



June 2018

# MILITARY PERSONNEL

## Collecting Additional Data Could Enhance Pilot Retention Efforts

# GAO Highlights

Highlights of [GAO-18-439](#), a report to congressional committees

## Why GAO Did This Study

Military pilots perform an array of operations, from combat to reconnaissance, that are critical to DOD successfully executing its national security mission. Retaining qualified pilots is important to ensure that requirements can be met, and to recoup the substantial investments—of both time and money—that the services make in training their pilots.

Public Law 115-91 (2017) included a provision for GAO to review the extent to which there is a national pilot shortage and its effects. Among other things, this report assesses for the Air Force, the Navy, and the Marine Corps (1) the extent to which the services had fixed-wing pilot staffing gaps from fiscal years 2013-2017; (2) how the services monitor pilot retention, and the extent to which airline market conditions have influenced retention; and (3) the incentives the services have developed to retain pilots, and the extent to which the Air Force's annual business case includes information to justify retention bonuses. GAO compared service-authorized pilot staffing levels to actual staffing levels, analyzed economic indicators, conducted a literature review, and interviewed airline association, DOD, and service officials.

## What GAO Recommends

GAO recommends that the Air Force, the Navy, and the Marine Corps develop and implement mechanisms to capture information about pilots' post-service employment; and that the Air Force analyze staffing levels by officer grade as part of its annual business case for aviation retention bonuses. DOD concurred with the recommendations, but noted concerns, which GAO addressed in the report.

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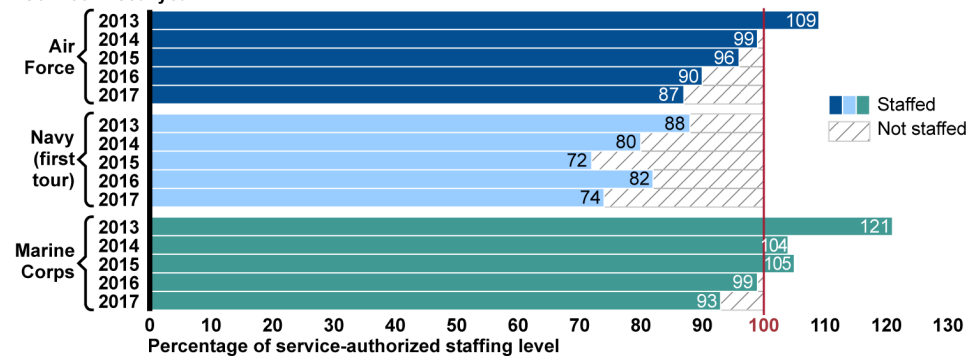
## MILITARY PERSONNEL

### Collecting Additional Data Could Enhance Pilot Retention Efforts

## What GAO Found

The Air Force, the Navy, and the Marine Corps had staffing gaps in some, but not all, fixed-wing pilot communities (or types of pilots) for operational positions from fiscal years 2013 through 2017. Gaps exist when actual staffing levels do not meet service-authorized staffing levels. GAO found that operational position staffing gaps decreased or generally remained the same over this time period, except for in the fighter pilot community. For fighter pilots, the gap increased across all three services over the past 2 to 5 fiscal years (see figure). In April 2018, GAO recommended that all three services reevaluate fighter pilot squadron requirements. The services agreed with these recommendations.

**Fighter Pilot Operational Position Staffing Gaps by Percentage from Fiscal Years 2013-2017**  
Service / fiscal year



Source: GAO analysis of Air Force, Navy, and Marine Corps staffing levels. | GAO-18-439

The three services monitor pilot retention through loss rates, but insufficient data limit a full understanding of the extent to which airline market conditions have influenced military pilot retention. The Department of Defense (DOD) has noted projected increases in airline hiring when justifying increases to aviation retention bonuses. However, DOD does not have data on the number of pilots leaving the military to accept jobs as airline pilots because, according to service officials, the services do not have mechanisms to capture these data. While studies have identified a correlation between airline hiring and military pilot retention, a study conducted on the Air Force's behalf identified the absence of these data as a limitation. Without developing and implementing mechanisms to capture data about pilots' post-service employment, including at commercial airlines, DOD lacks key information to support decisions regarding retention incentives.

All three services have developed retention incentives, but the Air Force's annual business case for aviation retention bonuses—prepared in accordance with a statutory requirement—does not differentiate staffing gaps by officer grade to ensure bonuses are appropriately targeted. To help determine bonus amounts, the Air Force uses a model to weigh various factors, including staffing levels for each pilot community. However, according to an Air Force official, the model only considers overall staffing levels and does not differentiate between senior officer staffing gaps—indicating retention challenges—and junior officer gaps, indicating other challenges. Without analyzing staffing levels by officer grade as part of its annual business case, the Air Force may not know whether it is targeting its bonuses—in the right amounts—to the appropriate pilot communities.

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### Abbreviations

ATP	airline transport pilot certificate
BLS	Bureau of Labor Statistics
DOD	Department of Defense
FAA	Federal Aviation Administration

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June 21, 2018

The Honorable John McCain  
Chairman  
The Honorable Jack Reed  
Ranking Member  
Committee on Armed Services  
United States Senate

The Honorable Mac Thornberry  
Chairman  
The Honorable Adam Smith  
Ranking Member  
Committee on Armed Services  
House of Representatives

Military pilots perform an array of operations, from combat to surveillance and reconnaissance, that are critical to the Department of Defense's (DOD) ability to successfully execute its national security mission. In April 2018, we reported that in fiscal year 2017, the Air Force, the Navy, and the Marine Corps all had gaps—fewer pilots than service-authorized levels—in their fighter pilot staffing levels of up to 27 percent.<sup>1</sup> Retaining qualified pilots is important not only to ensure that operational requirements can be met, but also to recoup the substantial investments—of both time and money—that the services make in training their pilots. An Air Force fighter pilot requires approximately 2 years of training to be considered mission-ready, at a cost of about \$3-11 million depending on the specific aircraft, according to Air Force officials.<sup>2</sup> The services report pilot retention issues stemming from internal challenges, such as quality of life and high operational tempo, and external factors, such as low unemployment and an increased demand for pilots in the commercial airline industry.

Former military pilots have historically been a source of pilots for the commercial airline industry. This industry contributes to the U.S. economy

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<sup>1</sup>GAO, *Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements*, [GAO-18-113](#) (Washington, D.C.: Apr. 11, 2018).

<sup>2</sup>These totals do not include initial training provided to all servicemembers, which involves additional time and costs.

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by providing global mobility and connectivity in transporting passengers and cargo, as well as significant economic and social benefits to communities. The industry experienced significant turmoil at the start of the 21st century (including the terrorist attacks of September 11, 2001, two recessions, and mergers and bankruptcies) that curtailed its growth. However, in February 2014, we reported on the increasing demand for and issues related to the supply of qualified pilots, and that industry forecasts indicated that the global aviation industry was poised for growth.<sup>3</sup> In that report, we cited concerns from aviation stakeholders that an insufficient supply of available and qualified pilots could develop because of, among other things, imminent retirements and changes to qualification requirements, which could challenge airlines' ability to fill the demand for pilots.

The *National Defense Authorization Act for Fiscal Year 2018* included a provision for us to review the extent to which there is a national pilot shortage and its effects, if any, on DOD pilot retention, as well as the Air Force's business case required as part of the annual justification for aviation retention bonuses.<sup>4</sup> This report addresses (1) the extent to which the Air Force, the Navy, and the Marine Corps had staffing gaps in their fixed-wing pilot communities from fiscal years 2013 through 2017; (2) the state of the commercial pilot labor market; (3) how the Air Force, the Navy, and the Marine Corps monitor pilot retention and the extent to which commercial airline market conditions have influenced DOD pilot retention; and (4) the non-monetary and monetary incentives the Air Force, the Navy, and the Marine Corps have developed to help retain pilots, and the extent to which the Air Force's annual business case includes key information to justify aviation retention bonuses.

For our first objective, we compared staffing levels authorized by the services—for operational pilot positions<sup>5</sup> in the active components of the Air Force, the Navy, and the Marine Corps—with the actual number of pilots available to staff those positions for fiscal years 2013 through

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<sup>3</sup>GAO, *Aviation Workforce: Current and Future Availability of Airline Pilots*, [GAO-14-232](#) (Washington, D.C.: Feb. 28, 2014).

<sup>4</sup>Pub. L. No. 115-91 (2017).

<sup>5</sup>Operational positions include both flying—i.e., combat pilot or instructor pilot positions—and non-flying positions, such as an air controller attached to an infantry unit.

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2017.<sup>6</sup> We selected this timeframe to enable us to evaluate trends over 5 years, and fiscal year 2017 was the most recent year for which complete data were available at the time of our review. Specifically, we analyzed the service-authorized staffing levels and actual staffing levels to identify staffing gaps by pilot community in those services' fixed-wing, cockpit-operated communities (fixed-wing communities). We did not include rotary-wing or unmanned aerial system pilots in our review because these pilots have not historically been a primary source of pilots for the commercial airlines. For the purposes of this report, when actual staffing levels are lower than service-authorized staffing levels, it is considered to be a staffing gap. We did not include the Army in our review because its service-authorized fixed-wing community pilot positions make up less than 7 percent of its total aviation force.<sup>7</sup>

For the Navy and the Marine Corps, we also analyzed these data to identify gaps by officer grade.<sup>8</sup> We did not analyze similar data for the Air Force because it did not designate officer grade in the data it provided. To assess the reliability of the service-authorized staffing levels and actual staffing levels, we reviewed related documentation; assessed the data for errors, omissions, and inconsistencies; and interviewed officials. We determined that the data were sufficiently reliable to describe the services' staffing levels and associated gaps from fiscal years 2013 through 2017.

For our second objective, we analyzed data from the Department of Labor's Bureau of Labor Statistics' (BLS) Current Population Survey on the unemployment rate, employment, and median weekly earnings from

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<sup>6</sup>Gaps between actual staffing levels and service-authorized staffing levels for operational positions represent a difference in the number of pilots available to fill operational positions and the number of authorized positions. Reported gaps do not reflect how the services have staffed their operational positions. For example, a service may move pilots from one community to another to help mitigate a gap. This is not reflected in our analysis.

<sup>7</sup>Details on staffing gaps in the Army's fixed-wing communities can be found in appendix I. For the appendix, we compared staffing levels authorized by the Army—for active component fixed-wing pilot positions—with the actual number of pilots available to staff those positions for fiscal years 2013 through 2017. We also interviewed Army officials about current and projected staffing challenges.

<sup>8</sup>In this report, we define junior officers as between the pay grades of Officer-1 and Officer-3 (e.g. lieutenants and captains in the Air Force and Marine Corps, and ensigns and lieutenants in the Navy), and senior officers as between the pay grades of Officer-4 and Officer-5 (e.g. majors and lieutenant colonels in the Air Force and Marine Corps, and lieutenant commanders and commanders in the Navy).



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2012 through 2017.<sup>9</sup> These data can be used as indicators of whether labor market conditions are consistent with a shortage. We chose this period because we have previously reported on these data for the period 2000 through 2012.<sup>10</sup> We did not assess whether there are shortages by geographic area or sector of the commercial aviation industry because the economic indicators we reviewed do not provide this type of specificity. We reviewed documentation about the BLS data and the systems that produced them, as well as our prior reports that used the data. We determined the data were sufficiently reliable for the purposes of our indicator analysis to provide context on the labor market.

To identify trends in supply sources for qualified airline pilots, we reviewed Federal Aviation Administration (FAA) data on pilot certificates issued and held from 2000 through 2017. We selected this timeframe to enable us to evaluate trends over time and 2017 was the most complete data available at the time of our review. We also reviewed data from the Department of Education on the number of completions for degree or certificate programs that might prepare individuals to work as airline pilots for academic years 2000-2001 through 2015-2016. To assess the reliability of the FAA and Department of Education data, we reviewed related documentation and interviewed officials. We determined that the data were sufficiently reliable to describe general sources of supply of airline pilots and recent trends. We also interviewed and collected information from the FAA and industry stakeholders, including associations representing airlines and pilots.

For our third objective, we interviewed service officials and calculated pilot loss rates—which the services use to monitor pilot retention—for the Air Force, the Navy, and the Marine Corps from fiscal years 2013 through 2017. To assess the reliability of these data, we reviewed related documentation and interviewed officials. We determined that the data

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<sup>9</sup>BLS Current Population Survey data for “Aircraft pilots and flight engineers” for unemployment, wage earnings, and employment combined two occupations. The Standard Occupational Classification for airline pilots, copilots, and flight engineers includes those who pilot and navigate the flight of fixed-wing, multi-engine aircraft, usually on scheduled air carrier routes, for the transport of passengers and cargo. The Standard Occupational Classification for commercial pilots includes those who pilot and navigate the flight of fixed-wing aircraft on nonscheduled air carrier routes, or helicopters. The 2018 Standard Occupational Classification system is a federal statistical standard used by federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.

<sup>10</sup>[GAO-14-232](#).

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were sufficiently reliable to describe pilot loss rates during this timeframe. To assess the extent to which commercial pilot labor market conditions have influenced DOD pilot retention, we conducted a literature search for relevant studies published since February 2014. We chose February 2014 as a starting point because that was when we last reported on this topic, and to reflect more recent trends in airline hiring and compensation and DOD pilot retention. We screened 54 studies using a multi-step process to gauge their relevance and evaluate their methodology. We identified 5 studies that had reliable and relevant information. However, none of the 5 studies we reviewed presented causal findings. Additionally, we interviewed officials from the Air Force, the Navy, the Marine Corps, the Office of the Secretary of Defense, the FAA, and airline associations about available data on former military pilots employed by the airlines, and spoke with researchers from the RAND Corporation regarding relevant research they have conducted. We compared information from the interviews with DOD and service officials to *Standards for Internal Control in the Federal Government* related to quality information and monitoring activities.<sup>11</sup>

For our fourth objective, we obtained and reviewed information from the Air Force, the Navy, and the Marine Corps about the non-monetary incentives they have developed to retain pilots. We also assessed those services' use of monetary incentives, such as aviation incentive pay and aviation retention bonuses from fiscal years 2013 through 2017, by analyzing budget information from their annual budget justification documents to determine total costs. We also reviewed each service's projected costs for these pay programs for fiscal years 2018 and 2019. Additionally, we analyzed the services' aviation bonus take rates for fiscal years 2013 through 2017.<sup>12</sup> Further, we conducted interviews with relevant officials from the Air Force, the Navy, the Marine Corps, and the Office of the Secretary of Defense about efforts to assess the effectiveness of the various pilot retention incentives.

We also analyzed the Air Force's annual business case required as part of the annual justification for aviation bonus payments for fiscal years

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<sup>11</sup>GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: September 2014).

<sup>12</sup>Aviation bonus take rates represent the percentage of pilots signing aviation retention bonus service agreements out of the total population of eligible pilots.

