figure 1: National Weather Service (NWS) Regions and Operational Units**



Sources: National Weather Service data and documents; MapInfo (map). | GAO-17-364

Note: We defined NWS operational units as those categories of units in which at least one of the units meets at least two of the following three criteria: (1) issues weather forecasts; (2) issues weather warnings; and (3) has essential emergency employees.



The structure of NWS's operational units is principally based on NWS's efforts to modernize the agency during the 1990s.<sup>23</sup> During the modernization effort, NWS established a standardized staffing model in its operational units to provide more uniform services.<sup>24</sup> The staffing structure across NWS operational units is generally based on "fair weather" forecasting needs, meaning that additional staff and overtime may be called for to help with issuing weather forecasts and warnings during severe weather and emergency events. See figure 2 for examples of forecasting workstations at NWS operational units.

**Figure 2: Photographs of National Weather Service Operational Unit Forecasting Workstations**



Denver/Boulder Weather Forecast Office workstation.

Source: GAO. | GAO-17-364



Space Weather Prediction Center workstations.

Note: Weather forecast offices operate 24 hours a day, 7 days a week to monitor local weather and issue local forecasts and warnings. The Space Weather Prediction Center provides space weather alerts and warnings for disturbances that can affect people and equipment working in space and on earth. For example, by interfering with satellite signals, a space weather event can prevent global positioning systems from being able to correctly calculate a position on Earth.

<sup>23</sup>The Weather Service Modernization Act required the Department of Commerce to develop a National Implementation Plan for NWS modernization and associated restructuring that describes the actions necessary to accomplish the objectives in the NWS's strategic plan for comprehensive modernization of the NWS. Pub. L. No. 102-567, Title VII, §§ 701-709, 106 Stat. 4270, 4303 (Oct. 29, 1992). The goals of modernization were to achieve more uniform weather services across the nation, improve forecasting, provide more reliable detection and prediction of severe weather and flooding, allow more cost-effective operations through staff and office reductions, and achieve higher productivity.

<sup>24</sup>NWS's modernization activities were addressed in our high-risk reports from 1995 through 2001 because the agency experienced a number of difficulties that included schedule delays, cost overruns, and technical problems on key systems. GAO, *Major Management Challenges and Program Risks: Department of Commerce*, [GAO-01-243](#) (Washington, D.C.: Jan. 1, 2001).

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As noted above, NWS receives support for certain administrative functions from NOAA's WFMO, including workforce planning; hiring; and processing personnel actions such as promotions. WFMO also works with NOAA's Office of Security—which is staffed and directed by the Department of Commerce's Office of Security—to ensure security checks and background investigations are conducted as part of the hiring process, as necessary.<sup>25</sup>

Beginning in 2013, a series of events led to a hiring backlog at NWS. Specifically, in response to the 2013 federal budget sequestration, NOAA implemented an agency-wide hiring freeze.<sup>26</sup> Because WFMO generally could not hire or replace departing employees during the freeze, the number of vacancies at NWS increased. According to WFMO officials, when the hiring freeze was lifted in 2014, demand for hiring across NOAA was high. Simultaneously, WFMO had experienced a high level of attrition during the freeze—in fiscal years 2013 and 2014, approximately 50 percent of WFMO staff handling hiring left the agency, according to a WFMO official—and therefore, WFMO could not keep pace with the hiring demand when the freeze was lifted.<sup>27</sup> In fiscal year 2016, attrition at NWS outpaced WFMO's hiring abilities. Over the course of the fiscal year, 191 staff left NWS, and WFMO hired 157 external candidates, according to WFMO data. Therefore, NWS's hiring backlog increased. According to NWS documents and officials, NWS had resources to fill vacant

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<sup>25</sup>NOAA does not control the staffing levels or the priorities for the NOAA Office of Security, according to NOAA officials. This office is funded through the Department of Commerce's Working Capital Fund.

<sup>26</sup>In 2011, Congress enacted the Budget Control Act of 2011, which amended the Balanced Budget and Emergency Deficit Control Act of 1985, to impose spending limits on discretionary appropriations for fiscal years 2012 through 2021. An across-the-board reduction known as sequestration was triggered in fiscal year 2013, and as a result, 5 months into the fiscal year federal agencies were required to implement an \$80.5 billion reduction to their total spending.

<sup>27</sup>According to data from November 2015, one NOAA human capital professional served 148 NOAA employees at various periods of time, which is nearly three times the number of employees served by human capital professionals in similar-sized agencies, such as the National Science Foundation and National Aeronautics and Space Administration, according to NOAA's former Administrator. See National Oceanic and Atmospheric Administration Administrator testimony, March 15, 2016.

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operational unit positions,<sup>28</sup> but it was unable to do so because of limited hiring resources at WFMO.<sup>29</sup> According to NOAA budget officials, an administrative spending cap has limited WFMO's ability to increase its hiring activities to address the hiring demand. In particular, since fiscal year 2005, NOAA has been subject to an administrative spending cap in its annual appropriation that places restrictions on the dollar amount the agency can spend for administrative support, including the amount it can spend on hiring actions.<sup>30</sup>

Additionally, in 2016, WFMO began planning changes to the hiring-related functions it provides to NWS. Specifically, NOAA began transitioning toward using a newly established Commerce-wide Enterprise Services Organization (ESO)—a shared services model—to process actions related to human capital, including hiring requests for NWS and NOAA's other agencies. A NOAA official said that ESO is intended to improve operational efficiencies by increasing automation levels, streamlining business processes, and improving customer service. When ESO is fully established, WFMO officials said they anticipate that WFMO will provide business advisors to NWS to continue to provide

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<sup>28</sup>According to NWS officials we interviewed, because WFMO has been unable to fill all of NWS's hiring requests, in recent years NWS has had annual budget carryover amounts for labor—a situation in which unexecuted funds within a program, project, or activity budget account from one fiscal year are made available in the next fiscal year. As a result of carryover funds, NWS adjusted its spend plans to use some of the funds originally intended for labor expenses to support deferred or backlogged operations and maintenance, such as repairing facilities and updating information technology equipment. NWS officials said the agency typically has a small funds balance in expiring appropriation accounts; in fiscal year 2015, the balance was \$260,000.

<sup>29</sup>According to NWS officials, the availability of funds to support permanent change of station costs—costs to cover employees moving from one operational unit to another—may limit the number of positions the agency can fill in a given year. These officials said one relocation can cost from \$10,000 to \$250,000 depending on such factors as where the employee is moving and whether the employee owns a home. NWS's operational unit permanent change of station obligations for fiscal year 2016 were \$8.6 million and were sufficient to cover the agency's relocations, but the number of future relocations will depend upon available funding, according to one NWS official.

<sup>30</sup>A proviso in NOAA's appropriation limits the amount that may be spent on "corporate services administrative support costs." For fiscal year 2016, the limit was \$226 million. Consolidated Appropriations Act, 2016, Pub. L. No. 114-113, div. B, title I, 129 Stat. 2242 (Dec. 18, 2015). NOAA budget officials said NOAA has requested additional appropriations for WFMO's execution of basic support functions but these requests were not approved in fiscal years 2014 through 2016.

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workforce planning assistance, counseling on human capital issues, and other hiring-related assistance.<sup>31</sup>

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## Available Data Indicate Vacancies across NWS Operational Units Have Increased Since Fiscal Year 2010

Available NWS data show that vacancies at operational units increased from fiscal years 2010 through 2016.<sup>32</sup> Specifically, we determined that across NWS's 168 operational units, vacancies increased from about 5 percent (211 positions) at the end of fiscal year 2010, to about 11 percent (455 positions) at the end of fiscal year 2016.<sup>33</sup> These vacancy rates are based on data from NWS's organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled.<sup>34</sup>

However, these vacancy rates do not factor in the agency's available resources, according to NOAA and NWS officials. The officials explained that from fiscal years 2010 through 2016, NWS did not have resources to support all of the positions included in its organizational table. For example, in fiscal year 2016, an NWS official said that the organizational

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<sup>31</sup>As of February 2017, Congress had not appropriated funding to fully establish the ESO, according to a Department of Commerce official. Additionally, a WFMO official we interviewed said the spending cap on administrative support functions at NOAA may continue to limit the amount of hiring actions that can be processed.

<sup>32</sup>Data indicate that vacancies at NWS operational units decreased from the end of fiscal year 2010 to 2011 but then increased each of the following fiscal years through 2016.

<sup>33</sup>These percentages and numbers represent a snapshot of vacancies as of the end of each fiscal year and do not capture fluctuations that may have occurred over the course of a year. They also do not capture how long individual positions remained vacant because this information is not in the organizational table or otherwise tracked by NWS, according to an NWS headquarters official.

<sup>34</sup>According to an NWS policy directive on the agency's organizational table, it provides detailed and summary information on personnel levels, provides a single source to retrieve reliable information on positions and onboard employees, and is the official organizational information for the agency. An NWS official said changes to the organizational table must be approved by the Office of the Chief Financial Officer. For example, to add a position to the organizational table, the Office of the Chief Financial Officer must ensure funding is available for the position and that the position is justified. According to a NOAA document, the organizational table is designed to provide managers information about NWS's employees, positions, and other cost information, and is one tool available to help managers make hiring decisions within their operational units. However, it is not intended to direct how managers staff their operational units.

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table contained approximately 185 more positions than the agency had resources to support.<sup>35</sup>

To address this issue, NWS developed additional vacancy data that factored in its available resources. Based on these data, the vacancy rate across operational units was approximately 0.6 percent in fiscal year 2010 and increased to about 7 percent in fiscal year 2016. NWS developed these data by proportionally distributing unfilled positions from the organizational table across the operational units to show the number of positions the agency had resources to fill at an agencywide level. However, while useful in providing an estimate of agencywide vacancies, these data do not reflect how individual NWS operational units have managed their staffing levels and vacancies. Instead of identifying specific positions on its organizational table to leave unfilled to ensure staffing levels did not exceed available agency resources, NWS established a “targeted vacancy rate” practice in 2014. Under this practice, the six NWS regional headquarters directors and the director of the National Centers are to hold approximately 5 percent of the positions on the organizational table vacant across their operational units. NWS headquarters officials said that the regional headquarters directors and the director of the National Centers are responsible for implementing this practice and have discretion to allocate resources according to their needs to achieve the agency’s mission goals. Most directors said that they have not had to manage to the targeted vacancy rate, however, because existing vacancies have kept staffing levels below what NWS resources can support.

For vacancy rates at the operational unit level, we examined data from NWS’s organizational table and determined that vacancies have varied across NWS operational units, by category of operational unit, and by region. For example, at the close of fiscal year 2016, the vacancy rate across operational units was about 11 percent. However, almost half of the units (75 of 168) had a higher vacancy rate, and more than 10 percent (21 of 168) had a vacancy rate higher than 20 percent at the close of fiscal year 2016. Similarly, we found a wide range of vacancy rates by

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<sup>35</sup>According to NWS officials, the agency had budgetary resources in fiscal year 2016 to support 4,638 full-time equivalents (FTE). Because the organizational table lists positions, and not FTEs, NWS officials said they use FTEs as a proxy for the number of overall positions the agency can support. FTEs are measured by the number of hours worked. For example, if a position is fully staffed for the entire fiscal year—2,080 hours—one FTE will be consumed. In fiscal year 2016, 3,900 of NWS’s 4,638 FTEs were in operational units, according to an NWS official.

operational unit category (see table 1 for a breakdown of vacancy rates by operational unit category for the last pay period of fiscal years 2014 through 2016).<sup>36</sup> Regional vacancy rates also varied. For example, at the end of fiscal year 2016, the Central Region had the lowest vacancy rate of 8 percent, while the Alaska Region had the highest vacancy rate of 19 percent (see app. III for additional data on vacancy rates by region).