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2017 and 2018<sup>13</sup> as well as related analyses and bonus program documentation.<sup>14</sup> We selected these years because the requirement for the military services to conduct annual business cases for aviation bonus payments started in fiscal year 2017, and fiscal year 2018 was the most recent business case available.<sup>15</sup> In addition, we conducted interviews with officials from the Air Force, the Air National Guard, the Air Force Reserve Command, and the Office of the Secretary of Defense. We compared bonus program documentation and information from our interviews with *Standards for Internal Control in the Federal Government* related to quality information.<sup>16</sup> Our scope and methodology is described in detail in appendix III.

We conducted this performance audit from December 2017 to June 2018 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>13</sup>While all of the military services are required to submit business cases as part of the annual justification for aviation bonus payments, section 616 of the *National Defense Authorization Act for Fiscal Year 2018* specifically requested that we review the Air Force's business case. Pub. L. No. 115-91 (2017). In addition, the Air Force spends the most money on an annual basis for aviation retention bonuses and recently increased its maximum offered bonus amount to the statutory cap of \$35,000.

<sup>14</sup>Details on the Air Force Reserve and the Air National Guard's business cases for their aviation retention bonuses as well as their fixed-wing pilot staffing levels for fiscal years 2013 through 2017 are provided in appendix II. For the appendix, we compared service-authorized staffing levels for fixed-wing pilot positions with the actual number of pilots available to staff those positions for the Air Force Reserve Command and the Air National Guard. To assess the reliability of the reserve components' service-authorized staffing levels and actual staffing levels, we reviewed related documentation; assessed the data for errors, omissions, and inconsistencies; and interviewed officials. We determined that the data were sufficiently reliable to describe staffing levels and associated gaps for the Air Force's reserve component during this timeframe.

<sup>15</sup>Section 334(c)(2)(A) of Title 37 of the U.S. Code states that the services shall determine the amount of the aviation bonus payable solely through a business case analysis of the amount required to be paid in order to address anticipated staffing shortfalls for such fiscal year by aircraft type category.

<sup>16</sup>[GAO-14-704G](#).

## Background

### Air Force, Navy, and Marine Corps Fixed-Wing Pilot Communities

The Air Force, the Navy, and the Marine Corps have fixed-wing, rotary-wing, and unmanned aerial system aircraft pilots. Within each service's fixed-wing pilot community, pilots operate a variety of aircraft. See table 1 for an overview of the different pilot communities and examples of the aircraft they operate.

**Table 1: Overview of Air Force, Navy, and Marine Corps Fixed-Wing Pilot Communities**

Fixed-wing pilot community	Description of mission	Examples of aircraft
<b>Air Force</b>		
Bomber	Operate aircraft to deliver munitions	B-1, B-2, B-52
Fighter	Operate tactical aircraft that engage in air-to-air and air-to-surface attacks	A-10, F-15, F-16, F-22A, F-35
Mobility	Operate aircraft used for aerial refueling and troop and cargo transport	C-17, KC-135
Special operations	Operate aircraft that provide close air support for ground troops	AC-130
Surveillance	Operate aircraft used for surveillance and reconnaissance to support ground troops	E-8, U-2
<b>Navy</b>		
Fighter	Operate tactical aircraft for air defense and support	F/A-18, EA-18G, F-35
Maritime Patrol	Operate jet aircraft for missions, such as anti-submarine warfare and anti-surface warfare	P-8A
Surveillance and transport	Operate turboprop aircraft used for surveillance and troop and cargo transport	E-2D, C-2A
<b>Marine Corps</b>		
Fighter	Operate tactical aircraft for air defense and close air support and attack missions	EA-6B, AV-8B, F/A-18, F-35
Tanker	Operate aircraft used for in-flight refueling and transport of troops and equipment	KC-130
Tiltrotor	Operate aircraft used to transport combat troops and equipment	MV-22

Source: GAO analysis of DOD information. | GAO-18-439

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## Air Force, Navy, and Marine Corps Processes for Determining and Staffing Pilot Positions

DOD guidance states that staffing requirements are driven by workload and shall be established at the minimum levels necessary to accomplish mission and performance objectives.<sup>17</sup> According to Air Force, Navy, and Marine Corps guidance, the services determine personnel requirements for their military units.<sup>18</sup> Service officials reported that they fill their requirements based on the number of those requirements that are funded—called service-authorized staffing levels—and the number of trained and qualified personnel available to be staffed to those positions.<sup>19</sup> In this report, we refer to the number of pilots available to fill service-authorized staffing levels as actual staffing levels.

Pilots may be staffed to operational or non-operational positions. Operational positions include a range of flying positions—in both operational and training squadrons—and non-flying positions, such as a close air support duty officer in an Air Operations Center, or an air controller attached to an infantry unit. Non-operational positions include staff assignments to headquarters or combatant commands. The process of staffing pilots is managed in the Air Force by the Air Force Personnel Center, in the Navy by the Navy Personnel Command, and in the Marine Corps by the Deputy Commandant for Manpower and Reserve Affairs. Service workforce planning documents acknowledge that, after this staffing process, a squadron's staffing level may be lower than the established requirements. This presents a potential readiness risk that the services manage by assigning a higher priority to the staffing of certain positions, such as those in deployed squadrons. In this report, we refer to differences between service-authorized staffing levels and actual staffing levels as staffing gaps.

We have previously reported on pilot staffing gaps within DOD. For example, in April 2018, we found that the Air Force, the Navy, and the Marine Corps had fewer fighter pilots than service-authorized staffing levels from fiscal years 2013 through 2017.<sup>20</sup> While the services were

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<sup>17</sup>Department of Defense (DOD) Directive 1100.4, *Guidance for Manpower Management* (Feb. 12, 2005).

<sup>18</sup>Air Force Instruction (AFI) 38-201, *Management of Manpower Requirements and Authorizations* (Jan. 30, 2014); Office of the Chief of Naval Operations Instruction (OPNAVINST) 1000.16L; Marine Corps Order (MCO) 5311.1E, *Total Force Structure Process* (Nov. 18, 2015).

<sup>19</sup>[GAO-18-113](#).

<sup>20</sup>[GAO-18-113](#).

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implementing initiatives to increase fighter pilot staffing levels, we found that they had not reevaluated fighter pilot squadron requirements to reflect changing conditions—such as increased training requirements—increased workload, and emerging unmanned aerial system requirements.<sup>21</sup> We recommended that the Air Force, the Navy, and the Marine Corps reevaluate fighter pilot squadron requirements. For the Air Force and the Navy, this includes updating current assumptions of fighter pilot workload and assessing the impact of future incorporation of unmanned aerial system platforms into combat aviation. The services agreed with these recommendations, but had not yet implemented them as of June 2018. Additionally, in August 1999, we found that while the services reported being able to fill their operational positions, staffing gaps existed in their non-operational flying and support positions.<sup>22</sup> However, we found that the significance of reported and projected pilot staffing gaps was difficult to ascertain because the basis for pilot requirements had not been firmly established or documented.<sup>23</sup>

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## Mainline and Regional Commercial Airlines

To operate as an airline carrying passengers or cargo (for hire or compensation), a business must have an air carrier (airline) operating certificate issued by the FAA, per federal aviation regulations and economic authority from the Department of Transportation. Certification is determined by the type of commercial service being provided. Airlines that provide scheduled commercial service are often grouped into two categories: mainline and regional. Mainline airlines include passenger or cargo service providers that offer domestic and international service on larger airplanes. Regional airlines include (1) domestic and limited international passenger service, generally using airplanes with fewer than 90 seats and transporting passengers between large hub airports and smaller airports, and (2) cargo service providers that provide domestic and limited international cargo service on a charter or contract basis.

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<sup>21</sup>For a list of our prior reports on this topic, see the Related GAO Products page at the end of this report.

<sup>22</sup>GAO, *Military Personnel: Actions Needed to Better Define Pilot Requirements and Promote Retention*, [GAO/NSIAD-99-211](#) (Washington, D.C.: Aug. 20, 1999).

<sup>23</sup>Among others, we made a recommendation that DOD develop criteria and detailed job descriptions for designating positions to be filled with pilots, classify the positions according to their operational and flying status, and specify the types of duties that make pilots essential. DOD partially agreed with this recommendation, but it was not implemented.

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## Air Force, Navy, Marine Corps, and Commercial Pilot Training and Production

Before qualifying to operate aircraft for military missions, pilots in the Air Force, the Navy, and the Marine Corps must complete a series of training requirements. Regardless of whether they will fly fixed- or rotary-wing aircraft, according to service officials, pilots in these services receive about 1 to 3 years of undergraduate pilot training—depending on the service—to earn their initial qualifications, or wings. After completing their undergraduate pilot training, graduates in these services receive additional advanced specialized aircraft training before they are assigned to an operational unit. The total length of training varies by military service and specific type of aircraft. For example, according to Air Force officials, training ranges from 1.5 years for a mobility pilot to 2 years for a fighter pilot. The cost of a pilot’s training and flying experience varies depending on the type of aircraft. In exchange for training, fixed-wing pilots incur a commitment of an additional 8 to 10 years of aviation service following pilot training, depending on the military service.

On the commercial side, airline pilots are mostly trained through three sources: (1) FAA-certified pilot schools at a college or university—typically through 2- and 4-year degree programs, (2) non-collegiate vocational schools, and (3) the military services. Pilot students will typically graduate or complete training from schools with a commercial pilot certificate, and then they must accumulate flight time and pass additional certification testing to obtain an airline transport pilot (ATP) certificate. An ATP certificate is the highest level of pilot certification and is necessary to fly as a captain or first-officer for an airline.<sup>24</sup> Similarly, former military pilots must meet the same flight time requirements and pass the same certification tests as civilian pilots to obtain an ATP certificate, although they may be able to use military flight time to meet those requirements.<sup>25</sup>

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<sup>24</sup>In commercial aviation, the captain (pilot-in-command) of an aircraft is the person aboard the aircraft who is ultimately responsible for its operation and safety during all phases of flight, as well as when it is operating or moving on the ground, in accordance with FAA’s regulations. The first officer (second-in-command) is the second pilot of an aircraft, and has the authority to assume command of the aircraft in the event of incapacitation of the captain. However, control of the aircraft is normally shared equally between the captain and first officer during flight.

<sup>25</sup>Former military pilots with at least 750 hours of total time as a pilot may obtain a “restricted-privileges” ATP certificate. This allows them to serve as first officers for an airline until they obtain the necessary 1,500 hours to qualify for an ATP certificate.

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## DOD Special and Incentive Pay Programs for Aviators

DOD uses special and incentive pay programs as tools in its compensation system to help ensure that military compensation is competitive in order to retain a high-quality, all-volunteer force, including those in hard-to-fill or critical specialties. To retain pilots, the military services primarily use the following two special pays:<sup>26</sup>

- **Aviation Incentive Pay** is monthly pay pilots receive in addition to their regular military compensation that, according to statute, is not to exceed \$1,000 per month.<sup>27</sup> The specific monthly amounts depend on years of aviation service and are set by the military services, in accordance with DOD guidance. For example, a pilot with between 2 and 6 years of service is eligible to receive up to \$250 per month, and a pilot with between 10 and 22 years of service is eligible to receive up to \$1,000 per month.
- **Aviation Retention Bonuses** are payable to eligible officers, on a selective basis, when there is a gap or a projected gap of officers qualified in critical aviation specialties. According to DOD officials, pilots generally qualify for aviation retention bonuses at approximately 8 to 10 years of aviation service—the end of their initial active duty service obligation. Individuals receiving the bonus must execute a written agreement to remain on active duty or in an active status in aviation service for a specified period. Among other things, the military services specify the amount of the bonus, the method of payment, and the period of obligated service.<sup>28</sup> Aviation retention bonuses are not to exceed \$35,000 for each year of additional obligated service and must be repaid if the officer receiving the bonus fails to fulfill eligibility requirements or other conditions of service. As part of each service's bonus program, the Secretary is required to prepare an

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<sup>26</sup>DOD Instruction 7730.67, *Aviator Incentive Pays and Bonus Program* (Oct. 20, 2016) states that aviation incentive pay and aviation bonuses may be paid to eligible active and reserve component officers for continued aviation service. For the purposes of this report, we refer to aviation bonuses as aviation retention bonuses.

<sup>27</sup>The *National Defense Authorization Act for Fiscal Year 2017* increased the maximum monthly amount of aviation incentive pay from \$850 to \$1,000. See Pub. L. No. 114-328, § 616(a) (2016).

<sup>28</sup>The additional period of obligated service must be at least a year. In addition, no agreement may be executed that would take an officer beyond 25 years of aviation service. DOD Instruction 7730.67, *Aviator Incentive Pays and Bonus Program* (Oct. 20, 2016).



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annual business case for aviation retention bonuses that is to be included in the services' annual budget justification documents.<sup>29</sup>

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## Gaps Existed Between Air Force, Navy, and Marine Corps Authorized and Actual Staffing Levels in Some, but Not All, Pilot Communities from Fiscal Years 2013-2017

The Air Force and the Marine Corps had gaps between actual overall fixed-wing pilot staffing levels and service-authorized levels for both operational and non-operational positions in fiscal years 2016 and 2017. In addition, since fiscal year 2013, pilot staffing gaps in the Air Force, Navy, and Marine Corps' operational positions have decreased or generally remained the same in all fixed-wing pilot communities, except for the fighter pilot community where the gap increased.<sup>30</sup> While 4 of the 6 fixed-wing pilot communities in the Navy and the Marine Corps had gaps that decreased or stayed the same during this timeframe, gaps in these services' operational positions were concentrated in junior officer grades.