**Table 1: Vacancies (Unfilled Positions) by National Weather Service (NWS) Operational Unit Category, Fiscal Years 2014 through 2016**

NWS operational unit category	Number of operational units	Fiscal year (last pay period)					
		2014		2015		2016	
		Rate	Range	Rate	Range	Rate	Range
Weather forecast offices	122	8	-8 to 27 <sup>a</sup>	9	-7 to 31 <sup>a</sup>	10	0 to 27
Weather service offices	15	11	0 to 50	22	0 to 50	27	0 to 100
River forecast centers	13	11	0 to 27	11	0 to 26	11	0 to 26
National Centers for Environmental Prediction <sup>b</sup>	10	14	3 to 25	13	3 to 20	16	4 to 26
Regional headquarters	6	15	7 to 20	19	12 to 23	17	8 to 23
Tsunami warning centers	2	21	20 to 22	17	16 to 19	11	5 to 19

Source: GAO analysis of National Weather Service data. | GAO-17-364

Note: We used data from NWS's organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled or vacant to calculate the vacancy rates presented in this table. The data were as of the last pay period for each fiscal year (ending on September 30); and therefore our analysis provides a snapshot of the vacancies in NWS operational units at a point in time. According to National Oceanic and Atmospheric Administration and NWS headquarters officials, NWS did not have resources to support filling all of the positions included in its organizational table for this time period.

<sup>a</sup>According to NWS officials we interviewed, some operational units in fiscal years 2014 and 2015 had additional staff assigned to them to complete pilot projects. When these projects were completed, the agency decided to leave the positions at the operational unit and "right-size through attrition." As a result, some operational units had negative vacancy rates.

<sup>b</sup>NWS provided data for nine National Centers for Environmental Prediction (National Centers) and the director's office. However, data for two of the nine National Centers (the Environmental Modeling Center and the National Centers for Environmental Prediction Central Operations) and the director's office were not disaggregated. Therefore, the rate and the range were calculated using the individual vacancy rate information for seven National Centers and the combined vacancy rate of the Environmental Modeling Center, the National Centers for Environmental Prediction Central Operations, and the director's office.

<sup>36</sup>Data for fiscal years 2010 through 2013 by operational unit category were unavailable. NWS provided us with two sets of organizational table data for fiscal years 2010 through 2016. For fiscal years 2014 through 2016, NWS provided data at the NWS operational unit level by position title, grade, and series. For fiscal years 2010 through 2013, NWS could not provide that level of detail while maintaining confidence in the reliability of the data; therefore, the agency provided data generally aggregated at the regional and National Centers' levels.

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We also determined that across NWS's 122 weather forecast offices—which comprised approximately 75 percent of NWS's operational unit staff at the end of fiscal year 2016—vacancies varied by position.<sup>37</sup> For example, at the end of fiscal year 2016, the number of vacant meteorologist positions—including entry-level, general, and lead meteorologists—had increased by 57 percent (from 98 to 154 vacant positions) from fiscal year 2014.<sup>38</sup> Over the same period, the number of vacant management positions—including the meteorologist-in-charge, warning coordination meteorologist, science and operations officer, and electronics systems analyst—decreased by 29 percent (from 42 to 30 vacant positions).<sup>39</sup> For more information on vacancy rates in weather forecast offices by position, see app. IV.

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## Officials Reported NWS Operational Units Took Steps to Address the Impact of Vacancies but at Times Were Unable to Complete Key Tasks

Officials we interviewed in NWS regional headquarters, the National Centers, and operational units reported taking steps to address the impact of vacancies and help ensure forecasts and warnings were issued but said they were at times unable to complete key tasks and were experiencing stress and fatigue from their efforts to cover for vacancies. For example, operational unit managers reported that they have needed to perform additional tasks, such as working forecasting shifts, and have modified leave schedules to cover forecasting shifts in their units. However, taking these steps, according to managers and staff, at times led to their inability to complete other key tasks, such as providing severe weather information support to state and local emergency managers.

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<sup>37</sup>Weather forecast offices are staffed similarly—generally with four managers, 10 lead and general meteorologists, and approximately 10 other positions, including technicians and an administrative support assistant.

<sup>38</sup>The entry-level meteorologist position had the highest vacancy rate across the positions in weather forecast offices (20 percent) at the end of fiscal year 2016. This position is called the “meteorologist intern” position, but it is not part of an internship. Rather, meteorologist interns are full-time permanent staff who are entry-level meteorologist trainees. They apply professional meteorological theories, methods, and techniques to weather forecasting.

<sup>39</sup>All weather forecast offices have four management positions; as of the end of fiscal year 2016, 12 of the 122 weather forecast offices also had a fifth position for data acquisition program manager.

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## NWS Operational Unit Managers and Staff Reported Taking Steps to Help Ensure Forecasts and Warnings Were Issued in Light of Vacancies

Most NWS officials we interviewed indicated that vacancies in operational units remained unfilled for extended periods, stretching from several months to a few years. For example, one operational unit manager said that over the course of 6 years (2011 to 2016), her unit had 16 vacancies. The vacancies remained unfilled for an average of 11 months, and 2 of the vacancies took over 2 years to fill, according to documentation provided by the manager. Another operational unit manager said that since 2014, 3 of the unit's positions were vacant between 8 and 20 months.

Operational unit managers and staff across the units we interviewed reported having taken several steps to address the impact of vacancies and to help ensure forecasts and warnings were issued.<sup>40</sup>

## Managers and Staff Performed Additional Tasks

Managers and staff in operational units with vacancies often performed additional tasks to help ensure forecasts and warnings were issued, according to officials we interviewed in five NWS regional headquarters, the National Centers, and six of eight operational units. For example, managers we interviewed in five of the eight operational units with vacancies that we visited said that they worked forecasting shifts to cover for vacancies. Typically, in a fully staffed operational unit, managers are expected to spend from 10 to 25 percent of their time working forecasting shifts.<sup>41</sup> In one weather forecast office we visited, however, three managers said they worked forecasting shifts above the expected percentage in 2016. For example, the warning coordination meteorologist estimated working around 70 percent of his time on forecasting shifts for about 6 months to cover for vacancies. Similarly, another operational unit we visited had a vacant administrative assistant position for over a year since February 2016. In this instance, the warning coordination meteorologist and the science and operations officer told us that, in addition to their managerial duties, they shared the administrative

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<sup>40</sup>We conducted nine site visits in 2016 to NWS operational units, eight of which had vacancies at the time of our visit. The steps officials in the eight units described taking do not represent all steps taken to help ensure forecasts and warnings are issued in NWS operational units with vacancies but instead provide illustrative examples. In addition, we interviewed officials from all six NWS regional headquarters and the National Centers to provide additional information and illustrative examples, as they are responsible for overseeing multiple operational units.

<sup>41</sup>Three of the management positions in weather forecast offices—the meteorologist-in-charge, the science and operations officer, and the warning coordination meteorologist—are required to remain proficient in meteorology by working forecasting shifts from 10 percent to 25 percent of their time, according to an NWS official.



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assistant's responsibilities, while also working forecasting shifts to cover for other vacancies in the unit.

Operational unit managers and staff were sometimes temporarily promoted to positions of greater responsibility when those positions were vacant, according to officials we interviewed in five NWS regional headquarters and managers in five operational units.<sup>42</sup> For example, they said that a general meteorologist may be temporarily promoted to a lead meteorologist position, allowing that meteorologist to act as a supervisor to other meteorologists.<sup>43</sup> According to data from NOAA's WFMO, NWS operational units made 333 temporary promotions in fiscal year 2016.<sup>44</sup> Officials in one NWS regional headquarters said that making temporary promotions generally does not increase the number of staff available to work forecasting shifts, but rather temporarily shifts a vacancy from one position in the unit to another. In addition, managers and staff are limited by regulations to being temporarily promoted for 120 days in a 12-month period, resulting in managers sometimes promoting several different staff to cover for one vacant position over the course of the vacancy, according to officials in another NWS regional headquarters.<sup>45</sup>

## Managers and Staff Adjusted Their Work Schedules

Managers and staff in operational units with vacancies adjusted their work schedules to cover for vacancies and help ensure forecasts and warnings were issued, according to officials in all six NWS regional headquarters, the National Centers, and seven of the eight operational units we visited. For example, managers in five operational units said that managers and staff worked overtime to cover forecasting shifts and ensure forecasts and

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<sup>42</sup>The NWS collective bargaining agreement states that managers should offer temporary promotions when an employee has performed the work of a higher-graded position for 20 consecutive days. Employees receive a commensurate compensation increase for the duration of the temporary promotion.

<sup>43</sup>According to the position description for lead meteorologists, they serve as shift leaders and are responsible for all NWS service products, warnings, and advisories produced on the forecasting shift, and for coordination with other offices.

<sup>44</sup>Temporary promotions can be used to cover for staffing shortages other than vacancies. For example, if a lead meteorologist is on extended sick leave, an operational unit manager could temporarily promote a general meteorologist into that position.

<sup>45</sup>According to Office of Personnel Management regulations, an agency may make time-limited promotions to fill temporary positions. 5 C.F.R. § 335.102(f). However, if the promotion is to a higher grade position and lasts beyond 120 days, the agency must use competitive procedures to fill the position. 5 C.F.R. § 335.103(c)(1)(i).

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warnings were issued.<sup>46</sup> Typically, NWS uses overtime to increase the number of staff covering forecasting shifts during severe weather. However, when operational units have had vacancies, managers and staff have also worked overtime to cover forecasting shifts during fair weather and additional forecasting shifts during severe weather, according to NWS headquarters officials.<sup>47</sup> Several staff in one operational unit said they frequently worked 15 to 20 consecutive days without a day off to cover for multiple vacancies. In another operational unit, in light of vacancies, three to five employees consistently worked about 100 hours per pay period during fiscal years 2015 and 2016 to ensure forecasts and warnings were issued, according to data provided by the regional director overseeing the unit.

Managers in three operational units we visited said that, because of vacancies, they had reduced the number of staff scheduled for forecasting shifts. For example, a manager in one operational unit with a hydrologist vacancy said he reduced the number of hydrologist shifts during the day from three to two to allow staff to take annual leave during the summer. Another operational unit manager said that because his office was short-staffed, on fair weather days he reduced the number of meteorologists scheduled from two to one, and then scheduled another employee, such as an entry-level meteorologist or a hydrometeorological technician, to ensure that at least two employees were staffed to a forecasting shift.<sup>48</sup> Officials in one NWS regional headquarters said that

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<sup>46</sup>According to the NWS collective bargaining agreement, to receive payment for scheduled overtime, an employee must work in excess of 8 hours in a day, or 40 hours in a week. Operational unit staff may choose to receive compensatory time—time off with pay—rather than overtime. Because of the way NWS collects data on overtime used, NWS officials said they were unable to disaggregate how much overtime was worked by managers and staff to cover for vacancies, as compared with overtime worked to issue forecasts and warnings during severe weather.

<sup>47</sup>According to the NWS collective bargaining agreement, when the operational unit manager determines that a forecasting shift needs to be filled, the following priorities are to be used: (1) use an employee scheduled for a supernumerary (administrative) shift, (2) offer a bargaining unit employee overtime on a voluntary basis, (3) offer management staff overtime, and (4) require a bargaining unit employee to work overtime. The last priority is to be used only if the operational unit manager has no alternative; the employee cannot refuse the assignment.

<sup>48</sup>In an arbitration decision between NWS and the NWS Employees Organization on January 15, 2007, the arbitrator concluded that it is a practice of the weather forecast offices to staff at least two employees to each forecasting shift. Several operational unit managers of weather forecast offices we interviewed said they typically interpret this to mean they are to staff two meteorologists per forecasting shift.

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reducing the number of staff on a forecasting shift during fair weather can be risky because severe weather can occur quickly without sufficient time for the operational unit manager to call in additional staff.

### Managers and Staff Modified Their Leave Schedules

Operational unit managers and staff modified their leave schedules to cover for vacancies and ensure staff were available to issue forecasts and warnings, according to officials in four NWS regional headquarters, the National Centers, and seven operational units we visited. For instance, managers in five operational units said they had denied or cancelled their own or others' planned annual leave because of vacancies in the office.<sup>49</sup> One operational unit manager indicated he cancelled annual leave as a last resort after taking other actions, such as requiring other staff to work overtime, and another manager said she altered her leave plans to allow operational unit staff to take annual leave. Staff in four operational units said that on some occasions they were not able to use annual or sick leave because they worked forecasting shifts to cover for vacancies instead. For example, staff in one operational unit we visited said that no one in the unit was granted annual leave at the end of 2015 to ensure that forecasting shifts would be covered. Staff in two other operational units said that employees were choosing not to take annual or sick leave because they did not want to leave their units short-staffed. Because staff had been unable to use their annual leave, officials in the National Centers and one NWS regional headquarters said some operational unit staff may end up losing some of their annual leave at the end of the year.<sup>50</sup>

### Managers Requested Additional Temporary Staff from Other Operational Units

Managers in four of eight operational units we visited said they had requested additional staff from other operational units through temporary duty assignments to ensure that forecasting shifts were staffed. For example, staff from one operational unit we visited said they had at least one meteorologist at the unit on temporary duty, working forecasting shifts for a 7-month period from 2015 to 2016, to cover for vacant meteorologist positions in the office. To obtain assistance, operational

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<sup>49</sup>According to the NWS collective bargaining agreement, supervisors have the discretion to decide if annual leave may be taken based on the circumstances and staffing needs of the operational unit.

<sup>50</sup>Federal employees may lose annual leave at the end of the year because of the annual leave ceiling, also known as "use or lose." The amount of leave an employee can accrue is capped by an annual leave ceiling (employees stationed in the United States have a leave ceiling of 30 days). Any accrued annual leave in excess of the ceiling will be forfeited if not used by the final day of the leave year. 5 U.S.C. § 6304.

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unit managers are to make requests to their respective NWS regional headquarters.<sup>51</sup> Officials in all six NWS regional headquarters said that some operational units they oversee have requested additional staff to cover forecasting shifts, but their ability to accommodate those requests has been limited by funding and the availability of staff. One regional headquarters official said that to accommodate requests for additional staff to cover forecasting shifts, the region performed fewer outreach activities because those activities are funded by the same account as temporary duty assignments.

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### Management and Staff Cited an Inability at Times to Perform Key Tasks, As Well As Increased Stress and Fatigue

Because operational unit managers and staff were doing work to cover for vacancies, they were unable at times to perform other key tasks, according to officials across the NWS units we interviewed. Examples include the following:

- **Delivering impact-based decision support services.** Managers we interviewed in six of eight operational units with vacancies said that because their units were short-staffed, they had been unable to provide some impact-based decision support services to core partners, such as local and state emergency managers. For example, managers in one operational unit said that given the vacancies in their office, they had been unable to provide in-person forecasting support to local emergency managers or to produce common impact-based decision support service products, such as informational webinars that provide more detailed information on the potential impacts of approaching severe weather. NWS officials said that providing this type of information is important for helping their core partners make decisions—such as the timing and locations for potential evacuations in advance of oncoming storms—that may affect their ability to save lives and property.
- **Obtaining training related to weather forecasting.** Managers in six operational units we visited said that with ongoing vacancies in their operational units, staff were not able to complete critical training related to weather forecasting. This was in part, because managers had reduced or eliminated the number of supernumerary shifts afforded to staff—administrative shifts used by staff to, among other things, complete training. For example, staff in one operational unit said that they had gone from approximately 15 supernumerary shifts

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<sup>51</sup>Funding for temporary duty assignments to cover for vacancies comes out of the NWS regional headquarters' travel budgets, according to NWS officials.

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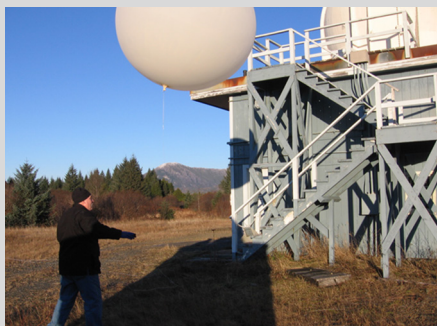
per year when they were fully staffed to 4 shifts per year, because of vacancies. According to staff in four operational units we visited, they were able to complete some, but not all, of their training during forecasting shifts on days with fair weather. Staff in an operational unit that has severe tropical weather said they had been unable to complete tropical weather training in advance of the upcoming hurricane season. Staff said that tropical weather training, though not required, is critical for honing meteorologists' skills for correctly predicting tropical storms and hurricane-related weather. Officials in two NWS regional headquarters said they were concerned about the long-term effects of vacancies on the staffs' forecasting skills.

- **Performing management and administrative activities.**

Operational unit managers were unable to perform certain management or administrative tasks, or were delayed in doing so, because they were covering for vacancies, according to officials in four NWS regional headquarters and the National Centers. For example, officials in one NWS regional headquarters said they have delayed conducting a number of administrative tasks, including processing the region's budget, procurement, travel authorizations, and permanent change of station vouchers, because staff were completing the work of multiple vacant administrative positions. Officials expressed concern about these delays, because they can make monitoring the region's finances difficult. Staff in one operational unit said because their managers were working forecasting shifts and performing other work to cover for vacancies, they were unable to review or approve projects that the staff developed as part of their focal duties. Focal duties, which are outside of meteorologists' regular forecasting tasks, help incorporate new science, technology, and techniques into the unit's operations.

- **Carrying out community outreach and education.** Managers we interviewed in five of eight operational units said their staff had been unable to participate in community outreach and education events because of vacancies in their units. For example, one operational unit manager said that his office had curtailed community outreach and education efforts to have staff cover forecasting shifts left open by vacancies. He said the office had stopped taking applicants for their StormReady and TsunamiReady programs—programs to help communities develop skills to save lives and property when severe

### Conducting Upper Air Observations with Weather Balloons



Every day, twice a day, NWS staff across the United States launch instruments—known as radiosondes—with weather balloons to capture observations from the upper atmosphere. According to NWS documents, conducting upper air observations is important for producing weather forecasts and warnings as it is the primary method of capturing information on temperature, humidity, and other conditions in the upper atmosphere. NWS launches about 70,000 radiosondes a year from 92 NWS locations, twice a day, almost simultaneously at 00:00 and 12:00 Coordinated Universal Time. The data collected by the radiosondes are fed into the computer models used for producing the agency's weather forecasts and warnings. In fiscal year 2017, NWS began testing and evaluating ways to automate the weather balloon launch process, which could eliminate the need for staff to manually launch the balloons, according to NWS headquarters officials.

Source: National Weather Service photo, documents, and officials. | GAO-17-364

weather occurs—because the staff who would normally be working with new participants had instead been working forecasting shifts.<sup>52</sup>

- **Launching weather balloons.** Managers in two operational units said that their staff missed weather balloon launches because of vacancies in their units. For example, managers in one operational unit said during the summer of 2015, on multiple occasions staff were unavailable to launch weather balloons twice a day to collect upper air observations, as instructed by an NWS directive. Staff were unavailable in these instances because they were taking steps to address work resulting from vacancies, such as covering forecasting shifts to monitor the development of severe weather in the area, according to the operational unit manager. When weather balloons are not launched, critical observations from the upper air atmosphere are not collected and entered into the computer models that produce forecasts and warnings.
- **Maintaining equipment.** One operational unit manager we interviewed said that as of fiscal year 2016 the unit had been unable to replace damaged precipitation gauges with new equipment because one electronic technician position has been vacant. According to the manager, precipitation gauges are important because they provide official recordings of rainfall that are used to calibrate radar precipitation estimates and track rainfall to assess the need for flood and flash flood warnings (see fig. 3).

<sup>52</sup>According to NWS documents, NWS's StormReady program helps educate communities on the communication and safety skills needed to save lives and property and helps community leaders and emergency managers strengthen local safety programs. NWS's TsunamiReady program promotes tsunami hazard preparedness as an active collaboration among federal, state, and local emergency management agencies, community leaders, and the public.

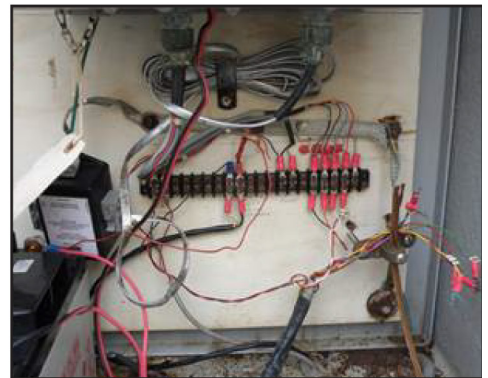
**Figure 3: A Damaged Precipitation Gauge Used by the National Weather Service (NWS) That Was Not Repaired as of Fiscal Year 2016**



This precipitation gauge was installed without cement at its base to keep the enclosure mounted, which caused it to lean over time.



The gauge has a damaged latch.



The gauge is missing the conduit and compression connections, and moisture has entered the enclosure from a bad seal that has rusted.

Source: National Weather Service. | GAO-17-364

Note: According to the NWS operational unit manager responsible for this equipment, staff have been unavailable to repair the damaged precipitation gauge because one of their electronic technician positions has been vacant. Precipitation gauges provide official recordings of rainfall that are used to calibrate radar precipitation estimates and track rainfall to assess the need for flood and flash flood warnings, according to the manager.