## The Air Force and the Marine Corps Had Fewer Pilots Overall Than Service-Authorized Staffing Levels in Fiscal Years 2016 and 2017

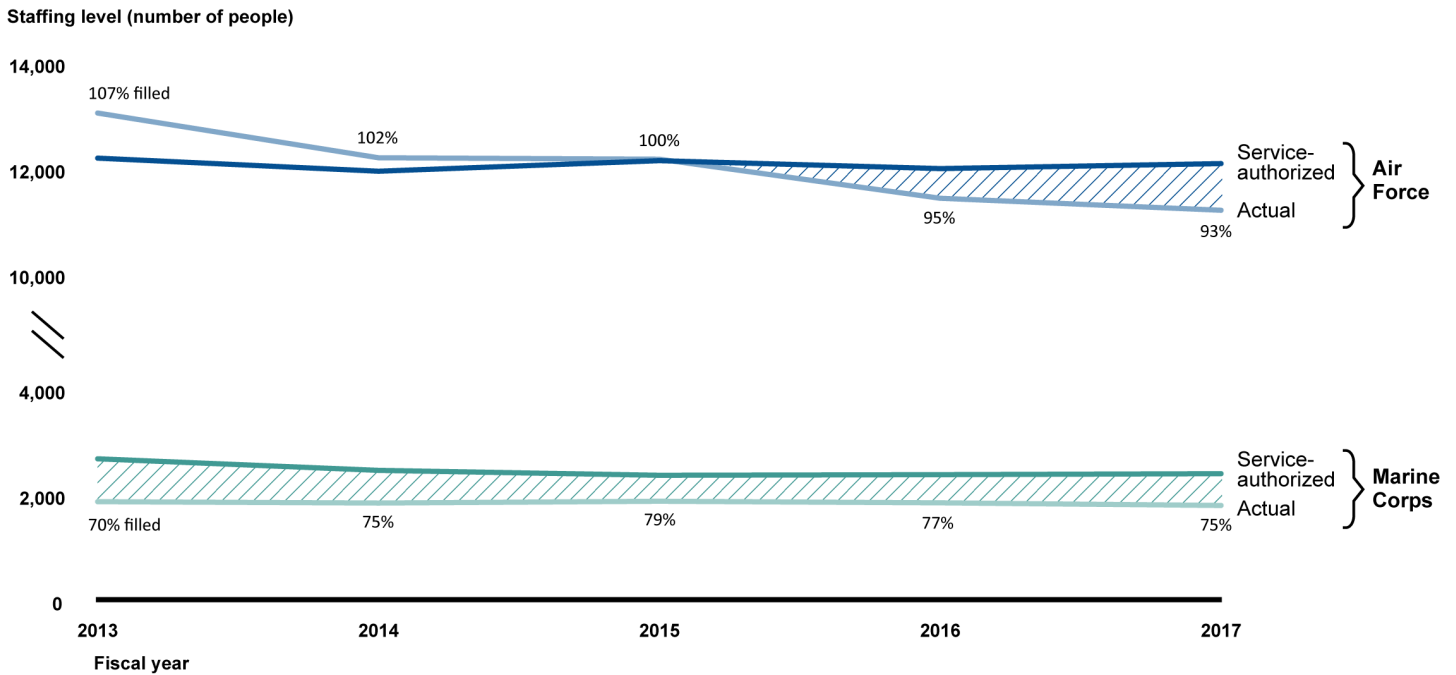
For overall fixed-wing staffing levels (both operational and non-operational positions), the Air Force and the Marine Corps both had gaps between actual staffing levels and service-authorized levels in fiscal years 2016 and 2017. According to our analysis of Air Force data, the Air Force was at or above 100 percent of service-authorized levels from fiscal years 2013 through 2015. However, in fiscal year 2016, the Air Force had an overall gap of 562 fixed-wing pilots (5 percent of service-authorized levels), which grew to 883 pilots (7 percent) in fiscal year 2017. Since fiscal year 2013, the Marine Corps had a consistent staffing gap. We cannot report similar data analysis for the Navy because it does not fully assign non-flying authorized levels to specific communities. Figure 1 compares Air Force and Marine Corps actual overall fixed-wing pilot staffing levels with service-authorized positions over the past 5 fiscal years.

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<sup>29</sup>37 U.S.C. § 334.

<sup>30</sup>For the purposes of this report, when actual staffing levels are lower than service-authorized staffing levels, it is considered to be a staffing gap.

**Figure 1: Air Force and Marine Corps Active Component Actual Overall Fixed-Wing Pilot Staffing Levels Compared with Service-Authorized Levels, Fiscal Years 2013-2017**



Source: GAO analysis of Air Force and Marine Corps staffing levels. | GAO-18-439

The Air Force, the Navy, and the Marine Corps have authorized staffing levels for both operational and non-operational positions. Pilots staff both types of positions and alternate between them throughout their careers. As previously discussed, operational positions include a range of flying positions—in both operational and training squadrons—and non-flying positions, such as a close air support duty officer in an Air Operations Center, or an air controller attached to an infantry unit. Non-operational positions include staff assignments to headquarters or combatant commands. Table 2 describes Air Force and Marine Corps active component fixed-wing pilot communities’ operational and non-operational positions in fiscal year 2017.

**Table 2: Air Force and Marine Corps Active Component Fixed-Wing Pilot Communities' Operational and Non-operational Positions, Fiscal Year 2017**

Military service	Total positions	Number of pilots	Percent filled	Number of operational positions	Examples of operational positions	Number of non-operational positions	Examples of non-operational positions
Air Force	12,079	11,196	93	10,209	Flying positions in operational, training, and test-fly squadrons Close air support duty officer positions in an Air Operations Center	1,870	Headquarters and combatant command staff positions
Marine Corps	2,387	1,785	75	1,901	Flying positions in operational and training squadrons Air controller attached to an infantry unit	486	Headquarters and combatant command staff positions

Source: GAO analysis of Air Force and Marine Corps staffing level data and information. | GAO-18-439

Note: Service workforce planning documents acknowledge that staffing levels may be lower than service-authorized positions. Services manage this readiness risk by assigning a higher staffing priority to certain positions, such as flying positions in operational squadrons.

Each military service prioritizes staffing pilots to operational positions over non-operational positions. For example, the Air Force's Rated Management Directive for fiscal year 2018 outlines staffing targets for various flying and non-flying positions. Specifically for fighter pilots, staffing targets for operational flying positions ranged from 95 to 100 percent and staffing targets for various staff positions ranged from 20 percent to 50 percent.<sup>31</sup> Air Force officials stated that these targets reflect the necessary level of risk given current staffing gaps.

**Gaps in Operational Positions Have Decreased or Generally Remained the Same in All Fixed-Wing Pilot Communities, Except for the Fighter Pilot Community**

Our analysis of Air Force, Navy, and Marine Corps data found that gaps between service-authorized staffing levels and actual staffing levels for operational pilot positions decreased or generally remained the same in all fixed-wing pilot communities between fiscal years 2013 and 2017, except for the fighter pilot community, where the gap increased. In total there are 11 fixed-wing pilot communities across these three services. Table 3 summarizes trends in staffing gaps for Air Force, Navy, and Marine Corps fixed-wing pilot communities over the past 5 fiscal years. For detailed information on staffing gaps in these services' active

<sup>31</sup>Department of the Air Force, *Memorandum: Fiscal Year 2018 USAF Rated Management Directive* (Oct. 26, 2017).

component fixed-wing pilot communities over the past 5 fiscal years, see an interactive graphic which can be viewed at <http://www.gao.gov/products/gao-18-439>.

**Table 3: Gaps in Air Force, Navy, and Marine Corps Active Component Fixed-Wing Pilot Community Operational Positions, Fiscal Years 2013-2017**

Military Service	Number of fixed-wing pilot communities	Communities without gaps from fiscal years 2013-2017	Communities where gaps decreased from fiscal years 2013-2017	Communities where gaps generally remained the same from fiscal years 2013-2017	Communities where gaps increased from fiscal years 2013-2017
<b>Air Force</b>	Five	Bomber Mobility	Surveillance Special operations	N/A	Fighter
<b>Navy - First Operational Tour</b>	Three	N/A	Maritime patrol	Surveillance and transport	Fighter
<b>Marine Corps</b>	Three	Tanker	Tiltrotor	N/A	Fighter

Source: GAO analysis of Air Force, Navy, and Marine Corps staffing level data. | GAO-18-439

Note: For the purposes of this report, when actual staffing levels are lower than service-authorized staffing levels, this is considered to be a staffing gap. We describe Navy first tour milestone trends in the table because Navy officials stated that, unlike subsequent milestones, this is the only milestone that cannot be staffed with naval flight officers or naval aviators from the same community.

In 3 of the 11 fixed-wing pilot communities there were no staffing gaps for operational positions over the past 5 fiscal years. For example, the Air Force’s mobility pilot community exceeded service-authorized staffing levels during this timeframe. Staffing levels for the mobility community were the highest in fiscal year 2013, when they exceeded service-authorized levels by 1,981 pilots (144 percent of service-authorized levels). This community had a surplus of 1,075 pilots (126 percent) in fiscal year 2017. Similarly, the Marine Corps’ tanker pilot community did not have any gaps in operational positions over the past 5 fiscal years. The community had a surplus of 57 pilots (118 percent of service-authorized levels) in fiscal year 2013 and 49 pilots (116 percent) in fiscal year 2017.

Staffing gaps for operational pilot positions decreased in 4 of the 11 fixed-wing communities over the past 5 fiscal years. For example, the gap in the Air Force’s special operations community decreased from 158 pilots (11 percent of service-authorized levels) in fiscal year 2013 to 46 pilots (3 percent) in fiscal year 2017. Similarly, we found that the gap in the Navy’s maritime patrol community—at the first operational tour milestone—generally decreased from 112 pilots (23 percent of service-authorized

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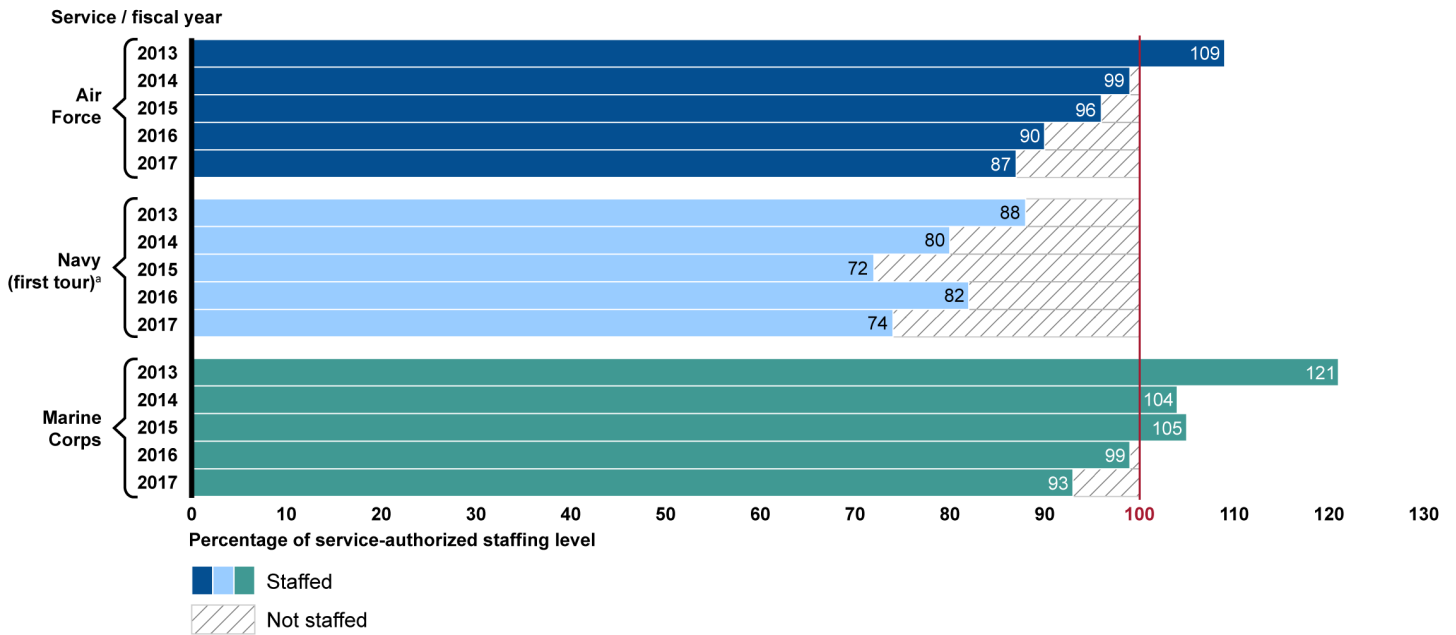
staffing levels) in fiscal year 2013 to 4 pilots (1 percent) in fiscal year 2017.<sup>32</sup>

The fighter pilot community is the only fixed-wing pilot community where the staffing gap for operational positions increased substantially across all three services over the past 5 fiscal years. Specifically, the Air Force had a surplus of 279 fighter pilots (109 percent of service-authorized staffing levels) in fiscal year 2013, but a gap of 399 fighter pilots (13 percent) in fiscal year 2017. The Navy's fighter pilot gap—at the first operational tour milestone—more than doubled from fiscal year 2013 (57 pilots or 12 percent of service-authorized staffing levels) to fiscal year 2017 (136 pilots or 26 percent). Additionally, the Marine Corps had a surplus of 185 fighter pilots (121 percent of service-authorized levels) in fiscal year 2013, but a gap of 57 pilots (7 percent) in fiscal year 2017. Figure 2 compares actual fighter pilot staffing levels with service-authorized staffing levels for the active components of the Air Force, the Navy (at the first tour milestone), and the Marine Corps over the past 5 fiscal years.

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<sup>32</sup>According to Navy officials, they monitor and manage their fixed-wing pilot communities at career milestones, three of which were within the scope of our review: first operational tour, mid-career Department Head, and Command. The first operational tour milestone is a pilot's first operational tour at sea, which is completed between 3 and 6 years of service. The Department Head milestone is a mid-career operational leadership tour for different aspects of squadron management, for pilots with between about 11 and 13 years of service. The Command milestone is a leadership tour for Commanders, including squadron commanders, for aviators with between about 17 and 19 years of service.

**Figure 2: Air Force, Navy, and Marine Corps Active Component Actual Fighter Pilot Staffing Levels Compared with Service-Authorized Operational Positions, Fiscal Years 2013-2017**



Source: GAO analysis of Air Force, Navy, and Marine Corps staffing levels. | GAO-18-439

<sup>a</sup>We compare Navy fighter pilot staffing levels with service-authorized positions for the first tour milestone because Navy officials stated that, unlike subsequent milestones, this is the only milestone that cannot be staffed with naval flight officers or naval aviators from the same community.

As previously discussed, the Air Force, the Navy, and the Marine Corps also have non-operational positions that are to be staffed with pilots. As a result, while a given pilot community may have a surplus of pilots when compared to the number of service-authorized operational positions, those additional pilots may be needed to staff certain non-operational positions designated for pilots. For example, Air Force officials noted that pilot subject matter expertise is needed in non-operational positions in order to support the operational component. In April 2018, we compared service-authorized staffing levels (for both operational and non-operational positions combined) to actual staffing levels for each fixed-wing pilot community in the Air Force and the Marine Corps.<sup>33</sup>

<sup>33</sup>For more about overall staffing gaps (operational and non-operational positions combined) within the Air Force and the Marine Corps' fixed-wing pilot communities, see [GAO-18-113](#).

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In April 2018, we reported that to address the gaps in staffing levels in the fighter pilot community, the services prioritize staffing fighter pilots to flying positions (instead of to staff positions) and also use senior fighter pilots to staff unfilled junior positions.<sup>34</sup> Additionally, the Air Force, the Navy, and the Marine Corps staff pilots from communities with surpluses to mitigate gaps in certain operational positions. For example, according to Air Force documentation, the Air Force staffs mobility and surveillance pilots—communities with a surplus in fiscal year 2017—to certain basic flying training instructor pilot positions that would otherwise be staffed by other pilots. Similarly, the Navy staffs certain Department Head positions designated for fighter pilots with Naval Flight Officers (officers that are responsible for navigation or weapons) from that community. Marine Corps officials stated that they use rotary-wing pilots to fill certain fixed-wing pilot operational staff positions.

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### Navy and Marine Corps Operational Staffing Gaps Were Concentrated in Junior Officer Grades

In all 6 fixed-wing pilot communities in the Navy and the Marine Corps, gaps between actual staffing levels and service-authorized staffing levels for operational positions for fiscal years 2013 through 2017 were concentrated in their junior officer grades—officers between the pay grades of Officer-1 and Officer-3.<sup>35</sup> Moreover, we found that the Navy had a gap in all 3 of its fixed-wing pilot communities at the first tour operational milestone in fiscal year 2017, and no gap at the Department Head or Command milestones.<sup>36</sup> For example, in the surveillance and transport pilot community the Navy had a gap of 30 junior officers (23 percent of service-authorized staffing levels) in fiscal year 2017 and a surplus of 2 aviators (104 percent) at the Department Head milestone.<sup>37</sup> We cannot report on staffing level gaps by officer grade for the Air Force because it did not designate officer grade in the data it provided. Figure 3 compares actual staffing levels with service-authorized levels for the

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<sup>34</sup>[GAO-18-113](#).