In addition, officials we interviewed in most NWS regional headquarters, the National Centers, and four operational units indicated that operational unit managers and staff experienced stress, fatigue, and reduced morale resulting from their efforts to cover for vacancies. For example, officials in two regional headquarters said that managers and staff in operational units with vacancies had continued to meet their critical mission of issuing forecasts and warnings in large part because of their dedication and commitment to the NWS mission. But the long-term result has been that employees are fatigued and morale is low, according to the officials. An official in another NWS regional headquarters said that staff are getting

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worn down covering extra forecasting shifts because of vacancies in operational units that, in some instances, have lasted for a few years. One operational unit manager we interviewed said staff in his unit were demoralized because they had continued to cover the workload for multiple vacancies. Additionally, staff we interviewed at two operational units said that because positions remain vacant for extended periods, staff are concerned that the agency may be intentionally leaving vacant positions open to downsize the number of staff across operational units. These staff said this perception has negatively affected their morale. NWS headquarters officials acknowledged that vacancies had created challenges and stress for operational unit managers and staff.

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## NOAA's WFMO Makes Limited Information Available to NWS Operational Unit Managers on the Status of Hiring Requests

WFMO makes available limited information on the status of hiring requests as the requests move through the phases of the hiring process. Through interviews and supporting documentation, we identified the following three phases of the NWS hiring process: (1) a regional headquarters or the director's office of the National Centers enters a hiring request into WFMO's data system;<sup>53</sup> (2) a job announcement is developed and posted, applicants are interviewed, and a candidate is selected; and (3) the selected candidate enters on duty at NWS (see fig. 4).<sup>54</sup>

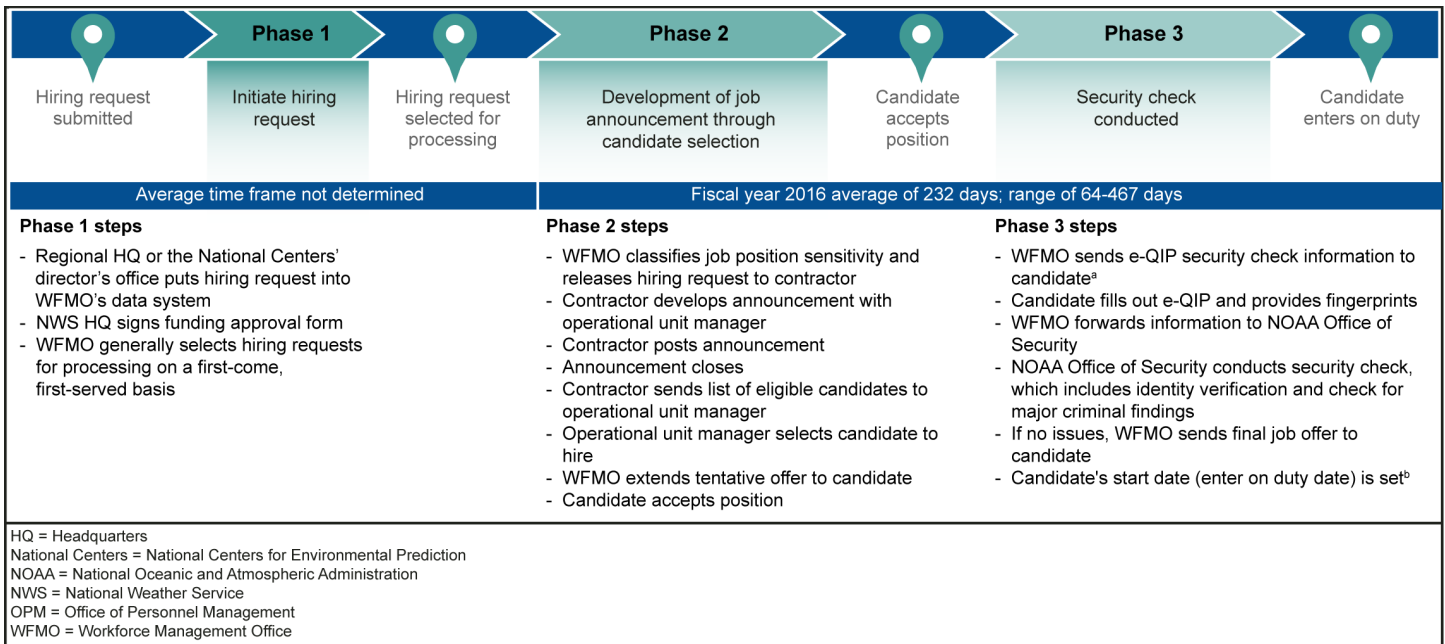
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<sup>53</sup>WFMO's data system—the Recruitment Analysis Data System—is WFMO's electronic system for maintaining hiring-related information throughout the hiring process.

<sup>54</sup>According to WFMO officials, after a selected candidate enters on duty, depending on the sensitivity level of the position, the candidate may also be required to undergo a more thorough background investigation, in addition to the security check conducted during phase 3 of the hiring process. The background investigation is coordinated through NOAA's Office of Security, and the investigation is completed by the Office of Personnel Management. WFMO officials said continued employment at NWS is contingent upon the candidate successfully clearing the background investigation. NOAA's Office of Security officials said background investigations generally are completed within a year. We do not include the background investigation in our discussion of the three phases of the hiring process because the investigation does not have to be completed before a selected candidate enters on duty.



**Figure 4: Hiring Process at the National Oceanic and Atmospheric Administration for the National Weather Service**



Source: GAO analysis of National Oceanic and Atmospheric Administration documents and interviews with agency officials. | GAO-17-364

Notes: Before phase 1, operational unit managers who seek to hire for a specific position must submit their hiring request to regional headquarters or the director's office of the National Centers, as appropriate, for approval.

We developed this flow chart to describe the phases of NOAA's hiring process for NWS from the perspective of the operational unit manager. This flow chart is not meant to align with OPM's hiring process model included in its End-to-End Hiring Process Roadmap. According to OPM documents, the roadmap lays out the steps and ideal time frames for the federal hiring process. It is used by OPM and others to, among other things, measure the length of the hiring process at federal agencies. Average time frames for phase 1 of the hiring process are not determined because WFMO does not measure or report this information. WFMO officials explained that they do not consider phase 1 to be part of the hiring process as defined by OPM's End-to-End Hiring Process Roadmap.

<sup>a</sup>e-QIP is an OPM web-based automated system designed to facilitate processing standard investigative forms used for conducting background investigations for federal security, suitability, fitness, and credentialing purposes. e-QIP allows candidates to electronically enter, update, and transmit their personal investigative data over a secure Internet connection to a requesting agency.

<sup>b</sup>According to WFMO officials, after a selected candidate enters on duty, depending on the sensitivity level of the position, the candidate may also be required to undergo a more thorough background investigation, in addition to the security check conducted in phase 3. The background investigation is coordinated through the NOAA Office of Security, but the investigations are completed by OPM. Continued employment at NWS is contingent upon the candidate successfully clearing the background investigation.

Operational unit managers we interviewed said that information on the status of their hiring requests was critical to their ability to allocate resources and manage work schedules. It is also particularly important in light of the length of the hiring process, which, according to some

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operational unit managers, has sometimes taken as long as 2 years. WFMO data for fiscal year 2016 show that the time it took to fill hiring requests once they were selected for processing averaged 232 days (around 8 months) and ranged from 64 to 467 days.<sup>55</sup>

On the basis of our interviews with NOAA's WFMO and NWS headquarters and operational units, we determined that limited information on the status of hiring requests is available. For example, during phase 1 of the hiring process—from when a regional headquarters or the director's office of the National Centers enters a hiring request into WFMO's data system to when the request is selected for processing—information on the status of the hiring request is not made available to operational unit managers. After NWS headquarters' approval, hiring requests are entered into the data system where they are then generally selected for processing in the order they are received. However, WFMO does not make available information to operational unit managers on when a request is likely to be selected for processing. The WFMO director said that the data system is unsophisticated and was not designed for reporting the length of time that hiring requests remain in the system or how many are likely to be processed before a specific request is selected for processing.

For phases 2 and 3 of the hiring process—from when the hiring request is selected for processing by WFMO to the time the newly hired staff enters on duty at NWS—the data system tracks and makes accessible to operational unit managers some information on the status of their hiring requests. Specifically, operational unit managers can log into the data system and view the status of their individual hiring requests once they have been selected for processing. For example, a manager can access the data system to see when a job opening was announced and the date when the announcement will close. However, WFMO officials acknowledged that some data fields in the system, such as job announcement open and close dates, have not consistently been updated in real time. According to the WFMO director, this occurs, in part, because contractors—who are largely responsible for making these

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<sup>55</sup>This example does not include data on phase 1 of the hiring process because WFMO does not measure or report this information. WFMO officials explained that they do not consider phase 1 to be part of the hiring process as defined by OPM's End-to-End Hiring Process Roadmap. OPM has established a time-to-hire target of 80 days for all federal agencies; however, evaluating the length of the hiring process at NWS was outside the scope of our review.

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updates—use a different system that is not integrated with the data system, and updating the WFMO’s system requires additional steps that contractors do not always take when they have heavy workloads and time constraints.

Additionally, information related to the security check process, which occurs at the end of phase 3, is not available in the data system because the system is not set up to track the steps involved in the security check. The NOAA Office of Security is responsible for processing security checks, and its data system is not integrated with WFMO’s data system. Officials we interviewed from the six regional headquarters and the National Centers, as well as several operational unit managers, characterized the security check part of the hiring process as lengthy, opaque, and difficult to track. For example, officials from one regional headquarters said they contacted WFMO to see where their candidate was in the security check process and were referred to the NOAA Office of Security, which told them that the security check had been completed weeks earlier. These regional headquarters officials cited this experience as an example of communication challenges arising between two organizational departments whose systems are not integrated. Similarly, some NWS operational unit managers said they were unable to obtain information about where their candidate was in the security check process from either the NOAA Office of Security or WFMO. The NOAA Office of Security director said he is aware of confusion about the security check process and, as a result, started providing NOAA-wide informational briefings in June 2016, with the goal of increasing transparency about his office’s functions and interaction with WFMO.

Officials we interviewed from most regional headquarters and several operational unit managers said it is often difficult to obtain information on hiring requests from WFMO staff. In particular, several operational unit managers said that they have been unable to obtain updates through telephone or e-mail communications with WFMO staff, and several officials described WFMO and the hiring process as a “black hole” for information. According to a WFMO policy document, human capital specialists should respond to telephone calls and e-mails as part of their regular duties. However, the WFMO director added that since sequestration, WFMO has been understaffed, and the human capital specialists have been unable to fully manage their workload, including returning telephone calls and e-mails to respond to requests for information. Most operational unit managers we interviewed said it is difficult to allocate resources and develop work schedules without information about the status of their hiring requests, which would help

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them estimate how long the hiring process may take and, therefore, when they might expect new staff to enter on duty.

According to federal standards for internal control, management should internally communicate the necessary quality information to achieve the entity's objectives.<sup>56</sup> For example, management communicates quality information down and across reporting lines to enable personnel to perform key roles. This could include communicating information to operational unit managers on the status of their hiring requests throughout the hiring process, which could help managers effectively plan and distribute their unit's workload.

The WFMO director acknowledged the difficulty operational unit managers have had in obtaining complete and timely information, and said that as part of the broader Commerce-wide effort to transition to ESO for processing hiring requests, WFMO is providing support in the development of a new Commerce-wide data system. In developing the system, officials said they are exploring ways to enhance information available to managers. For example, WFMO officials said that a new system could automatically update certain milestones as they occur, which would enhance the timeliness and quality of information available to operational unit managers. The WFMO director said the Department of Commerce plans to develop the new system, potentially in 2017, but the design and capabilities have yet to be finalized. In the interim, without access to complete and real-time information on the status of their requests throughout the three phases of the hiring process, NWS operational unit managers are limited in their ability to plan for and distribute their unit's workload in the most efficient and effective manner.

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<sup>56</sup>[GAO-14-704G](#).

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## NOAA's WFMO and NWS Have Taken Some Actions to Help Address the Hiring Backlog but Have Not Evaluated These Actions

NWS has faced challenges in supporting its goal of sustaining a highly skilled workforce in part because of its hiring backlog, according to NWS headquarters officials we interviewed.<sup>57</sup> To help address the hiring backlog, NOAA's WFMO and NWS are taking several actions, including the following.

- **Employing contractors to process hiring actions.** Beginning in June 2014, WFMO started using contractors to process the majority of NWS's hiring requests. It did so because WFMO staff were unable to meet the demand for processing hiring requests as a result of a number of resource-related factors, including being short-staffed, according to WFMO officials. However, the contractors have been unable to fully meet NWS's demand. For example, the primary contractor generally processed about 50 hiring-related actions per month for NWS and another NOAA agency, representing a fraction of NWS hiring requests in the system, according to WFMO officials.<sup>58</sup> Additionally, the officials said that though WFMO has begun transitioning toward using the Commerce-wide ESO for hiring, it has faced challenges with the transition because of funding limitations. WFMO's director said that until funding becomes available and ESO is fully established, WFMO will continue using contractors to help process hiring requests for NWS. NWS officials expressed concern that once the transition to ESO is complete, the move away from contractors who are focused on NWS and another NOAA agency toward one serving all Department of Commerce agencies may increase NWS's hiring backlog, as more NOAA agencies will be vying for the same services from a single contractor.
- **Combining multiple hiring requests into a single job announcement.** In March 2015, NWS began identifying hiring requests for similar positions and requesting that WFMO process those requests in bundles instead of individually, as had been past practice. For example, in July 2016, NWS combined hiring requests for 30 entry-level meteorologist positions at 24 locations into a single job announcement. While the announcement was open, six more

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<sup>57</sup>National Oceanic and Atmospheric Administration, National Weather Service, *Strategic Plan: Building a Weather-Ready Nation* (Silver Spring, MD: June 2011). One of six goals in NWS's plan is sustaining a highly skilled, professional workforce equipped with the training, tools, and infrastructure to accomplish its mission.

<sup>58</sup>The contractor processed hiring actions for NWS and for the National Marine Fisheries Service, which as of December 2016 were the two NOAA agencies with the greatest hiring needs, according to WFMO officials.

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hiring requests were approved, and NWS was then able to fill 36 positions from the combined announcement. Combining job announcements for similar positions is intended to accelerate and streamline hiring, according to NWS officials.

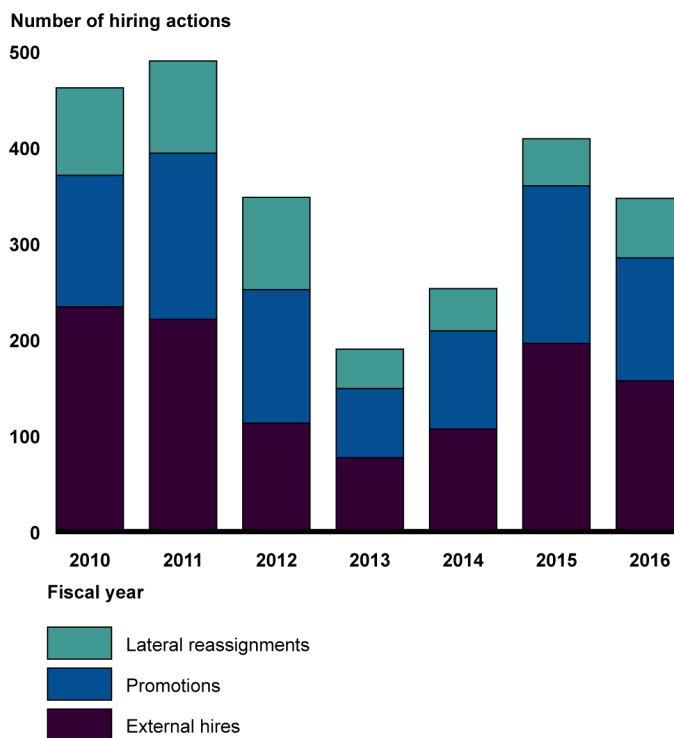
- **Developing an inventory of lead meteorologist candidates.** In June 2015, NWS issued a lead meteorologist job announcement—a position NWS typically fills by hiring internal general meteorologists—to develop an inventory of qualified candidates. The job announcement was open for 1 year, and applicants could identify specific operational units they wanted to be considered for, even if those units did not have a vacancy at that time. Once an operational unit had a vacancy that was approved to fill, the manager could request a list of qualified and interested candidates from the inventory to interview and potentially hire. Previously, vacant lead meteorologist positions were advertised through individual job announcements, each of which required a unique job announcement and subsequent hiring action. NWS officials said they plan to continue using this inventory approach to fill lead meteorologist positions by posting one announcement biannually or annually to maintain a current inventory of qualified candidates. By developing this inventory through one announcement, NWS officials said the process of identifying qualified candidates is more efficient, and operational units may be able to fill vacant positions more quickly.
- **Limiting entry-level job announcements to external candidates.** In July 2016, NWS changed the way it announced its entry-level meteorologist positions—the positions with the highest vacancy rate across weather forecast offices at the time—so that these positions would be available exclusively to candidates outside the agency. NWS officials said they made this change because previously NWS often hired internal candidates to fill open entry-level meteorologist positions, which filled a vacancy in one location but created a vacancy in another.<sup>59</sup> According to our analysis of WFMO data, during fiscal years 2010 through 2016, over half of all NWS hiring actions were for internal candidates. Of these, about two-thirds were for promotions, and about one-third were for lateral reassignments, which typically involve staff keeping the same position but moving to a different operational unit—such as current entry-level meteorologists accepting

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<sup>59</sup>According to an NWS official, a memorandum of understanding between NWS management and the NWS Employees Organization enables entry-level meteorologists and certain other staff to change operational units through a new internal lateral reassignment process rather than through a job announcement.

a position in a new unit (see fig. 5 for an annual breakdown of NWS hiring actions).<sup>60</sup> Additionally, according to NWS data, 42 percent of the agency's workforce will be eligible to retire by 2020. Therefore, NWS officials said they recognized the need to bring in new employees to the agency. They also noted that limiting entry-level hiring to external candidates is intended to help increase the overall number of employees, reduce the number of vacancies, and reduce the number of hiring actions to be processed by WFMO.

**Figure 5: Types of National Weather Service (NWS) Hiring Actions, Fiscal Years 2010 through 2016**



Source: GAO analysis of National Oceanic and Atmospheric Administration Workforce Management Office data. | GAO-17-364

Note: NWS internal hiring actions can include lateral reassignments, promotions, and changes to a lower grade. Lateral reassignments can involve staff keeping the same position but moving to a different operational unit. Changes to a lower grade are rare, accounting for 5 percent of all hiring actions from fiscal year 2010 through 2016, according to agency data. Therefore, we have excluded them from this analysis.

<sup>60</sup>According to NWS officials, staff can be promoted in their own operational unit if a position is available; otherwise, they may need to move to another operational unit to obtain a promotion.

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- **Exploring a change in the entry-level meteorologist promotion process.** NWS is exploring changing its promotion process so that entry-level meteorologists will be able to progress to general meteorologists based on merit promotion criteria. The current process requires entry-level meteorologists to apply through a competitive announcement, which requires WFMO to post a job announcement and complete the associated hiring action. The change under consideration would allow entry-level meteorologists to accept a promotion while staying in their current operational unit, rather than requiring them to change units to obtain a promotion—which occurs if no openings are available in their unit. According to our analysis of NWS data, 35 percent of the agency’s hiring actions from fiscal year 2010 through 2016 were for promotions. NWS officials we interviewed said that the change under consideration may help reduce the human capital workload and, in turn, help reduce the hiring backlog. NOAA officials indicated that they plan to begin implementing this change late in fiscal year 2018 for meteorologist positions in weather forecast offices and some National Centers.

NWS headquarters officials stated that reducing the hiring backlog is a high priority but that they have not evaluated the extent to which their hiring actions have helped reduce the hiring backlog or helped to achieve their goal of sustaining a highly skilled workforce. Under federal standards for internal control, management should design control activities, such as comparing actual performance with planned or expected results and analyzing significant differences, to achieve objectives.<sup>61</sup> NWS officials said they believe the hiring actions to date have helped allow the agency to streamline hiring but said they have not evaluated the actions. However, the officials added that they intend to develop a strategic human capital plan with WFMO’s assistance that may, in part, provide a framework for integrating and evaluating the effectiveness of the various hiring actions. The officials said they do not have a time frame for developing such a plan because WFMO staff will be unavailable until the transition to using ESO is complete, and they are uncertain when that will happen. In the interim, by evaluating whether its actions are reducing the hiring backlog or achieving the goal of sustaining a highly skilled workforce, NWS would have better assurance that its actions were achieving expected results and could better determine where to devote resources.

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<sup>61</sup>[GAO-14-704G](#).



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## Conclusions

In light of vacancies that have increased since fiscal year 2010, NWS operational managers and staff have taken several steps to help ensure forecasts and warnings are issued. However, in taking these steps, managers and staff have faced challenges, including an inability at times to complete key tasks, and have experienced stress, fatigue, and reduced morale. WFMO and NWS officials recognize the need to fill vacant positions across NWS operational units, but the hiring process has been lengthy and WFMO makes limited information available to managers on the status of requests. This has limited managers' ability to effectively plan and distribute workloads. WFMO officials agree that it is important to provide complete and timely information to managers, and said that, as WFMO moves to using a new Commerce-wide data system, they may be able to enhance the information that is made available to operational unit managers during the hiring process. In the interim, without access to complete and real-time information on the status of their requests throughout the three phases of the hiring process, NWS operational unit managers are limited in their ability to plan for and distribute their units' workload in the most efficient and effective manner.

Additionally, WFMO and NWS are taking several actions intended to streamline hiring, but NWS has not evaluated the success of these actions in reducing the hiring backlog or achieving the goal of sustaining a highly skilled workforce. NWS intends to develop a strategic human capital plan that may, in part, provide a framework for integrating and evaluating the effectiveness of the various hiring actions, but officials do not have a time frame for its development. In the interim, by evaluating whether its actions are reducing the hiring backlog or achieving the goal of sustaining a highly skilled workforce, NWS would have better assurance that its actions were achieving expected results and could better determine where to devote resources.

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## Recommendations for Executive Action

We recommend that the Secretary of Commerce take the following two actions:

To enhance information available to operational unit managers, we recommend that the Secretary of Commerce direct the director of NOAA's WFMO to ensure that complete information on hiring requests is routinely communicated to NWS managers throughout the three phases of the hiring process, such as by supporting the development of improved tracking and reporting capabilities in the planned new Commerce-wide data system.