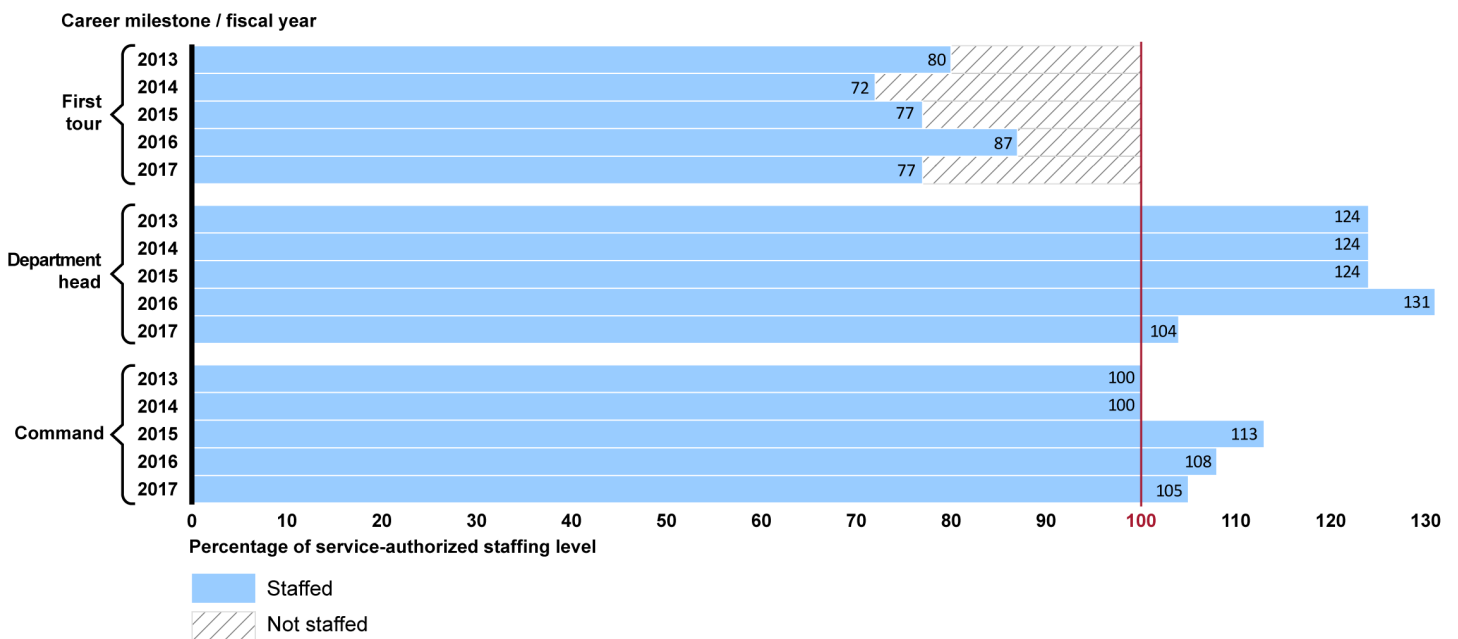
<sup>35</sup>In this report, we define junior officers as between the pay grades of Officer-1 and Officer-3 (e.g. lieutenants and captains in the Air Force and Marine Corps, and ensigns and lieutenants in the Navy), and senior officers as between the pay grades of Officer-4 and Officer-5 (e.g. majors and lieutenant colonels in the Air Force and Marine Corps, and lieutenant commanders and commanders in the Navy).

<sup>36</sup>Staffing level data for the Navy Department Head and Command milestones include all naval aviators—pilots and Naval Flight Officers (i.e. officers that are responsible for navigation or weapons).

<sup>37</sup>Specifically, the Navy had a gap of 30 junior officers at the first tour milestone.

active component surveillance and transport pilot community at the Navy's first operational tour, Department Head, and Command milestones over the past 5 fiscal years.

**Figure 3: Navy Active Component Surveillance and Transport Actual Aviator Staffing Levels Compared with Authorized Operational Positions by Career Milestone, Fiscal Years 2013-2017**



Source: GAO analysis of Navy staffing level data. | GAO-18-439

Similarly, for operational positions the Marine Corps had a staffing gap among junior officers in each of its 3 fixed-wing pilot communities in fiscal year 2017. For example, the tanker pilot community had a gap of 27 junior officer pilots (13 percent of service-authorized levels) in fiscal year 2017, but a surplus of 76 senior officer pilots. The fighter and tanker pilot communities had more senior officers than service-authorized operational positions, while the tiltrotor community had a gap of 8 senior officer pilots (3 percent of service-authorized levels).<sup>38</sup> Table 4 compares actual staffing levels with service-authorized levels for operational positions for the Marine Corps active component tanker pilot community's junior

<sup>38</sup>The tiltrotor is an aircraft that operates as a helicopter for takeoffs and landings and, once airborne, converts to a turboprop aircraft. We included tiltrotor pilots in our review since the aircraft they operate function as fixed-wing aircraft once airborne.



(Officer-1 through Officer-3) and senior officers (Officer-4, and Officer-5 grade) over the past 5 fiscal years.

**Table 4: Percent of Marine Corps Active Component Tanker Pilot Positions Filled (Actual Staffing Levels Compared with Authorized Operational Positions) by Officer Grade, Fiscal Years 2013-2017**

Officer grade	Fiscal year 2013	Fiscal year 2014	Fiscal year 2015	Fiscal year 2016	Fiscal year 2017
Junior officer	108	87	98	90	88
Officer-4	143	154	174	176	185
Officer-5	124	164	171	161	191

Source: GAO analysis of Marine Corps staffing level data. | GAO-18-439

Note: Junior officer is defined as officers between the pay grades of Officer-1 and Officer-3 (e.g. lieutenants and captains).

Officials from both the Navy and the Marine Corps stated that, to mitigate gaps in junior officer pilots, they assign senior pilots (at the Officer-4 grade) from the same pilot community to staff unfilled junior pilot positions. However, Navy officials further stated that this approach reduces the number of Officer-4 grade pilots filling positions designated for their grade, and could reduce leadership opportunities considered to be necessary for promotion. In April 2018, we reported that reductions to active duty military end strength and aircraft readiness challenges have resulted in the services training fewer pilots than targeted over the last decade.<sup>39</sup> Specifically, from fiscal years 2007 through 2016, the Navy and the Marine Corps each trained 8 percent fewer new fighter pilots than the targeted amount. The Air Force also trained 12 percent fewer new fighter pilots than the targeted amount.

## Commercial Airline Pilot Demand and Compensation Have Increased

According to our analysis of BLS data from 2012 through 2017, labor market indicators for the pilot occupation were consistent with the existence of a pilot shortage. In addition, increasing demand for pilots—with projections that 810 to 1,450 new pilots will be needed annually over the next decade—and difficulties in keeping a steady supply of pilots may create additional gaps in the airline pilot labor market. Further, compensation for commercial airline pilots has increased in recent years, most noticeably in new-hire compensation at regional airlines.

<sup>39</sup>GAO-18-113.

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## Data Indicate the Likelihood that an Airline Pilot Shortage Exists

According to our analysis of BLS data from 2012 through 2017, unemployment rate, employment, and wage earnings for the pilot occupation were consistent with the existence of a shortage—a marked change since we last reported on the subject in February 2014.<sup>40</sup> While no single metric can be used to identify whether a labor shortage exists, we used labor market data as “indicators,” in conjunction with observations from stakeholders.<sup>41</sup> According to economic literature, if a labor shortage were to exist, one would expect (1) a low unemployment rate (signaling limited availability of workers in a profession), (2) increases in employment (due to increased demand for that occupation), and (3) increases in wages offered (to draw more people into the industry).<sup>42</sup> In February 2014, we reported that unemployment data for the pilot profession for 2000 through 2012 were consistent with the presence of a pilot shortage, employment data and wage earnings were not.<sup>43</sup> However, both of these indicators changed significantly from 2012 through 2017 (See table 5).

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<sup>40</sup>The BLS household survey-based Current Population Survey data used to evaluate these three indicators combined airline and commercial pilots into a single occupational category of pilots; therefore, we cannot isolate the extent to which the indicators apply only to airline pilots, although airline pilots represent about two-thirds of employment within the occupation. [GAO-14-232](#).

<sup>41</sup>A labor shortage occurs when demand for workers for a particular occupation is greater than the number (or “supply”) of workers who are qualified, available, and willing to do the work at a current wage rate.

<sup>42</sup>All data on the unemployment rate, employment, and earnings are from the Bureau of Labor Statistics’ Current Population Survey, unless otherwise noted. We previously reported on important limitations to these indicators, as measured using Current Population Survey data. See [GAO-14-232](#).

<sup>43</sup>[GAO-14-232](#).

**Table 5: Comparison of Selected Labor Market Indicators for the Airline Pilot Occupation for the Periods 2000 through 2012 and 2012 through 2017**

	Average unemployment <sup>a</sup>		Annual percent changes in employment <sup>b</sup>		Annual percent change in median wages <sup>c</sup>	
	2000-2012	2012-2017	2000-2012	2012-2017	2000-2012	2012-2017
<b>Pilots and flight engineers</b>	2.7	2.4	-1.1	4.5	-0.8	2.4
<b>All occupations</b>	6.3	6.0	0.1	2.0	0.1	0.9

Source: GAO and GAO analysis of the Bureau of Labor Statistics' Current Population Survey data. | GAO-18-439

Note: We previously reported on the data from 2000 through 2012 in GAO, *Aviation Workforce: Current and Future Availability of Airline Pilots*, [GAO-14-232](#) (Washington, D.C.: Feb. 28, 2014).

<sup>a</sup>The unemployment rate is the percentage of persons aged 16 years or older that had no employment, but were seeking employment, out of the entire labor force. The unemployment rate for an occupation includes those unemployed in that occupation based on their most recent job. We calculated "average unemployment" as the average unemployment rate in that occupation over the period.

<sup>b</sup>We calculated the "annual percent change in employment" as the annualized percent change in employment among full time workers in that occupation over the period.

<sup>c</sup>We calculated the "annual percent change in median wages" as the annualized percent change in median weekly earnings among full-time workers in that occupation (the boundary between the highest paid and the 50 percent lowest paid 50 percent in that occupation). The median wages were adjusted for inflation using the CPI-U.

Our analysis of BLS data from 2012 through 2017 shows that the unemployment rate of pilots averaged 2.4 percent—a much lower unemployment rate than for the economy as a whole, which averaged 6 percent over this period. This level of unemployment is consistent with a shortage because it suggests few pilots reported that they were looking for employment as a pilot and were unable to find it during this timeframe. In addition, we found that the unemployment rate has dropped since we last reported on this topic in February 2014.<sup>44</sup> Of the three indicators, the unemployment rate provides the most direct measure of a labor shortage because it estimates the number of people who are unemployed and actively looking for work in a specific occupation.<sup>45</sup>

Our analysis of BLS data from 2012 through 2017 shows that pilot employment has increased by 4.5 percent per year over this period, an increase that is consistent with a shortage. In comparison, for all occupations, employment has increased by about 2 percent per year over

<sup>44</sup>[GAO-14-232](#).

<sup>45</sup>See Malcom S. Cohen, *Labor Shortages as America Approaches the Twenty-first Century* (Ann Arbor: The University of Michigan Press, 1995).

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this period. In addition, our analysis of BLS data over this period showed that the median wages in the pilot occupation increased by approximately 2.4 percent per year. In comparison, for all occupations, wages increased by about 1 percent per year over this period. According to economic literature, a positive growth in wages is required for a shortage to be present. Therefore, the findings for this indicator appear consistent with a pilot shortage during this timeframe. However, median wages for the pilot occupation did not increase in every year, exhibiting swings of as much as 26 percent.

These data can indicate the extent to which employers may have difficulty attracting people at the current wage rate. It is important to note that the term “labor shortage” is sometimes used to describe a variety of situations, some of which are generally not considered to be shortages. For example, during periods of economic recession, employers may become accustomed to hiring high caliber candidates with specific training or levels of experience at a prescribed wage rate. In these cases, employers can be more selective when hiring for the position. However, during an economic expansion, when companies may be increasing the size of their workforce, it is likely that the number of job applicants will shrink and employers may have difficulty finding the same caliber of candidates as they would during a downturn. Under these circumstances the employer’s challenge may become the quality of applicants versus the quantity of applicants. Economic literature also suggests that when describing the nature and scope of any potential shortage, these indicators should be considered in conjunction with other information, such as industry trends that can affect the demand of and supply for qualified professionals as well as employer’s hiring experiences, as discussed below.

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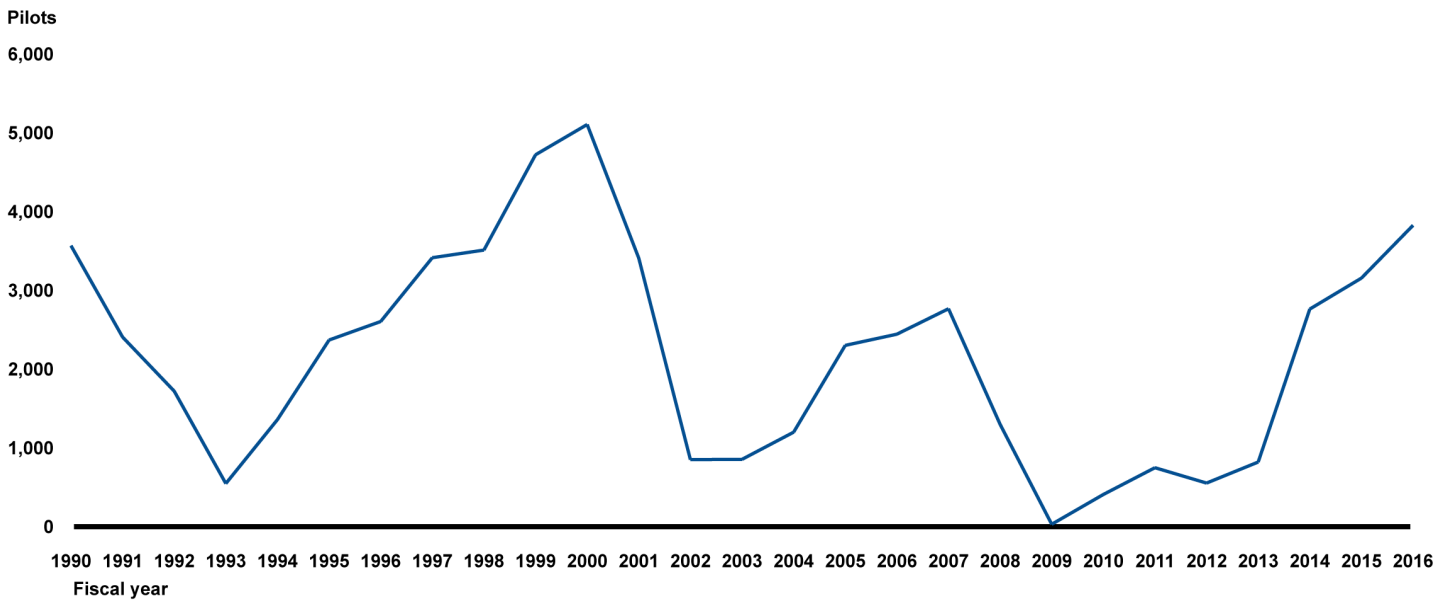
## Increasing Demand and Difficulties in Keeping a Steady Supply of Pilots May Create Gaps in the Airline Pilot Labor Market

Employment growth in U.S. airline pilots is driven by increases in passenger traffic (growth) and replacements for retirement and other attrition. Several reports have projected that airlines will need to hire an average of 810 to 1,450 new pilots annually over the next 10 years.<sup>46</sup> While these projections are helpful in gaining a sense for potential changes in aviation employment, developing long-term occupational employment projections is uncertain for a number of reasons, including assumptions about the future, some of which may not come to fruition. For example, the projections discussed above assumed continued economic growth, but if a recession or other unexpected economic event were to occur, the employment projections are likely to be overstated. Since 2013, mainline airlines have significantly increased pilot hiring to address growth demands and attrition. See figure 4 for trends in mainline airline pilot hiring.