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To help ensure NWS's hiring actions are achieving expected results, we recommend the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to evaluate the extent to which NWS's actions are reducing the hiring backlog and achieving the goal of sustaining a highly skilled workforce; for example, NWS could evaluate these actions as part of the development of its strategic human capital plan.

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## Agency Comments

We provided a draft of this report for review and comment to the Department of Commerce. The Department of Commerce transmitted written comments from NOAA, which are reproduced in appendix V. NOAA agreed with our recommendations, and stated that the report provides a factual account of the status of NWS hiring, efforts NWS and WFMO have taken to expedite hiring, the resources challenges NWS and WFMO have faced, and the impact that understaffing has had on the NWS's ability to carry out its mission. NOAA agreed with our two recommendations to communicate complete information on hiring requests and evaluate the extent to which NWS's actions are reducing the hiring backlog; regarding the first, NOAA stated that WFMO will work with ESO to continue to develop the requirements and tools needed to track human capital service delivery. NOAA also provided technical comments, which we incorporated as appropriate.

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We are sending copies of this report to the appropriate congressional committees, the Secretary of Commerce, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or [fennella@gao.gov](mailto:fennella@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff members who made key contributions to this report are listed in appendix VI.



Anne-Marie Fennell  
Director, Natural Resources and Environment

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# Appendix I: Objectives, Scope, and Methodology

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Our objectives were to examine (1) information available on vacancies at National Weather Service (NWS) operational units for fiscal years 2010 through 2016; (2) steps, if any, NWS operational unit management and staff have taken to address the impact of vacancies at their units; (3) the extent to which National Oceanic and Atmospheric Administration's (NOAA) Workforce Management Office (WFMO) makes information available to operational unit managers on the status of hiring requests; and (4) the extent to which NOAA's WFMO and NWS are taking actions to address the hiring backlog at operational units.

To conduct our work, we reviewed relevant laws and NOAA, WFMO, and NWS policies, directives, and other documents. We also reviewed congressionally requested studies, including studies by the National Academy of Sciences and National Academy of Public Administration.<sup>1</sup> To define NWS operational units for the purposes of this report, we developed criteria based on our review of documents and interviews with knowledgeable NWS officials. We defined NWS operational units as all units in any category of units (e.g. weather forecast offices) in which at least one of the units met at least two of the following three criteria: (1) issues forecasts, (2) issues warnings, and (3) has personnel that are essential emergency employees.<sup>2</sup> We analyzed a list of NWS essential emergency employees by operational unit, and cross-referenced this list with information on which units issue forecasts or warnings to determine

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<sup>1</sup>National Academy of Sciences, Committee on the Assessment of the National Weather Service's Modernization Program, *The National Weather Service Modernization and Associated Restructuring: A Retrospective Assessment* (Washington, D.C.: National Academies Press, 2012); National Academy of Sciences, Committee on the Assessment of the National Weather Service's Modernization Program, *Weather Services for the Nation: Becoming Second to None* (Washington, D.C.: National Academies Press, 2012); and National Academy of Public Administration, *Forecast for the Future: Assuring the Capacity of the National Weather Service* (Washington, D.C.: May 2013).

<sup>2</sup>Data on the number of NWS employees exclude fully reimbursable positions for which the agency receives funding from other federal agencies, interns hired through the Pathways internship program (a federal internship program that provides employment opportunities to current students or recent graduates), and temporary positions. We excluded fully reimbursable positions and Pathways intern positions because NWS does not include those positions in its request for appropriations. We also excluded temporary positions because the agency creates these positions to temporarily promote staff into vacant positions after which the temporary positions are eliminated.

which units met our criteria.<sup>3</sup> As long as one of the operational units in a particular unit category met our criteria, we included all of the units in the category in our analysis. On the basis of these criteria, we identified six categories of operational units and a total of 168 individual operational units (see table 2). Appendix II provides a complete list of the operational units included in our scope.

**Table 2: National Weather Service (NWS) Operational Unit Categories and Number of Units Included in GAO’s Review**

Operational unit category	Number of operational units
Weather forecast offices	122
Weather service offices	15
River forecast centers	13
National Centers for Environmental Prediction (National Centers) and the director’s office of the National Centers	10
Regional headquarters	6
Tsunami warning centers	2
<b>Total</b>	<b>168</b>

Source: GAO analysis of National Weather Service data. | GAO-17-364

To examine the information available on vacancies at NWS operational units for fiscal years 2010 through 2016, we obtained data for the end of those fiscal years from the agency’s organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled.<sup>4</sup> We calculated the number of vacancies—which we define as unfilled positions—and vacancy rates by dividing the number of unfilled positions by the total

<sup>3</sup>Department of Commerce guidance describes an “emergency employee” as one who occupies a position that has been determined to be critical—i.e., a job that may be vital to public health, safety, welfare, national defense, or the operation of essential facilities or functions. Office of Personnel Management guidance defines “emergency employees” as those who must report for work in emergency situations—e.g., severe weather conditions, interruption of public transportation, and other situations in which significant numbers of employees are prevented from reporting for work or that require agencies to close all or part of their operations. NWS sometimes refers to these employees as “excepted” or “emergency-essential.” For the purposes of this report, we refer to such employees as “essential emergency employees.”

<sup>4</sup>NWS provided us with two sets of organizational table data for fiscal years 2010 through 2016. For fiscal years 2014 through 2016, NWS provided data at the NWS operational unit level by position title, grade, and series. For fiscal years 2010 through 2013, NWS could not provide that level of detail while maintaining confidence in the reliability of the data; therefore, the agency provided data generally aggregated at the regional and National Centers levels.

number of positions for each fiscal year, operational unit category, and position type. To assess the reliability of NWS's organizational table data, we reviewed relevant documentation and interviewed knowledgeable NWS and NOAA officials about how data are entered and maintained. We also conducted a review of the organizational table data for obvious errors and completeness. On the basis of this review, we determined that the data were sufficiently reliable for the purposes of reporting available information on the number of vacancies across NWS operational units.

We also reviewed data NWS provided that adjusted information from the organizational table to factor in the level of positions the agency indicated it had resources to support. NWS developed these data because, according to NWS officials, the organizational table does not reflect resources the agency had available to fill many of the vacancies. However, the additional data the agency prepared did not identify which positions listed on the organizational table it did not have resources to fill. Rather, NWS developed these data by proportionally distributing vacancies across the operational units to show the number of positions the agency had resources to fill, according to NOAA and NWS officials. At an agencywide level (across all operational units collectively), these data were helpful to see the vacancy levels NWS estimated having, based on its resource levels. However, we determined that the additional data did not provide an accurate reflection of vacancies for a particular unit or position type and did not reflect how NWS has been managing its staffing levels or vacancies. In particular, the regional headquarters and director's office of the National Centers have discretion to allocate resources according to their needs, including identifying which positions to leave vacant to ensure they do not exceed available resources, according to NWS headquarters officials. They do not, according to officials at regional headquarters and the director's office of the National Centers, spread vacancies proportionally across their operational units. Given these limitations, we report data directly from the organizational table as described above.

To examine any steps NWS operational unit management and staff have taken to address the impact of vacancies at their units, we conducted interviews and obtained documentation when available from officials from the six NWS regional headquarters and nine National Centers and the

director’s office.<sup>5</sup> In addition, we visited a nongeneralizable sample of nine operational units across the United States that were selected to represent a range in (1) the number of vacancies in the unit; (2) the types of weather typical for the unit’s area of coverage, as demonstrated by types of forecasts produced; (3) the size of the population of the warning area covered by the unit; (4) the region in which the unit is located; and (5) the category of operational unit.<sup>6</sup> Table 3 shows the operational units we selected and visited during our review. During our site visits we conducted separate interviews with management and staff and analyzed available documentation to corroborate steps they described having taken to address the impact of vacancies.<sup>7</sup> The results from our interviews and site visits cannot be generalized to those operational units and employees we did not interview but rather provide illustrative examples of steps being taken to address vacancies.

**Table 3: National Weather Service Operational Units Visited, February through July, 2016**

NWS region or National Centers For Environmental Prediction	Operational unit name	State
Central	Pueblo Weather Forecast Office	Colorado
	Denver/Boulder Weather Forecast Office	Colorado
Eastern	Philadelphia Weather Forecast Office	New Jersey <sup>a</sup>
	Middle Atlantic River Forecast Center	Pennsylvania
	Central Pennsylvania Weather Forecast Office	Pennsylvania
Southern	Miami Weather Forecast Office	Florida
	Tallahassee Weather Forecast Office	Florida
Western	Seattle Weather Forecast Office	Washington
National Centers for Environmental Prediction	National Hurricane Center	Florida

Source: GAO. | GAO-17-364

<sup>a</sup>The official name of the weather forecast office located in New Jersey is the Philadelphia Weather Forecast Office.

<sup>5</sup>Our interviews with officials from the six NWS regional headquarters and the director’s office of the National Centers provided additional context and examples, as they are responsible for overseeing multiple operational units.

<sup>6</sup>The data used to determine the number of vacancies in operational units we selected were provided by NWS as of March 5, 2016.

<sup>7</sup>During our site visits, operational unit staff were given the opportunity to meet with us in person, talk to us on the telephone, or provide written responses to our questions.

We analyzed the information we obtained from our interviews and site visits to identify themes and develop a summary of the types of impacts from vacancies and any steps management and staff have taken to address vacancies.

We also collected and analyzed data on the number of temporary promotions for fiscal years 2010 through 2016 from NOAA's WFMO to obtain additional context, as temporary promotions were commonly cited as an action taken to address vacancies in operational units we visited. To assess the reliability of these data, we interviewed knowledgeable NWS and NOAA officials and reviewed relevant documentation. We determined that the data were sufficiently reliable for the purposes of our report.

To examine the extent to which NOAA's WFMO makes information available to operational unit managers on the status of hiring requests and the extent to which NOAA's WFMO and NWS have taken actions to address the hiring backlog at operational units, we examined documentation regarding the process for hiring at NWS operational units, as well as any actions NWS and WFMO have taken to address the hiring backlog. We analyzed available data on NWS and WFMO attrition, the number and types of hiring actions completed by WFMO and its contractors for NWS, and data on the amount of time it took to complete NWS hiring actions for fiscal years 2010 through 2016. According to a WFMO official, these data were not available at the operational unit level; therefore, we analyzed them for all NWS employees. To assess the reliability of these data, we reviewed relevant documentation, interviewed knowledgeable NWS and NOAA officials, and reviewed the data for obvious errors and completeness. We determined that the data were sufficiently reliable for the purposes of reporting the number and types of hiring actions and the amount of time the hiring actions took from fiscal years 2010 through 2016.

We interviewed NWS and WFMO officials regarding ongoing and planned actions to address the hiring backlog. We also interviewed officials from NOAA's Office of Security, which is directed by the Department of Commerce's Office of Security, regarding the process for completing security checks and background investigations as well as to determine the information available to operational unit managers during the security check step of the hiring process. In addition, we interviewed officials from the NOAA Budget Office and the Enterprise Services Organization about NOAA's transition to a shared services model. Finally, we compared activities related to information WFMO makes available to operational unit

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managers, as well as information on actions NWS and WFMO have taken to address the hiring backlog, with federal standards for internal control.<sup>8</sup>

We conducted this performance audit from November 2015 to May 2017 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>8</sup>GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#). (Washington, D.C.: Sept. 10, 2014).