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<sup>46</sup>Based on the BLS Employment Projections 2016-2026, we calculated that an average of 290 additional pilot jobs will be available annually through 2026 due to an average net increase in employment of 3.5 percent. BLS also projects an annual average of 810 openings during that 10-year period. A 2016 University of North Dakota study estimated that the industry would need to hire almost 14,500 new pilots over the next 10 years, for an annual average of about 1,450 over that 10-year period. J. Higgins, E. Bjerke, K. Lovelace, A. and Leonard, "US Airline Pilot Supply Forecast 2016" The University of North Dakota (2016).

**Figure 4: Mainline Airline Pilot Hiring from 1990 through 2016**



Source: GAO analysis of data from Future and Active Pilot Advisors (FAPA.aero), a career and financial advisory service for pilots and pilot aspirants. | GAO-18-439

Despite the indication of a shortage, according to representatives from an airlines' association, mainline airlines are not experiencing difficulty in attracting qualified and desirable candidates. Mainline airlines largely hire experienced pilots from the military services and regional airlines. According to aviation stakeholders, the proportion of former military pilots hired to work as civilian pilots depends on the sector. However, all stakeholders we spoke with estimated that the percentage is lower today than the estimate we previously reported that 70 percent of airline pilots hired prior to 2001 were military-trained.<sup>47</sup> Representatives of an airline pilots' association estimated that former military pilots currently make up about half of new hires at the larger mainline airlines and about 30 percent of new hires at low-cost mainline airlines and regional airlines. However, as mainline airlines hire from their regional partners in greater numbers, regional airlines have struggled to fill the gap with qualified candidates, according to representatives from an airlines' association, and have increasingly hired pilots with prior military experience. A 2015

<sup>47</sup> [GAO-14-232](#).

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study found that 12 percent of new hires at regional airlines were former military pilots, up from 3 percent before August 1, 2013.<sup>48</sup>

Aside from former military pilots, regional airlines have primarily relied on newly-certificated, civilian-trained pilots to fill entry-level first officer positions. There are no comprehensive data on pilot student graduations or enrollment from collegiate aviation schools or pilot training programs. However, available evidence suggests that the number of students completing pilot training has increased in recent years. According to Department of Education data,<sup>49</sup> the cumulative number of graduates of professional pilot-degree programs—those most likely to pursue a career as an airline pilot—increased about 34 percent from academic years 2012-2013 through 2015-2016.<sup>50</sup> However, the 1,986 reported graduates in academic year 2015-2016 is 15 percent fewer than the number of completions in the 2000-2001 academic year. According to aviation stakeholders, graduations are reflective of pilot labor market conditions about 4 years prior.<sup>51</sup> Additionally, while representatives from an airlines' association and collegiate aviation schools have noted increased enrollment at collegiate aviation schools in recent years, industry stakeholders have reported challenges to schools' ability to produce more pilots. Furthermore, representatives from one industry association expressed concern that students who graduate from these programs still must accrue hundreds of additional hours of flight time on their own—

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<sup>48</sup>The 2015 Pilot Source Study analyzed information on pilots hired by all regional airlines in the United States. See Elizabeth Bjerke et al., "Pilot Source Study 2015: US Regional Airline Pilot Hiring Background Characteristic Changes Consequent to Public Law 111-216 and the FAA First Officer Qualifications Rule," *Journal of Aviation and Technology Engineering*, vol. 5, no. 2 (2016).

<sup>49</sup>The Department of Education requires institutions of higher learning, including collegiate aviation schools, to report the number of degrees awarded, which we interpret as graduations. Schools classify and report completed degrees by program type using the Department of Education's classification system. The "Airline/Commercial/Professional Pilot and Flight Crew" code appears to best capture professional pilot program graduates, but because some pilot student graduates could be classified under a number of other aviation related programs, the number of professional pilot graduates could be higher. See GAO, *Collegiate Aviation Schools: Stakeholders' Views on Challenges for Initial Pilot Training Programs*, [GAO-18-403](#) (Washington, D.C.: May 15, 2018) for additional discussion of these data limitations.

<sup>50</sup>The cumulative number of graduates includes both U.S. citizens and foreign nationals that have completed certificates, and associate or bachelor degrees at U.S. institutions of higher learning.

<sup>51</sup>[GAO-18-403](#).

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which is not structured towards any particular training requirements and may not be geared towards airline operations or aircraft type—prior to being able to get an ATP and thus eligible to apply for an entry-level first officer position.<sup>52</sup>

The number of ATP certificate holders is large relative to airline pilot employment. FAA data show that an estimated 144,557 active pilots under the age of 65 held ATP certificates as of December 31, 2017—a greater number than at any point in the past 17 years and much greater than the over 84,000 pilots employed by airlines in 2016.<sup>53</sup> However, this large pool of ATP certificate holders may include pilots who are unavailable for work, not suitable or competent to act as pilots in airline operations, or unwilling to work at wages being offered.<sup>54</sup>

Despite this large pool, data indicate the number of new ATP certifications may not be keeping pace with airline hiring, which may affect the supply of civilian pilots in the near term. Although the average number of newly issued ATP certificates from 2012 through 2017 is 45 percent higher than it was from 2000 through 2011, much of that increase

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<sup>52</sup>To enhance the academic training and operational experience requirements for airline pilots, FAA created the ATP Certification Training Program (ATP CTP) to be a prerequisite for pilots to take the knowledge test to obtain an ATP certificate. This requirement went into effect August 1, 2014. Pub. L. No. 111-216, § 217 (2010). The program includes training in aerodynamics, automation, adverse weather conditions, air carrier operations, transport airplane performance, leadership, and professional development. Also, the program requires that pilots receive 10 hours of training in flight simulation training devices: 6 hours in a Level C or higher full-motion flight simulator, and 4 hours in Level 4 or higher flight training simulation device. Further, to serve to as a first officer for an airline, a pilot with an ATP or restricted-privileges ATP must also obtain an appropriate type rating for the aircraft for which he or she operates for the airline.

<sup>53</sup>An active pilot is a person with a pilot certificate and a valid medical certificate. Pilots are required to obtain a medical certificate that indicates they have passed a physical exam by a FAA-authorized doctor. 14 C.F.R. 61.23. To remain current for most types of pilot certificates, pilots must undergo a medical examination at various intervals. While airline captains must hold first-class medical certificates—requiring the most extensive medical examination—which must be renewed every 12 months for pilots under age 40 and every six months for pilots age 40 and over, first officers are allowed to hold second-class medical certificates which must be renewed every 12 months for all pilots regardless of age. 14 C.F.R. 61.23(d). Pilots age 65 and older are not allowed to work as airline pilots due to mandatory age retirement.

<sup>54</sup>Active pilots under the age of 65 who hold ATP certificates but are not employed by airlines may also be serving as pilots in the U.S. military, employed as pilots in non-airline operations, employed by foreign airlines, employed in non-pilot jobs in the aviation industry, or working in non-aviation careers. Data were not available to determine or verify how many active ATP certificate holders were otherwise employed.



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can be attributed to the 2013 change in FAA first officer qualification requirements, rather than an indication of a larger pilot pool.<sup>55</sup> Moreover, the number of newly issued ATP certificates dropped from 9,520 in 2016 to 4,449 in 2017. Furthermore, the average number of new commercial certificates, a prerequisite for the ATP certificate and necessary for a variety of non-airline pilot jobs, is down 6 percent from 2012 through 2017 (compared to the average from 2000 through 2011, which we previously reported on in February 2014). Reductions in the number of newly issued commercial and ATP certificates may affect the supply of civilian pilots in the near term, potentially presenting challenges for airlines seeking to fill vacancies caused by attrition and retirements, as discussed above.

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## Commercial Airline Pilot Compensation Has Increased

Compensation for commercial airline pilots has increased in recent years, most noticeably in new-hire compensation at regional airlines. According to representatives from an airlines' association, mainline airlines have been increasing salaries when contracts are up for renegotiation. Most mainline airlines are paying first officers who have been with them for 2 to 3 years between \$125,000 and \$150,000 a year, according to representatives from an airlines' association.<sup>56</sup> By contrast, at the completion of the initial service obligation, a military pilot would receive about \$107,650 to \$121,600, at the 10<sup>th</sup> and 11<sup>th</sup> years of service respectively, according to DOD documentation.<sup>57</sup> The following year, a pilot would potentially be eligible for an aviation retention bonus at a maximum amount of \$35,000 a year. Airline pilots have the opportunity to earn more as their seniority and the size of the aircraft increase, and if they promote to captain. Representatives from an airlines' association stated that during the recession, some mainline airline pilots had an 18-

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<sup>55</sup>To be eligible for hire as either a captain or first officer for an airline, individuals must also obtain an ATP certificate in addition to the other certificates and ratings. FAA requires all airline first officers to have an ATP certificate, which requires 1,500 hours of flight experience. Pilots with fewer than 1,500 hours can obtain a "restricted-privileges" ATP certificate (R-ATP), under which specific academic training courses can count towards the required hours of total flight time. 14 C.F.R. § 121.436.

<sup>56</sup>These salary estimates reflect wages and do not include other forms of compensation, such as benefits and the 12-to-17-percent of a pilot's salary that an airline typically puts toward a pilots' defined benefit retirement plan, according to representatives from an airlines' association.

<sup>57</sup>These salaries are for commissioned officers and include the officer's regular military compensation—which includes basic pay, housing allowance, and allowance for subsistence—and aviation incentive pay. These figures do not include military retirement or health care.

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year wait to promote to captain, but now first officers are promoting to captain sooner.

Airline and pilot representatives stated that many regional airlines have increased entry-level compensation for first officers to attract more pilots to their airlines. According to Air Line Pilots Association data, in 2016 the estimated average first year salary, including bonuses, for a first officer at a regional airline was about \$48,000. Excluding bonuses, the association estimates that first year salaries at regional airlines have increased approximately 53 percent since 2014. Even with increased compensation, regional airlines continue to face difficulties meeting hiring targets for new-hire first officers, according to representatives from an airlines' association. The representatives noted that many regional airlines observed an overall decline in the quality of flight experience of pilots applying for first-officer jobs and have cited higher drop-out rates among new-hire classes and new-hire candidates seeming to be less prepared for the airline environment, which they attribute to the lack of structured training while pilots are accruing enough flight time to be able to apply for their ATP.

As we reported in May 2018, student interest in pilot careers has increased because of a perception of a clearer career path for pilots, according to representatives at eight collegiate aviation schools.<sup>58</sup> Since 2001 the airline pilot career had lost some of its appeal for young people due to a variety of factors, including increases in education costs, limited sources of financial assistance, and a perceived lack of stability in the industry.<sup>59</sup> In addition, according to airline association representatives, changes to first officer qualification requirements also affected student perceptions. As we reported in May 2018, schools' ability to produce pilots is affected by key challenges, such as flight instructor retention and the high cost of training.

However, in recent years, airline industry growth and increasing pilot retirements, among other things, have caused commercial airlines to accelerate pilot recruitment, enhance cadet programs, and collaborate with flight schools to improve the pipeline of pilots from initial flight training to an entry-level first officer position, according to airline association representatives. These efforts have been focused on the pool of would-be

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<sup>58</sup>[GAO-18-403](#).

<sup>59</sup>[GAO-14-232](#).

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pilots being trained on the civilian side, although according to representatives from one airline association, there is a program aimed at former military rotary-wing pilots in an effort to get them training for fixed-wing aircraft. According to Army officials, they are concerned that such programs may begin to affect their rotary-wing staffing levels and that they may experience staffing challenges as a result. Details on the Army's fixed-wing pilot communities are provided in appendix I.

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## DOD Monitors Pilot Retention Through Loss Rates, but Insufficient Data Limit a Full Understanding of the Effects of the Airline Pilot Labor Market on Military Pilot Retention

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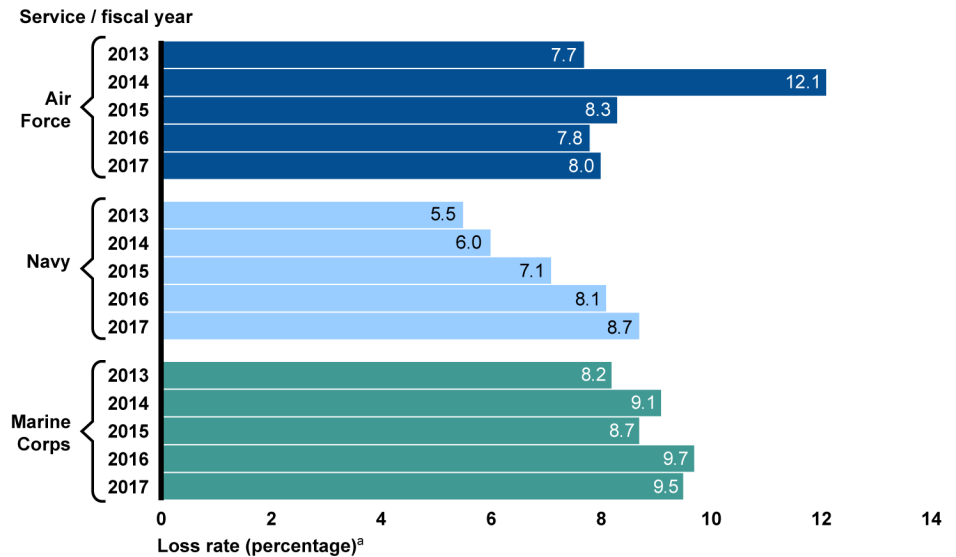
### The Air Force, the Navy, and the Marine Corps Monitor Pilot Retention through Pilot Loss Rates

Officials from all three services stated that they monitor pilot retention through pilot loss rates, which represent the percentage of pilots a service lost during a given fiscal year for reasons such as separation or retirement. The Air Force's loss rate remained relatively stable at around 8 percent over the past 5 fiscal years—with a notable exception in 2014.<sup>60</sup> However, the Navy has experienced a steady increase in its pilot loss rate over this timeframe—increasing from 5.5 percent in fiscal year 2013 to 8.7 percent in 2017. In addition, the Marine Corps had a slight increase in its loss rate over this timeframe, ranging from 8.2 percent to 9.7 percent. Figure 5 provides an overview of the services' pilot loss rates over the past 5 fiscal years.

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<sup>60</sup>Reductions to active duty military end strength have contributed to reductions in Air Force pilot staffing levels. For example, in April 2018, we reported that the Air Force offered 54 fighter pilots early retirement incentives between fiscal years 2014 and 2015. See [GAO-18-113](#).

**Figure 5: Air Force, Navy, and Marine Corps Pilot Loss Rates, Fiscal Years 2013-2017**



Source: GAO analysis of Air Force, Navy, and Marine Corps information. | GAO-18-439

<sup>a</sup>Loss rates represent the percentage of pilots a service lost during a given fiscal year for reasons such as separation or retirement.

For each service, the loss rates varied by pilot community. For example, the Air Force’s fighter and bomber pilot communities had the highest loss rates in fiscal year 2017—both of which were over 10 percent. Within the Marine Corps, the tanker community had the highest loss rate—11.9 percent—and the tiltrotor community had the lowest loss rate—6.4 percent—in fiscal year 2017. A Marine Corps official stated that the tiltrotor community has historically had one of the best retention rates, but that this is, in part, because it is a new community and many of the pilots are still under their initial service obligation. The official stated that this could change as the community continues to grow and as pilots become eligible to separate from the Marine Corps.

The three services use pilot loss rates to identify any changes in pilot retention over time. For example, Navy officials stated that they assess loss rate trends over the past 5 fiscal years to estimate future loss rates. These officials further stated that whether the loss rate is manageable depends on the specific pilot community and the specific situation, but noted that a 6 percent loss rate is typically manageable. According to an Air Force official, the Air Force monitors pilot retention through its annual rated officer retention reports. These reports provide a breakdown of

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losses by pilot community during a given fiscal year, a historical overview of continuation rates, and aviation retention bonus take rates, which will be discussed later in this report.<sup>61</sup> An Air Force official noted that while monitoring pilot loss rates allows the Air Force to identify any changes in retention behaviors over time, loss rates are most useful when compared against the number of pilots the service is producing. This official stated that, assuming steady service-authorized staffing levels, the Air Force needs to at least produce the same number of pilots as it is losing each fiscal year. Similarly, a Marine Corps official stated that the Marine Corps uses historical and forecasted pilot loss rates to adjust the number of new pilots needed.

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### Studies Identify a Correlation between Commercial Airline Hiring and DOD Pilot Retention, but Insufficient Data Limit an Understanding of the Extent of Its Effects on Military Pilot Retention

The studies we reviewed identified a correlation between commercial airline hiring and DOD pilot retention, and discussed several factors affecting military retention. Specifically, in a 2016 study on Air Force pilot retention, the RAND Corporation identified a correlation between major airline pilot hiring and active duty Air Force pilot separations from 1996 to 2013.<sup>62</sup> The study found, among other things, that Air Force pilot separations tend to move in tandem with major airline hiring—as airline hiring increases, so do Air Force separations. A separate RAND study also identified a correlation between full-time pilot turnover in both the Air Force Reserve and the Air National Guard, and major airline hiring from 1997 to 2014.<sup>63</sup>

RAND’s 2016 study on Air Force pilot retention used a dynamic retention model to simulate the steady-state effect of a number of factors, including increases in major airline hiring and compensation, on Air Force pilot

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<sup>61</sup>Aviation retention bonus take rates are the percentage of pilots signing aviation retention bonus service agreements out of the total population of eligible pilots.

<sup>62</sup>RAND Project Air Force conducted this study at the request of the Air Force. Specifically, the Air Force requested that RAND provide information on recent and likely future changes in airline pilot demand and civilian opportunities for Air Force pilots; assess whether and how such changes would affect pilot retention in the Air Force; and analyze whether and how aviation special and incentive pay programs would need to change to sustain pilot retention. RAND Project AIR FORCE, *Retaining U.S. Air Force Pilots When the Civilian Demand for Pilots Is Growing* (Santa Monica, Calif.: Rand Corporation, 2016).

<sup>63</sup>RAND Project AIR FORCE, *Can the Air Force and Airlines Collaborate for Mutual Benefit: An Exploration of Pilot and Maintenance Workforce Options* (Santa Monica, Calif.: Rand Corporation, 2016).

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retention.<sup>64</sup> RAND used the model to simulate several different outcomes by changing various factors, such as the specific number of airline pilots hired each year. For example, under one scenario, the study estimated that the Air Force would experience a steady-state decline in force size of 12.3 percent or 1,587 pilots per year assuming: (1) an increase in major airline hiring by 3,200 pilots per year, (2) a 50 percent probability of being hired by a major airline, (3) a 13 percent net increase in civilian pilot pay, and (4) a 4 percent net increase in civilian non-pilot pay through 2018 relative to 2014.<sup>65</sup> Under this scenario, the study authors argued that there is evidence to support an increase in the aviation retention bonus cap from \$25,000 to \$48,500.<sup>66</sup>

Other studies we reviewed examined both monetary and non-monetary factors predicted to affect military pilot retention, including the commercial airline industry. For example, a 2015 study found, among other things, that the value of a major airline salary is correlated with a pilot's retention decision.<sup>67</sup> The study discussed other factors, such as fewer opportunities to fly, that are also predicted to increase an individual's likelihood of leaving the active duty Air Force.

In July 2016, DOD submitted a report to Congress in support of increasing special and incentive pays for aviation officers.<sup>68</sup> DOD's report cited findings from RAND's 2016 study on Air Force pilot retention, including the correlation between major airline pilot hiring and active duty Air Force pilot separations, as well as RAND's projections for needed increases to aviation retention bonuses given increased airline hiring

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<sup>64</sup>RAND developed the dynamic retention model to analyze manpower and personnel policies for the Air Force and the Office of the Secretary of Defense.

<sup>65</sup>We did not evaluate these assumptions. The study notes that not all outgoing military pilots will seek careers as civilian pilots. In characterizing civilian pay opportunities available to Air Force pilots, the study considered both pilot and non-pilot pays.

<sup>66</sup>At the time the study was conducted, the cap for aviation retention bonuses was \$25,000. The National Defense Authorization Act for Fiscal Year 2017 increased the cap to \$35,000. See Pub. L. No. 114-328, § 616(a) (2016).

<sup>67</sup>Specifically, as the monthly value of major airline senior captains with greater than 12 years on the job increased, the predicted probability of active duty Air Force fighter and bomber pilot attrition increased. N. Sweeney, "Predicting Active Duty Air Force Pilot Attrition Given an Anticipated Increase in Major Airline Pilot Hiring" (dissertation, Pardee RAND Graduate School, 2015).

<sup>68</sup>Department of Defense, *Report to Congress in Support of Increasing Special and Incentive Pays for Aviation Officers* (July 2016).

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assumptions. In the July 2016 report, DOD requested an increase in the maximum bonus amount from \$25,000 to \$35,000 in an effort to stay ahead of projected airline hiring expected over the next few years.<sup>69</sup> Air Force officials stated that while DOD cannot match airline salaries, increased bonus amounts help it to be more competitive.

However, DOD does not have data on the number of pilots that leave the military for employment at the commercial airlines, which ultimately limits its ability to understand the extent of the relationship between the airlines and military pilot retention. Specifically, officials from the Air Force, the Navy, and the Marine Corps stated that their services do not have a mechanism to consistently capture information on the number of pilots that join commercial airlines after separating or retiring from the military. In addition, while the FAA tracks the number of ATP certificates issued—which as previously discussed, are necessary to fly as a captain or first officer for an airline—FAA officials stated that the agency does not maintain data on the number of former military pilots employed by the commercial airlines. Further, RAND’s 2016 study identified the absence of data on the jobs taken by rated officers when they leave the military as a limitation of its work. For example, RAND noted that data on the number of officers that become pilots for large airlines, and how that varies by type of aircraft flown in the military and by years of service at exit is not routinely collected. RAND researchers that we spoke with stated that these data are important for understanding pilots’ retention decisions.

Officials from the Office of the Secretary of Defense agreed that DOD does not have a good understanding of where pilots seek employment after separation from the military, and that this information is critical to better understanding retention challenges. They further stated that there is an assumption that military pilots join the mainline airlines, but there is no data to support it. In addition, fighter pilots from the Air Force, the Navy, and the Marine Corps told us that fighter pilots do seek employment with the airlines after separating from the military, but that they also seek careers in technology, consulting, fracking, and banking,

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<sup>69</sup>*The National Defense Authorization Act for Fiscal Year 2017* increased the cap for the aviation bonus from \$25,000 to \$35,000 for each year of obligated service. See Pub. L. No. 114-328, § 616(a) (2016).

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among other industries.<sup>70</sup> *Standards for Internal Control in the Federal Government* states that management should use quality information to achieve the entity's objectives.<sup>71</sup> Specifically, management should obtain relevant data from reliable internal and external sources in a timely manner based on the identified information requirements. Further, management should establish and operate monitoring activities and evaluate the results.

The services have taken some steps to coordinate with the commercial airlines. Specifically, an Air Force official stated that the Air Force participates in quarterly meetings of the National Pilot Sourcing Forum, which are attended by chief executives and pilots of the mainline and regional airlines, the FAA, the Office of the Secretary of Defense, and the military services. In addition, according to service officials, all three services currently conduct exit surveys to capture, among other things, information about pilots' reasons for leaving military service. Navy officials stated that while the Navy's exit surveys do not capture information about whether pilots are seeking employment with the commercial airlines, they could potentially be revised to do so. These officials further stated that they would like to pursue more rigorous methods to identify retention challenges and that as part of this, the Navy Bureau of Personnel is planning to conduct a survey of all aviators leaving the Navy to determine their primary reasons, including whether they are planning to seek employment with the airlines. A Marine Corps official also noted the possibility of collecting this information through the Marine Corps' exit surveys.

Without developing and implementing mechanisms to consistently capture information on pilots' post-service employment—including the number of those going to the commercial airlines—DOD will not have the information it needs about post-service career preferences and, therefore, a complete understanding of how these preferences affect its retention

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<sup>70</sup>As part of our related work on fighter pilot workforce management, we conducted 13 discussion groups ranging between 3 and 20 fighter pilots per group. While these discussion sessions and interviews allowed us to learn about many important aspects of the fighter pilot workforce from the perspective of fighter pilots and squadron leaders, they were designed to provide anecdotal information, not results that would be representative of all the department's more than 5,000 fighter pilots as of fiscal year 2017. Additional details on the methodology can be found in GAO, *Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements*, [GAO-18-113](#) (Washington, D.C.: Apr. 11, 2018).

<sup>71</sup>[GAO-14-704G](#).



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efforts. This additional information would be useful when determining which retention incentives to pursue and how to establish aviation retention bonus amounts.

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## The Air Force, the Navy, and the Marine Corps Have Retention Incentives, but the Air Force Business Case Lacks a Key Piece of Information to Appropriately Target Bonuses

The Air Force, the Navy, and the Marine Corps have recently developed non-monetary incentives to increase pilot retention that focus on improving the quality of life for pilots. In addition, while the services have generally decreased their spending on aviation incentive pay and aviation retention bonuses since fiscal year 2013, they all project future increases. Further, in accordance with a statutory requirement, the Air Force prepares an annual business case for its aviation retention bonuses, but it does not differentiate staffing gaps by officer grade to ensure bonuses are appropriately targeted.

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## The Air Force, the Navy, and the Marine Corps Have Recently Developed Non-Monetary Retention Incentives Focused on Improving Quality of Life in Four Key Areas

Each service has recently taken steps to identify and address retention challenges. For example, the Air Force established a *Fighter Enterprise Tiger Team* in March 2016, which focused on fighter pilot challenges. It subsequently increased the scope of this effort to include other pilot communities and renamed it the *Aircrew Crisis Task Force* in February 2017.<sup>72</sup> In addition, the Navy is formulating a service-wide strategy—referred to as *Sailor 2025*—which includes over 40 initiatives. Through their surveys and symposia, the Air Force, the Navy, and the Marine Corps have identified four key areas affecting quality of life and pilot retention—flying time, locational flexibility, career flexibility, and time on home station—and developed non-monetary incentives to address them.

- **Increased flying time.** The three services have identified limited flying opportunities—due to staffing pilots to non-flying positions, increased administrative burdens, and reductions in available aircraft—as a retention challenge, and have taken steps to increase

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<sup>72</sup>In April 2018, we reported that the Fighter Enterprise Tiger Team formulated a range of initiatives to address the fighter pilot shortage. The Aircrew Crisis Task Force addresses workforce challenges for all rated personnel, i.e. servicemembers with an aeronautical rating—including pilots, combat systems officers, and air battle managers. [GAO-18-113](#).

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flying time for pilots. For example, the Air Force has reviewed non-flying duties pilots perform and has reduced 29 additional administrative duties and 31 computer-based training courses. In addition, Navy officials stated that they have created opportunities for senior officer pilots to continue flying as instructor pilots.

- **Locational flexibility.** The three services have identified regular moves—which create disruptions for military families—as another retention challenge, and have taken steps to address this challenge. For example, in September 2016 the Navy approved an initiative to allow families to submit a request to remain in the same location, allowing their children to complete their senior year of high school. In March 2016 the Navy also approved a military couple assignment policy, wherein dual-military couples are assigned a special identifier, and the Navy works to find a co-location assignment.
- **Career flexibility.** The three services have identified a lack of career flexibility for pilots—such as control over the timing of their careers—as a retention challenge, and have developed incentives to address this. For example, each service has pilots that have participated in the Career Intermission Pilot Program.<sup>73</sup> Specifically, as of April 2018, 10 Air Force pilots, 9 Navy pilots, and 1 Marine Corps pilot had participated in the program. In addition, the Marine Corps’ fiscal year 2018 aviation bonus business case analysis states that the Marine Corps works individually with pilots to match personal preferences for assignments.
- **Increased time on home station.** The three services have identified limited time at home as a retention challenge, and have taken steps to re-evaluate target deployment lengths. For example, in February 2017 Marine Corps leadership set lower operational tempo goals for the whole service to increase time at home. Marine Corps officials stated

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<sup>73</sup>We have previously reported on the Career Intermission Pilot Program. In October 2015, we reported that participation in the program has remained below statutorily authorized limits, and officials have identified factors that could be affecting participation, but DOD has not developed a plan for evaluating whether the program is an effective means to retain servicemembers. GAO recommended that DOD develop and implement a plan to evaluate whether the program is enhancing retention. DOD concurred with GAO’s recommendation. As of April 2018, the recommendation remained open. GAO, *Military Personnel: DOD Should Develop a Plan to Evaluate the Effectiveness of its Career Intermission Pilot Program*, [GAO-16-35](#) (Washington, D.C.: Oct. 27, 2015). In May 2017, we made observations on the Career Intermission Pilot Program, including the number of servicemembers that participated and their occupations. We did not make any recommendations. GAO, *Military Personnel: Observations on the Department of Defense’s Career Intermission Pilot Program*, [GAO-17-623R](#) (Washington D.C.: May 31, 2017).