# Appendix II: National Weather Service Operational Units, by Operational Unit Category and Location

**Table 4: National Weather Service's (NWS) 168 Operational Units**

<b>NWS region or National Centers for Environmental Prediction</b>	<b>Operational unit category</b>	<b>Operational unit name</b>	<b>State/Territory</b>
Alaska	Regional Headquarters	Alaska Regional Headquarters	Alaska
	River Forecast Center	Alaska-Pacific	Alaska
	Tsunami Warning Center	National Tsunami Warning Center	Alaska
	Weather Forecast Offices	Anchorage	Alaska
		Fairbanks	Alaska
		Juneau	Alaska
	Weather Service Offices	Annette Island	Alaska
		Barrow	Alaska
		Bethel	Alaska
		Cold Bay	Alaska
		King Salmon	Alaska
		Kodiak	Alaska
		Kotzebue	Alaska
		McGrath	Alaska
		Nome	Alaska
		St. Paul Island	Alaska
Valdez	Alaska		
Yakutat	Alaska		
Central	Regional Headquarters	Central Regional Headquarters	Missouri
	River Forecast Centers	Missouri Basin	Missouri
		North Central	Minnesota
	Weather Forecast Offices	Aberdeen	South Dakota
		Bismarck	North Dakota
		Central Illinois	Illinois
		Cheyenne	Wyoming
		Chicago	Illinois
		Denver/Boulder	Colorado
		Des Moines	Iowa
		Detroit	Michigan
		Dodge City	Kansas
		Duluth	Minnesota
		Eastern North Dakota	North Dakota
Goodland		Kansas	
Grand Island	Nebraska		

**Appendix II: National Weather Service  
Operational Units, by Operational Unit  
Category and Location**

<b>NWS region or National Centers for Environmental Prediction</b>	<b>Operational unit category</b>	<b>Operational unit name</b>	<b>State/Territory</b>
		Grand Junction	Colorado
		Grand Rapids	Michigan
		Green Bay	Wisconsin
		Indianapolis	Indiana
		Jackson	Kentucky
		Kansas City	Missouri
		La Crosse	Wisconsin
		Louisville	Kentucky
		Marquette	Michigan
		Milwaukee	Wisconsin
		Minneapolis	Minnesota
		North Central Lower Michigan	Michigan
		North Platte	Nebraska
		Northern Indiana	Indiana
		Omaha	Nebraska
		Paducah	Kentucky
		Pueblo	Colorado
		Quad Cities	Iowa
		Rapid City	South Dakota
		Riverton	Wyoming
		Sioux Falls	South Dakota
		Springfield	Missouri
		St. Louis	Missouri
		Topeka	Kansas
		Wichita	Kansas
	Weather Service Offices	Evansville	Indiana
		Williston	North Dakota
Eastern	Regional Headquarters	Eastern Regional Headquarters	New York
	River Forecast Centers	Middle Atlantic	Pennsylvania
		Northeast	Massachusetts
		Ohio	Ohio
	Weather Forecast Offices	Albany	New York
		Baltimore/Washington	Virginia
		Binghamton	New York
		Boston	Massachusetts
		Buffalo	New York

**Appendix II: National Weather Service  
Operational Units, by Operational Unit  
Category and Location**

<b>NWS region or National Centers for Environmental Prediction</b>	<b>Operational unit category</b>	<b>Operational unit name</b>	<b>State/Territory</b>
		Burlington	Vermont
		Caribou	Maine
		Central Pennsylvania	Pennsylvania
		Charleston	West Virginia
		Charleston	South Carolina
		Cincinnati	Ohio
		Cleveland	Ohio
		Columbia	South Carolina
		Greenville-Spartanburg	South Carolina
		Morehead City	North Carolina
		New York	New York
		Philadelphia	New Jersey
		Pittsburgh	Pennsylvania
		Portland	Maine
		Raleigh	North Carolina
		Roanoke	Virginia
		Wakefield	Virginia
		Wilmington	North Carolina
Pacific	Regional Headquarters	Pacific Regional Headquarters	Hawaii
	Tsunami Warning Center	Pacific Tsunami Warning Center	Hawaii
	Weather Forecast Offices	Guam Island	Guam
		Honolulu	Hawaii
	Weather Service Office	Pago Pago	American Samoa
Southern	Regional Headquarters	Southern Regional Headquarters	Texas
	River Forecast Centers	Arkansas-Red Basin	Oklahoma
		Lower Mississippi	Louisiana
		Southeast	Georgia
		West Gulf	Texas
	Weather Forecast Offices	Albuquerque	New Mexico
		Amarillo	Texas
		Atlanta	Georgia
		Austin/San Antonio	Texas
		Birmingham	Alabama
		Brownsville	Texas
		Corpus Christi	Texas
		El Paso	New Mexico

**Appendix II: National Weather Service  
Operational Units, by Operational Unit  
Category and Location**

<b>NWS region or National Centers for Environmental Prediction</b>	<b>Operational unit category</b>	<b>Operational unit name</b>	<b>State/Territory</b>
		Fort Worth/Dallas	Texas
		Houston	Texas
		Huntsville	Alabama
		Jackson	Mississippi
		Jacksonville	Florida
		Key West	Florida
		Knoxville/Tri-Cities	Tennessee
		Lake Charles	Louisiana
		Little Rock	Arkansas
		Lubbock	Texas
		Melbourne	Florida
		Memphis	Tennessee
		Miami	Florida
		Midland	Texas
		Mobile	Alabama
		Nashville	Tennessee
		New Orleans/Baton Rouge	Louisiana
		Oklahoma City/Norman	Oklahoma
		San Angelo	Texas
		San Juan	Puerto Rico
		Shreveport	Louisiana
		Tallahassee	Florida
		Tampa Bay Area	Florida
		Tulsa	Oklahoma
Western	Regional Headquarters	Western Regional Headquarters	Utah
	River Forecast Centers	California-Nevada	California
		Colorado Basin	Utah
		Northwest	Oregon
	Weather Forecast Offices	Billings	Montana
		Boise	Idaho
		Elko	Nevada
		Eureka	California
		Flagstaff	Arizona
		Glasgow	Montana
		Great Falls	Montana
		Las Vegas	Nevada

**Appendix II: National Weather Service  
Operational Units, by Operational Unit  
Category and Location**

<b>NWS region or National Centers for Environmental Prediction</b>	<b>Operational unit category</b>	<b>Operational unit name</b>	<b>State/Territory</b>
		Los Angeles	California
		Medford	Oregon
		Missoula	Montana
		Pendleton	Oregon
		Phoenix	Arizona
		Pocatello	Idaho
		Portland	Oregon
		Reno	Nevada
		Sacramento	California
		Salt Lake City	Utah
		San Diego	California
		San Francisco Bay Area	California
		San Joaquin Valley	California
		Seattle	Washington
		Spokane	Washington
Tucson	Arizona		
National Centers for Environmental Prediction		Director's Office of the National Centers	Maryland
		Aviation Weather Center	Missouri
		Central Operations	Maryland
		Climate Prediction Center	Maryland
		Environmental Modeling Center	Maryland
		National Hurricane Center	Florida
		Ocean Prediction Center	Maryland
		Space Weather Prediction Center	Colorado
		Storm Prediction Center	Oklahoma
Weather Prediction Center	Maryland		

Source: National Weather Service data and documents. | GAO-17-364

Note: We defined NWS operational units as all units in any category of units (e.g. weather forecast office) where at least one unit within a category met at least two of the following three criteria: (1) issues forecasts, (2) issues warnings, and (3) has personnel that are essential emergency employees. We analyzed a list of NWS essential emergency employees by operational unit, and cross-referenced this list with information on which units issue forecasts or warnings to determine which units met our criteria. As long as one of the operational units in a particular unit category met our criteria, we included all of the units in the category in our analysis. On the basis of these criteria, we identified six operational unit categories and a total of 168 individual operational units.

# Appendix III: Information on Vacancies by National Weather Service Region

**Table 5: Vacancy Rates (Percentage) for National Weather Service (NWS) by Region and the National Centers for Environmental Prediction (National Centers), Fiscal Years 2010-2016**

NWS region or National Centers	Fiscal year (last pay period)						
	2010	2011	2012	2013	2014	2015	2016
Alaska Region	10	6	12	16	14	18	19
Central Region	4	3	5	6	6	9	8
Eastern Region	3	2	3	6	11	8	13
Pacific Region	7	8	7	12	15	12	16
Southern Region	3	4	6	8	9	12	9
Western Region	4	2	6	6	8	8	10
National Centers	12	6	5	10	14	13	16

Source: GAO analysis of National Weather Service data. | GAO-17-364

Note: We used data from NWS's organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled or vacant, to calculate the vacancy rates presented in this table. The data were as of the last pay period for each fiscal year (ending on September 30), and therefore our analysis provides a snapshot of the vacancies in NWS operational units at a point in time. According to National Oceanic and Atmospheric Administration and NWS headquarters officials, NWS did not have resources to support filling all of the positions included in its organizational table for this time period.

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# Appendix IV: Information on Vacancies in National Weather Service Weather Forecast Offices

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The National Weather Service's (NWS) 122 weather forecast offices comprise the majority of the 168 operational units (73 percent) included in our review.<sup>1</sup> At the end of fiscal year 2016, 2,720 of NWS's 3,629 operational unit employees (75 percent) worked in weather forecast offices. Table 6 provides vacancy rates by the positions in weather forecast offices for fiscal years 2014 through 2016, based on data from NWS's organizational table, which is a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled. Table 7 provides a brief summary of the roles and responsibilities for positions in weather forecast offices.

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<sup>1</sup>The 168 operational units included in our review were 122 weather forecast offices, 15 weather service offices, 13 river forecast centers, 9 National Centers for Environmental Prediction (National Centers) and 1 director's office of the National Centers, 6 NWS regional headquarters, and 2 tsunami warning centers.

**Appendix IV: Information on Vacancies in  
National Weather Service Weather Forecast  
Offices**

**Table 6: Vacancy Rates (Percentage) in National Weather Service (NWS) Weather Forecast Offices by Position, Fiscal Years 2014-2016**

Position	Vacancy rates (as of the last pay period)		
	Fiscal year 2014	Fiscal year 2015	Fiscal year 2016
<b>Management positions</b>			
Meteorologist-in-charge	7	7	7
Electronics systems analyst	7	3	2
Science and operations officer	9	16	5
Warning coordination meteorologist	11	6	10
Data acquisition program manager <sup>a</sup>	0	18	0
<b>Meteorologist positions</b>			
Lead	1	4	4
General	6	7	10
Entry-level <sup>b</sup>	15	18	20
<b>Technicians/support positions</b>			
Administrative support assistant	6	8	4
Electronics technician	13	13	13
Hydrometeorological technician	18	17	19
Information technology officer	7	4	7
Observing program leader	10	12	18
Service hydrologist	13	10	8
Other <sup>c</sup>	12	16	13

Source: GAO analysis of National Weather Service data. | GAO-17-364

Note: We used data from NWS's organizational table, a database that tracks information on the number, type, and location of positions across the agency, including whether each position is filled or vacant, to calculate the vacancy rates presented in this table. The data were as of the last pay period for each fiscal year (ending on September 30), and therefore our analysis provides a snapshot of the vacancies in NWS operational units at a point in time. According to National Oceanic and Atmospheric Administration and NWS headquarters officials, NWS did not have resources to support filling all of the positions included in its organizational table for this time period.