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that they also work with individual Marines in the assignment process to reduce temporary assignments and training at other locations. In addition, the Air Force is considering reducing deployments for rated personnel from 180 days to 120 days to enable Air National Guard and Reserve personnel to staff the assignments.

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**The Services' Monetary Retention Incentives Generally Decreased since Fiscal Year 2013, but Are Projected to Increase in the Future**

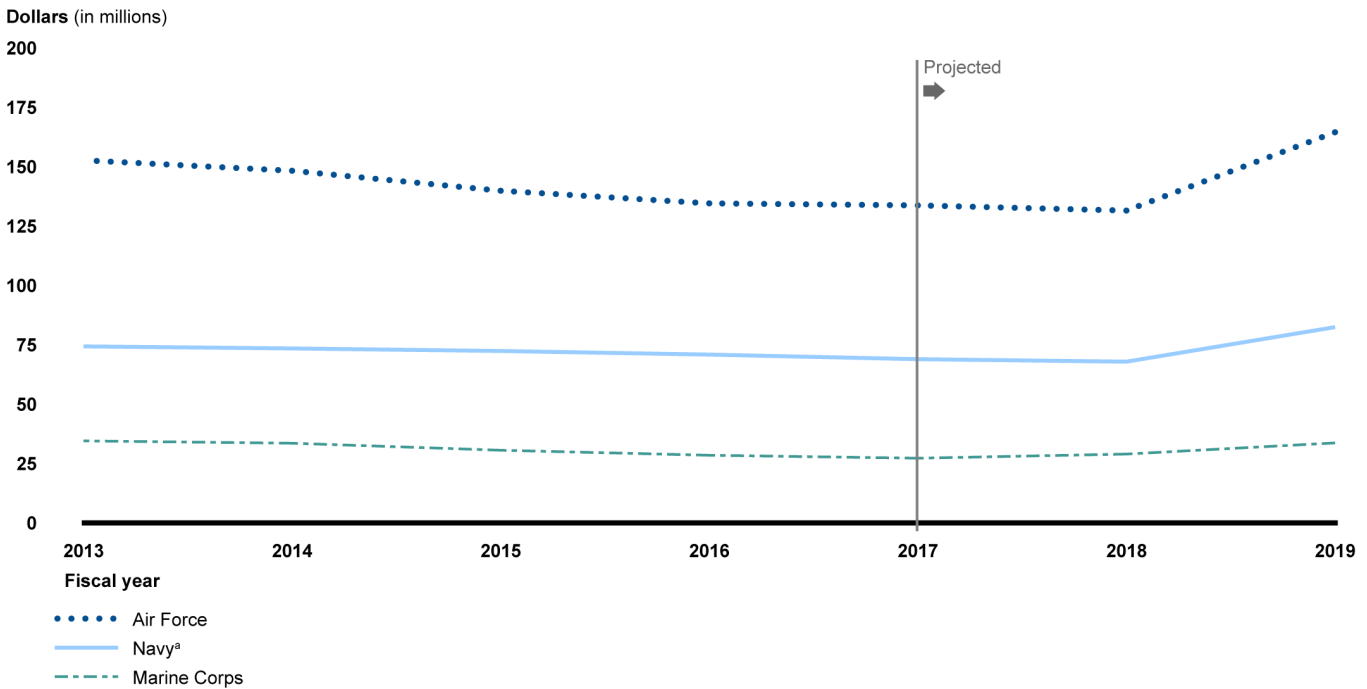
As previously discussed, the services primarily provide two types of monetary incentives to pilots—aviation incentive pay and aviation retention bonuses. Since 2013, both types of monetary incentives have seen a decrease, but the Air Force, the Navy, and the Marine Corps all anticipate future increases in both types.

**Aviation incentive pay.** Due to a decrease in the number of aviators eligible for aviation incentive pay, the Air Force, the Navy, and the Marine Corps' spending on aviation incentive pay decreased over the past 5 fiscal years. For example, the number of eligible Marine Corps pilots decreased from 5,695 in fiscal year 2013 to 4,278 in fiscal year 2017 (a 25-percent decrease). Office of the Secretary of Defense officials stated that the decrease in spending and eligible pilots is a reflection of sustained down-sizing, which occurred during this period. However, each service anticipates an increase by fiscal year 2019 as the number of eligible pilots increases, and because the maximum amount of incentive pay authorized increased from \$850 to \$1,000 a month in fiscal year 2017.<sup>74</sup> Specifically, the Marine Corps anticipates an increase beginning in fiscal year 2018, and the Air Force and the Navy in fiscal year 2019. Figure 6 shows the actual costs for aviation incentive pay by service over the past 5 fiscal years and projected costs for fiscal years 2018 and 2019.

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<sup>74</sup>The *National Defense Authorization Act for Fiscal Year 2017* increased the maximum monthly rate to \$1,000. Pub. L. No. 114-328, § 616(a) (2016).

**Figure 6: Actual and Projected Costs for Aviation Incentive Pay by Service, Fiscal Years 2013-2019**

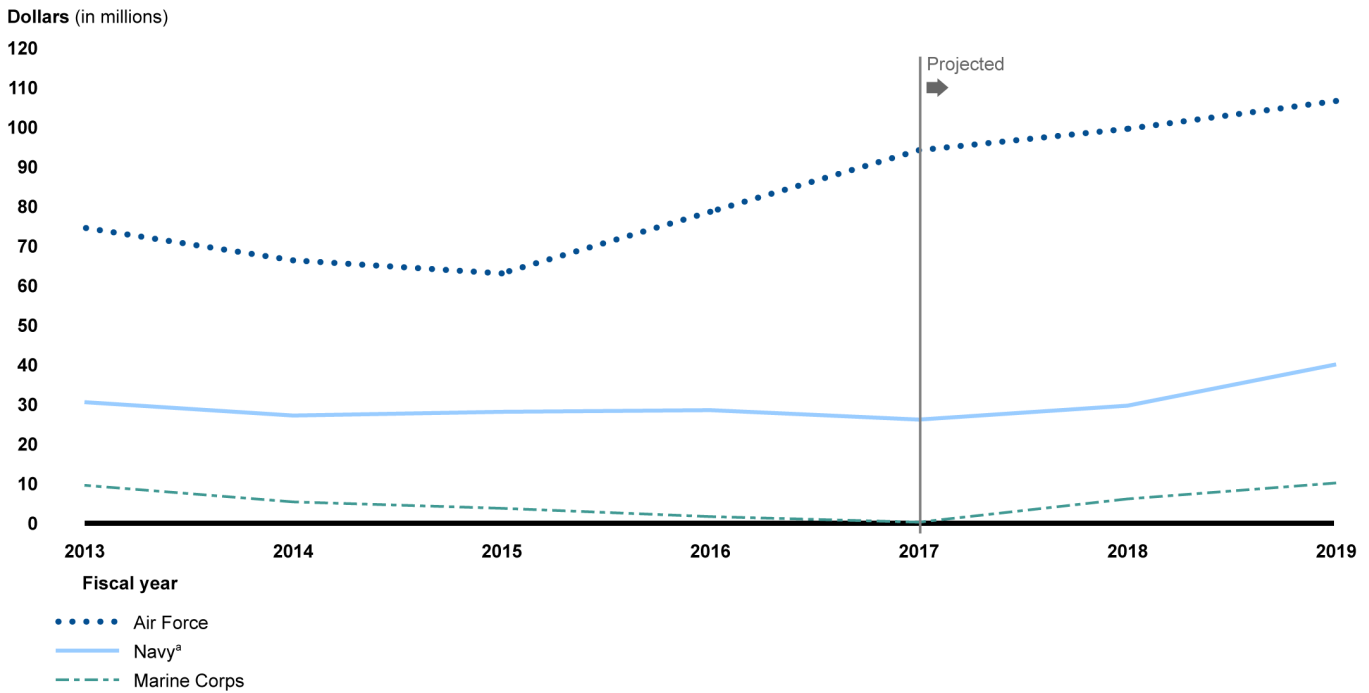


Source: GAO analysis of Air Force, Navy, and Marine Corps budget data. | GAO-18-439

<sup>a</sup>The costs presented are from the services' budget justification documents. The Navy made subsequent changes to its aviation incentive pay program in fiscal year 2018, which are not reflected in this figure.

**Aviation retention bonus.** The Air Force, the Navy, and the Marine Corps also generally decreased aviation retention bonus spending between fiscal years 2013 and 2015. Specifically, Air Force spending decreased from about \$74.6 million in fiscal year 2013 to about \$63.1 million in fiscal year 2015. Marine Corps spending also decreased because it did not offer new aviation retention bonus service agreements between fiscal years 2012 and 2017, and only paid bonuses under existing service agreements. However, each service anticipates increases by fiscal year 2019. For example, the Air Force projects that its spending will increase to more than \$106.6 million by fiscal year 2019, due to an increase in the number of recipients and bonus amounts offered. In addition, the Marine Corps reintroduced its bonus in fiscal year 2018, and spending is projected to increase to more than \$10.2 million by fiscal year 2019. Figure 7 compares Air Force, Navy, and Marine Corps actual costs for aviation retention bonuses over the past 5 fiscal years and projected costs for fiscal years 2018 and 2019.

**Figure 7: Air Force, Navy, and Marine Corps Actual and Projected Aviation Retention Bonus Costs, Fiscal Years 2013-2019**



Source: GAO analysis of Air Force, Navy, and Marine Corps budget data. | GAO-18-439

<sup>a</sup>The costs presented are from the services' budget justification documents. The Navy made subsequent changes to its aviation retention bonus program in fiscal year 2018, which are not reflected in this figure.

As we previously reported in February 2017, each of the services took a different approach to implement the aviation retention bonus.<sup>75</sup> Specifically, there are differences in how the services identified the target population and established service agreement amounts offered. The services may target the aviation retention bonus to specific groups of aviators, adjust the pay amounts on an annual basis, or choose not to offer the pay at all. These approaches resulted in different bonus amounts offered by the Air Force, the Navy, and the Marine Corps from fiscal years 2013 through 2018, as shown in table 6.

<sup>75</sup>GAO, *Military Compensation: Additional Actions Are Needed to Better Manage Special and Incentive Pay Programs*, [GAO-17-39](#) (Washington, D.C.: Feb. 3, 2017).

**Table 6: Active Duty Aviation Retention Bonus Amounts, Fiscal Years 2013-2018**

Military service	Fiscal year 2013	Fiscal year 2014	Fiscal year 2015	Fiscal year 2016	Fiscal year 2017	Fiscal year 2018
<b>Air Force</b>	\$45,000-\$225,000	\$125,000-\$225,000	\$125,000-\$225,000	\$75,000-\$225,000	\$28,000-\$455,000	TBD
<b>Navy</b>	\$50,000-\$125,000	\$75,000-\$125,000	\$75,000-\$125,000	\$75,000-\$125,000	\$75,000-\$125,000	\$30,000-\$175,000
<b>Marine Corps</b>	N/A	N/A	N/A	N/A	N/A	\$40,000

Source: GAO analysis of Air Force, Navy, and Marine Corps data. | GAO-18-439

Note: The amounts listed are the range of amounts offered over the term of the service agreement for each platform for the specific fiscal year offering. Aviation retention bonus service agreements offered to non-pilot aviators are not included. As of April 2018, the Air Force had not yet finalized its aviation retention bonus offerings for fiscal year 2018. The Marine Corps did not offer new aviation retention bonus service agreements between fiscal years 2012 and 2017.

We found that the services differ in target pilot populations. For example, the Air Force offers the bonus to pilot communities (for example, fighter or bomber pilots), while the Navy and the Marine Corps offer the bonus by aircraft model. Further, while the Air Force and Navy offer an aviation retention bonus to all of their fixed-wing pilot communities, the Marine Corps limited its fiscal year 2018 bonus to the F/A-18, F-35, AV-8B, and MV-22 pilot communities.

Officials from all three services stated that they measure the effectiveness of aviation retention bonuses by monitoring bonus take rates. Air Force pilots' aviation retention bonus take rates declined from 68 percent in fiscal year 2013 to 44 percent in fiscal year 2017, while Navy take rates decreased from 51 percent in fiscal year 2013 to 43 percent in fiscal year 2017.<sup>76</sup> Air Force officials noted that bonus take rates do not provide a complete measure of retention because some pilots who do not take a bonus may still decide to continue their service. These officials stated that there are indications that the number of pilots continuing their service without taking a bonus has recently increased. An Air Force official attributed this change to pilots' desire for career flexibility and reluctance to enter into an additional service obligation. Table 7 describes Air Force and Navy bonus take rates over the past 5 fiscal years.

<sup>76</sup>The Marine Corps did not offer new aviation retention bonus service agreements between fiscal years 2012 and 2017.

**Table 7: Percent of Eligible Air Force and Navy Pilots Accepting Aviation Retention Bonuses, Fiscal Years 2013-2017**

Military service	Fiscal year 2013	Fiscal year 2014	Fiscal year 2015	Fiscal year 2016	Fiscal year 2017
Air Force	68	59	55	48	44
Navy	51	51	51	42	43

Source: GAO analysis of Air Force and Navy aviation retention bonus data. | GAO-18-439

Note: The Air Force’s fiscal year 2014 take rate removed pilots that participated in voluntary force management from the take rate calculation. The Air Force’s fiscal year 2017 take rate for pilots does not include pilots permanently flying remotely piloted aircraft. The Navy’s take rates are representative of all aviators. Navy aviators have a two-year eligibility period during which they can accept an aviation retention bonus. The Navy’s take rates for each fiscal year represent the percentage of eligible aviators within that cohort that accepted a bonus. The Marine Corps did not offer new aviation retention bonus service agreements between fiscal years 2012 and 2017.

**The Air Force’s Annual Business Case Does Not Differentiate Staffing Gaps by Officer Grade to Ensure That Bonuses are Appropriately Targeted**

In accordance with a statutory requirement, the Air Force prepares an annual business case for aviation retention bonuses, but it does not differentiate staffing gaps by officer grade to ensure bonuses are appropriately targeted. Section 334(c)(2) of Title 37 of the U.S. Code states that the services shall determine the amount of the aviation bonus payable solely through a business case analysis of the amount required to be paid in order to address anticipated staffing shortfalls for the fiscal year by aircraft type category. There are no specific requirements about what must be included in the services’ business case analyses. Since fiscal year 2017, the business case analysis is required to be included with budget justification materials in support of the President’s budget each fiscal year.<sup>77</sup> In response to this requirement, the Air Force prepared business cases for fiscal years 2017 and 2018.<sup>78</sup>

While we found that the Air Force provided some useful information about its bonus program in these analyses, we also identified a key limitation. For example, the fiscal year 2018 business case included useful

<sup>77</sup>While all of the military services are required to submit annual business cases for aviation bonus payments, section 616 of the *National Defense Authorization Act for Fiscal Year 2018* specifically requested that we review the Air Force’s business case. Pub. L. No. 115-91 (2017). In addition, the Air Force obligates the most money on an annual basis for aviation retention bonuses and recently increased its maximum offered bonus amount to the statutory cap of \$35,000.