<sup>a</sup>About 10 percent of all 122 weather forecast offices had a data acquisition program manager at the end of fiscal year 2016.

<sup>b</sup>The entry-level meteorologist position is called the "meteorologist intern" position, but the position is not part of an internship. Meteorologist interns are full-time permanent staff who are entry-level meteorologist trainees.

<sup>c</sup>"Other" includes vacancies across various positions not located in the majority of weather forecast offices, including application integration meteorologists, automated surface observing system electronics technicians, automated surface observing system program managers, assistant electronics systems analysts, emergency response specialists, facilities engineering technicians, information technology specialists, next-generation radar electronics technicians, physical scientists, port meteorological officers, regional maintenance specialists, sea ice forecasters, and student trainees.



**Appendix IV: Information on Vacancies in  
National Weather Service Weather Forecast  
Offices**

**Table 7: Position Descriptions for National Weather Service (NWS) Positions in Weather Forecast Offices**

<b>Position</b>	<b>Position descriptions</b>
<b>Management positions</b>	
Meteorologist-in-charge	The meteorologist-in-charge is responsible for oversight and supervision of the weather forecast office, including providing direction to the other managers and staff in issuing forecasts and warnings and providing impact-based decision support services. The meteorologist-in-charge is also responsible for overseeing forecasting shift schedules, hiring, carrying out administrative tasks, and working forecasting shifts to maintain proficiency in other weather forecast office positions. Every weather forecast office has a meteorologist-in-charge position.
Electronics systems analyst	The electronics systems analyst is responsible for oversight and management of the weather forecast office's electronics programs, including the automated surface observing system, upper air system, weather radars, and other information technology systems, such as the advanced weather interactive processing system and the National Oceanic and Atmospheric Administration (NOAA) weather radio. The electronics systems analyst also supervises electronics technicians. Every weather forecast office has an electronics systems analyst position.
Science and operations officer	The science and operations officer is responsible for integrating new science and technology into forecasting and warning operations. The science and operations officer is also responsible for participating in research projects with universities or research centers and for managing training for the weather forecast office staff. The science and operations officer also works forecasting shifts to maintain proficiency in other weather forecast office positions and, when necessary, to alleviate temporary staffing shortfalls. Every weather forecast office has a science and operations officer position.
Warning coordination meteorologist	The warning coordination meteorologist is responsible for serving as the weather forecast office's liaison with the community to conduct outreach and provide educational programs and to conduct product and service evaluations. The warning coordination meteorologist is responsible for helping to explain forecasts and warnings to the public and core partners, including emergency managers. The position also reviews office policies and procedures and works forecasting shifts to maintain proficiency in other weather forecast office positions and, when necessary, to alleviate temporary staffing shortfalls. Every weather forecast office has a warning coordination meteorologist position.
Data acquisition program manager	The data acquisition program manager is responsible for supervising hydrometeorological technicians in the weather forecast office, including scheduling and assisting with performance evaluations of the technicians. The manager also oversees and participates in data collection in support of local and national programs, including the upper air program and cooperative observer program, which is a network of approximately 11,000 weather observing stations located across the United States. The manager is also responsible for collecting and maintaining local climatological reports and analyzing data from multiple sources to provide support products and for monitoring NOAA weather radio operations. Weather forecast offices typically have either a data acquisition program manager position or an observing program leader position (see position description below).

**Appendix IV: Information on Vacancies in  
National Weather Service Weather Forecast  
Offices**

<b>Position</b>	<b>Position descriptions</b>
<b>Meteorologist positions</b>	
Lead	The lead meteorologist serves as the head of each forecasting shift and oversees the issuance of all forecasts and warnings to help ensure their quality and timeliness. The lead meteorologist is responsible for reviewing all forecasts prepared by other weather forecast office staff before the forecasts are issued to the public. The position also serves as a focal point for one or more of the office's service areas (e.g., climate or tropical programs). The lead meteorologist is responsible for all office operations when a manager is not on duty. A typical weather forecast office has five lead meteorologist positions.
General	The general meteorologist is responsible for analyzing and integrating meteorological data available from a variety of sources to produce forecasts and warnings during a forecasting shift. The general meteorologist is also responsible for serving as a focal point for one or more office service areas (e.g., climate or tropical programs). In this capacity, general meteorologists manage or help improve products and services through outreach or by conducting local projects to incorporate new science, technology, or techniques into the operations of the weather forecast office. A typical weather forecast office has between five and seven general meteorologist positions.
Entry-level <sup>a</sup>	The entry-level meteorologist serves as a meteorologist-in-training and applies professional meteorological theories, methods, and techniques to weather forecasting duties. The responsibilities of the entry-level meteorologist may include operating the public service desk during forecasting shifts and launching weather balloons to conduct upper air weather observations. With training and experience, these meteorologists can work on forecast shifts with oversight. Every weather forecast office has entry-level meteorologist positions.
<b>Technicians/support positions</b>	
Administrative support assistant	The administrative support assistant provides administrative support to the management team and performs a wide range of administrative functions for the weather forecast office, including managing aspects of the budget, purchasing, procurement requests, contract monitoring, bankcards, property, vehicles, travel, training, personnel actions, time and attendance, mail, and equipment. Every weather forecast office has an administrative support assistant position.
Electronics technician	The electronics technician is responsible for maintenance and repair of the equipment used by the weather forecast office to produce forecasts and warnings, including the automated surface observing system and the computer systems of the office. Weather forecast offices typically have one to three electronics technician positions.
Hydrometeorological technician	The hydrometeorological technician is responsible for collecting data; writing weather summaries; answering telephone calls; running the weather radio; and on occasion, working the public service desk. In weather forecast offices that conduct upper air observations, hydrometeorological technicians are responsible for launching the weather balloons. About half of the weather forecast offices have hydrometeorological technician positions.
Information technology officer	The information technology officer is responsible for maintaining the information technology systems of the weather forecast office, including the advanced weather interactive processing system used to produce forecasts and warnings. Every weather forecast office has an information technology officer position.

**Appendix IV: Information on Vacancies in  
National Weather Service Weather Forecast  
Offices**

Position	Position descriptions
Observing program leader	The observing program leader's role is similar to that of the data acquisition program manager. The observing program leader is responsible for providing technical support and assistance regarding observational data to meteorologists issuing forecasts and warnings. The observing program leader is also responsible for leading the cooperative observer program, which is a network of approximately 11,000 weather observing stations located across the United States. Weather forecast offices have either an observing program leader position or a data acquisition program manager position (see position description above).
Service hydrologist	The service hydrologist is responsible for the weather forecast office's hydrology program, which includes coordinating with local river forecast centers, monitoring river gauges, issuing river stage forecasts, and providing expert guidance regarding river flooding. The service hydrologist is also responsible for providing training and education to other weather forecast office staff and conducting outreach to the local community and other water agencies on flood mitigation. Nearly three-fourths of all 122 weather forecast offices have a service hydrologist position.

Source: National Weather Service documents and officials. | GAO-17-364

<sup>a</sup>The entry-level meteorologist position is called the "meteorologist intern" position, but the position is not part of an internship. Meteorologist interns are full-time permanent staff who are entry-level meteorologist trainees.

# Appendix V: Comments from the Department of Commerce



**UNITED STATES DEPARTMENT OF COMMERCE**  
**Office of the Secretary**  
Washington, D.C. 20230

May 10, 2017

Ms. Anne-Marie Fennell  
Director  
Natural Resources and Environment  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Ms. Fennell:

Thank you for the opportunity to review and comment on the Government Accountability Office's (GAO) draft report titled *National Weather Service: Actions Have Been Taken to Fill Increasing Vacancies, but Opportunities Exist to Improve and Evaluate Hiring* (GAO-17-364). Enclosed are the National Oceanic and Atmospheric Administration's programmatic comments to the draft report.

If you have any questions, please contact me or Brian Lenihan, Acting Assistant Secretary for Legislative and Intergovernmental Affairs, at (202) 482-3663.

Sincerely,

A handwritten signature in cursive script that reads "Ellen Herbst".

Ellen Herbst

Enclosure

**Department of Commerce**  
**National Oceanic and Atmospheric Administration**  
**Response to the GAO Draft Report Titled**  
*National Weather Service: Actions Have Been Taken to Fill Increasing Vacancies, but*  
*Opportunities Exist to Improve and Evaluate Hiring*  
(GAO-17-364, May 2017)

**General Comments**

The National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Government Accountability Office (GAO) draft report on vacancies and hiring within National Weather Service (NWS) operational units. NOAA agrees with the report's recommendations and provides both general comments and suggested factual and technical changes below.

The draft report provides a factual account of the status of NWS personnel hiring, highlights efforts the NWS and NOAA's Workforce Management Office (WFMO) have taken to expedite hiring, notes the under-resourced nature of NWS, WFMO, and the Department of Commerce's Enterprise Services Organization (ESO), and describes the impact that understaffing has on NWS's ability to carry out its mission. As noted in the report, funding challenges for NWS, WFMO, and ESO have affected NWS's inability to obtain the necessary hiring throughput capacity and human resources support to address its hiring backlog and to sustain adequate workforce levels. Notwithstanding these challenges, NWS is committed to building a Weather Ready Nation, and NWS's dedicated workforce is critical to meeting its mission of saving lives and property and enhancing the national economy. NWS's intent is to hire and maintain a workforce level to the fullest extent permitted by appropriations.

**NOAA's Response to GAO's Recommendations**

**Recommendation 1:** "To enhance information available to operational unit managers, we recommend that the Secretary of Commerce direct the director of the WFMO to ensure that complete information on hiring requests is routinely communicated to NWS managers throughout the three phases of the hiring process, such as by supporting the development of improved tracking and reporting capabilities in the planned new Commerce-wide data system."

**NOAA Response:** NOAA agrees with this recommendation. NOAA WFMO will work with ESO to continue to build out the requirements and tools needed to track HR service delivery data.

**Recommendation 2:** "To help ensure NWS's hiring actions are achieving expected results, we recommend the Secretary of Commerce direct the NOAA Assistant Administrator for Weather Services to evaluate NWS's actions in reducing the hiring backlog or achieving the goal of sustaining a highly-skilled workforce, such as through the development of its strategic human capital plan."

**NOAA Response:** NOAA agrees with this recommendation.

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# Appendix VI: GAO Contact and Staff Acknowledgments

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## GAO Contact

Anne-Marie Fennell, (202) 512-3841 or [fennella@gao.gov](mailto:fennella@gao.gov).

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## Staff Acknowledgments

In addition to the individual named above, Alyssa M. Hundrup (Assistant Director), Amy R. Bowser, John W. Delicath, Tanya Doriss, Cindy K. Gilbert, Amanda K. Goolden, Steven Gregory Lozano, Ryan B. Millendez, Colleen M. Phillips, and Sara A. Sullivan made key contributions to this report.

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