<sup>78</sup>The Air Force Reserve and the Air National Guard prepared separate business cases for their aviation retention bonuses in fiscal years 2017 and 2018. Details about the business cases and the Air Force reserve component’s fixed-wing pilot staffing levels from fiscal years 2013 through 2017 are provided in appendix II.

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information on staffing levels for the prior fiscal year, as well as projected staffing levels for the next 2 fiscal years, by pilot community, such as fighter and bomber pilots.<sup>79</sup> Both business cases also included a justification for the funds requested. Specifically, the fiscal year 2018 business case states that the amount requested for each aircraft type category is necessary to influence the retention behavior of specific experienced aviators to meet emerging service requirements and increased demand.

The fiscal year 2018 business case, which was submitted to the DOD Comptroller by Air Force Financial Management and Comptroller, also discusses non-monetary incentives to improve retention, such as increasing input and transparency in the assignment process, and improving support for families. In addition, it includes information about the projected effects of the bonus program on pilot staffing levels. Specifically, the business case states that the Air Force projects that pilot staffing levels will stop declining from fiscal year 2022 onward, but that the Air Force does not anticipate material improvements under its current program.<sup>80</sup>

The information for aviation retention bonus amounts included in the Air Force business case is developed from a model. This model divides the Air Force pilot communities into different levels—or tiers. These tiers reflect the bonus amount that each pilot community receives. Pilot communities at the highest tier level are offered the highest bonus amount. For example, in fiscal year 2017, the fighter pilot community was identified as “tier 1,” and the Air Force offered pilots within this community the maximum bonus amount allowed—\$35,000 per year. To determine the tiers, the model weighs four factors: (1) overall staffing levels (40 percent), (2) bonus take rates (40 percent), (3) time to train a replacement pilot (10 percent), and (4) cost to train a replacement pilot (10 percent). The model then assigns a tier level to each pilot community. According to an Air Force official, these tiers were developed because statutory

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<sup>79</sup>The Air Force’s business cases for fiscal years 2017 and 2018 provided information on staffing levels and bonus amounts for the following pilot communities: fighter; bomber; mobility; special operations; command, control, intelligence, surveillance, and reconnaissance; rescue; and remotely piloted aircraft pilots.

<sup>80</sup>Air Force Manpower and Personnel staff, who are responsible for the aviation retention bonus program, stated that they do not agree with this statement and that staffing level projections produced by RAND do not show this improvement with the current aviation pay authorities and major airline hiring.



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restraints constrain the bonus amounts that the Air Force is able to offer to pilot communities; this model helps the Air Force target and prioritize bonuses by pilot community in its annual business case. This official stated that after the model determines tier levels, Air Force Manpower and Personnel determines service agreement lengths and amounts for each pilot community, using information such as bonus take rates from prior years and projected staffing levels to inform those decisions.

However, we identified one important limitation related to the staffing levels included in the model that the Air Force uses to prepare its annual business case. According to an Air Force official, staffing levels—one of the four factors included in the Air Force’s model—refer to a pilot community’s overall staffing levels. The staffing levels do not differentiate between staffing gaps among senior officers—indicating retention challenges—and gaps among junior officers, indicating other challenges, such as training. An Air Force official stated that the Air Force includes overall staffing levels in the aviation bonus model because even if staffing gaps are concentrated among junior officers in a particular pilot community, the Air Force needs to retain more senior officers than it otherwise would to fill those positions and mitigate the gap. However, this official acknowledged that once a pilot community’s staffing levels are healthy, it will become important to differentiate between staffing gaps of junior versus senior officers when determining aviation retention bonuses. This official further stated that the number of senior officers needed to fill junior officer positions depends heavily on the number of junior pilots that have been produced over the previous decade.

*Standards for Internal Control in the Federal Government* states management should use quality information to achieve the entity’s objectives.<sup>81</sup> Because the Air Force’s model for determining aviation retention bonuses does not differentiate between staffing gaps among junior and senior officers it cannot provide key information the Air Force needs to manage its aviation retention bonus program. Without analyzing staffing levels by officer grade for each pilot community as part of its annual business case, the Air Force may not know whether it is targeting bonuses, in the right amounts, to the appropriate pilot communities—those with the greatest gaps of senior officers.

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<sup>81</sup> [GAO-14-704G](#).

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## Conclusions

While staffing gaps have decreased or generally stayed the same in many of DOD's fixed-wing pilot communities, gaps remain. The military services monitor pilot retention to ensure that operational requirements can be met and that DOD is able to successfully execute its national security mission. However, DOD does not have key information on pilots' post-service employment, including the number of pilots that leave the military for employment at the commercial airlines. While DOD and service officials assume a significant number of former military pilots are joining the airlines—and they have requested increases to aviation retention bonus amounts specifically to be more competitive with the airlines—they lack data to understand the full range of pilots' post-service career preferences. This limits DOD's ability to more fully understand pilots' decisions to remain in or leave the military.

Moreover, in preparing its annual business case for the aviation retention bonus program, the Air Force lacks visibility into whether staffing gaps are concentrated among junior officers or senior officers when determining bonus amounts. This is because the model it uses to prepare the business case does not distinguish between junior and senior officer staffing levels for each pilot community. Having better information on where staffing gaps are concentrated within each pilot community would provide the Air Force the information it needs to ensure that bonuses are appropriately targeted.

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## Recommendations for Executive Action

We are making the following four recommendations to DOD:

- The Secretary of Defense should ensure that the Secretary of the Air Force develops and implements mechanisms to consistently capture information on pilots' post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DOD collects. (Recommendation 1)
- The Secretary of Defense should ensure that the Secretary of the Navy develops and implements mechanisms to consistently capture information on pilots' post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DOD collects. (Recommendation 2)

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- The Secretary of Defense should ensure that the Commandant of the Marine Corps develops and implements mechanisms to consistently capture information on pilots' post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DOD collects. (Recommendation 3)
  - The Secretary of Defense should ensure that the Secretary of the Air Force analyzes staffing levels by officer grade for each pilot community as part of its annual business case for aviation retention bonus payments to help ensure that aviation retention bonuses are targeted to the appropriate pilot communities. (Recommendation 4)

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOD and DOT for review and comment. In its written comments, reproduced in appendix IV, DOD concurred with our recommendations, noting planned actions to address them. DOD and DOT also provided technical comments, which we incorporated in the report as appropriate.

In its written comments, DOD provided additional comments from the Navy, the Army, and the Air Force. The Navy stated that its fighter pilot staffing gap in fiscal year 2017—for fighter pilots at all career milestones combined—was lower than the 26 percent we report for fighter pilots at the first tour milestone. As discussed in the report, we report staffing levels for the first tour milestone because Navy officials stated that this is the only milestone that cannot be staffed with naval flight officers or naval aviators from the same community. Fighter pilot staffing levels for the Navy's Department Head and Command milestones are included in an interactive graphic that accompanies this report. The graphic can be viewed at <http://www.gao.gov/products/gao-18-439>.

The Army noted that regional airlines are actively recruiting its rotary-wing pilots, which poses a possible challenge to aviator retention. As we state in the report, our review was focused on fixed-wing pilot communities and the Army was not included in our review because its service-authorized fixed-wing community pilot positions make up less than 7 percent of its total aviation force. In the report, we discuss a program that trains former military rotary-wing pilots for fixed-wing aircraft, and we include the Army's concerns about the potential effects of such programs on its rotary-wing staffing levels.

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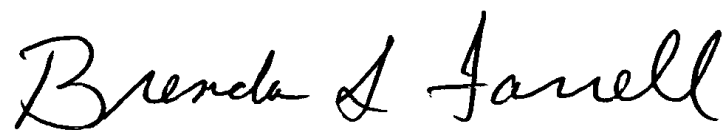
The Air Force stated that it believes the report underestimates the forecasted number of future airline hires and their average compensation; however it did not provide evidence to support these statements. We reported on available forecasts of industry demand for domestic airline pilots, which projected annual averages over a decade. As discussed in the report, developing long-term occupational employment projections is uncertain for a number of reasons, including assumptions about the future, some of which may not come to fruition. With respect to the issue of domestic airline pilot compensation, we do not report information on average compensation. Rather, we report information from airline and pilot associations on domestic airline first-officers' salaries—the first two years with a mainline airline and entry-level first officers at regional airlines—as those are the salary former military pilots are most likely to receive as a new-hire with a domestic airline. The Air Force also stated that it disagrees that leaving non-operational pilot positions unfilled would pose acceptable risk. We do not make this conclusion in the report. We focused on operational position staffing gaps to determine whether the services have had a sufficient number of pilots to meet their operational needs over the past 5 fiscal years. We discuss in the report that pilots may be staffed to both operational and non-operational positions and provide staffing levels for both types of positions combined for the Air Force and the Marine Corps. As noted in the report, we were unable to provide a similar data analysis for the Navy because it does not fully assign non-flying authorized levels to specific communities.

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We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Secretary of the Air Force, the Secretary of the Navy, the Commandant of the Marine Corps, the Secretary of the Army, the Secretary of Transportation, and the Administrator of the Federal Aviation Administration. In addition, this report is available at no charge on the GAO website at <http://www.gao.gov>.

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If you or your staff have any questions regarding this report, please contact us at Brenda S. Farrell, (202) 512-3604 or [farrellb@gao.gov](mailto:farrellb@gao.gov), or Andrew Von Ah, (202) 512-2834 or [vonaha@gao.gov](mailto:vonaha@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 who made significant contributions to this report are listed in appendix V.



Brenda S. Farrell  
Director, Defense Capabilities and Management



Andrew Von Ah  
Director, Physical Infrastructure Issues

# Appendix I: Army Fixed-Wing Pilot Staffing Levels from Fiscal Years 2013-2017

The Army's fixed-wing pilot community makes up less than 7 percent of its total aviation force. According to Army documentation, Army warrant officers perform the majority of pilot-related duties. Our analysis of Army data showed that while the Army exceeded service-authorized staffing levels for warrant officers in its fixed-wing pilot community from fiscal years 2013 through 2015, it has had a gap since fiscal year 2016. In contrast, staffing levels for commissioned officers in the Army's fixed-wing community have exceeded service-authorized levels over the past 5 fiscal years, growing from 126 percent of service-authorized staffing levels in fiscal year 2013 to 165 percent in fiscal year 2017. The Army's total fixed-wing pilot community—warrant and commissioned officers combined—exceeded service-authorized staffing levels over the past 5 fiscal years. Table 8 provides an overview of Army fixed-wing staffing levels from fiscal years 2013 through 2017.

**Table 8: Actual Army Fixed-Wing Staffing Levels Compared with Service-Authorized Staffing Levels, Fiscal Years 2013-2017**

Pilot community		Fiscal year 2013	Fiscal year 2014	Fiscal year 2015	Fiscal year 2016	Fiscal year 2017
<b>Warrant officers</b>	Service-authorized staffing level	335	382	353	352	351
	Actual staffing level	391	416	381	332	310
	<b>Percent filled</b>	<b>117</b>	<b>109</b>	<b>108</b>	<b>94</b>	<b>88</b>
<b>Commissioned officers</b>	Service-authorized staffing level	240	233	227	167	176
	Actual staffing level	302	292	289	300	290
	<b>Percent filled</b>	<b>126</b>	<b>125</b>	<b>127</b>	<b>180</b>	<b>165</b>
<b>Total fixed-wing aviation force</b>	Service-authorized staffing level	575	615	580	519	527
	Actual staffing level	693	708	670	632	600
	<b>Percent filled</b>	<b>121</b>	<b>115</b>	<b>116</b>	<b>122</b>	<b>114</b>

Source: GAO analysis of Army staffing level data. | GAO-18-439

According to Army officials, the Army's largest pilot staffing gaps are in its fixed-wing community. In addition, in March 2017 the Army identified a significant staffing gap from year groups 2010-2017 among active duty warrant officers. Army officials stated that these staffing gaps are primarily the result of training or production challenges rather than retention challenges, noting that a lack of resources combined with directed force reductions is responsible for the Army's decision to under-access pilots. However, Army officials stated that they also have some concerns about growing retention challenges. According to Army

documentation, it plans to address these gaps by increasing accessions, production, and retention of warrant officers. Army officials noted that they anticipate the warrant officer pilot gaps will increase as the 2010-2017 year groups mature, and that the 2013-2016 year groups will face the greatest staffing challenges. However, these officials stated that increased pilot production combined with increased retention may help to alleviate these staffing challenges.

According to Army officials, the Army utilizes monetary and non-monetary incentives to retain pilots and offers these incentives on an ad-hoc basis. Specifically, officials noted that they typically provide aviation retention bonuses to critical communities as a short-term solution, and that they are better able to offer non-monetary incentives—such as preferential basing—when the Army’s pilot communities are healthy. According to current Army documentation, pilot communities may become eligible for aviation retention bonuses when their actual staffing levels fall below 95 percent of service-authorized staffing levels. The Army’s business case for its fiscal year 2018 aviation retention bonus program states that the Army plans to offer bonuses to three specific populations in fiscal year 2018: special operations pilots, conventional force pilots, and operational support instructor pilots. According to Army officials, aviation retention bonuses are currently being offered for all Army aircraft platforms as the current or forecasted staffing levels are at or below 95 percent for all Army aircraft. In addition, the business case states that the Army recognizes that it can maximize retention through non-monetary incentives, such as providing pilots a choice for their follow-on assignment or the opportunity to complete civilian education. However, the Army stated that it requires a healthy population of pilots in order to give assignment officers flexibility in rotating pilots through the most demanding assignments.

# Appendix II: Air Force Reserve Component Fixed-Wing Pilot Staffing Levels from Fiscal Years 2013-2017

According to our analysis of Air Force Reserve and Air National Guard service-authorized staffing levels and actual staffing levels for their fixed-wing pilot communities for fiscal years 2013 through 2017, reserve component staffing gaps were primarily concentrated in the bomber, special operations, and fighter pilot communities. These communities all experienced staffing gaps around or above 20 percent from fiscal years 2013 through 2017. The mobility and surveillance communities also experienced gaps, but to a lesser extent. Reserve component staffing gaps decreased across all five fixed-wing pilot communities from fiscal year 2013 through fiscal year 2017. In the special operations and surveillance communities, the decrease in the staffing gap is a reflection of an increase in actual staffing levels. However, in the bomber, fighter, and mobility communities, the gap decrease was driven by reductions in service-authorized staffing levels. Table 9 provides an overview of reserve component staffing levels by fixed-wing pilot community over the past 5 fiscal years.

**Table 9: Percent of Air Force Reserve Component Fixed-Wing Pilot Positions Filled, Fiscal Years 2013-2017**

Fiscal year	Bomber pilots	Fighter pilots	Mobility pilots	Special operations pilots	Surveillance pilots
2013	66	76	86	74	82
2014	69	77	86	79	79
2015	61	76	93	63	86
2016	70	80	92	71	89
2017	76	83	91	79	87

Source: GAO analysis of Air National Guard and Air Force Reserve Command staffing levels. | GAO-18-439

The Air Force Reserve and the Air National Guard prepared business cases for their aviation retention bonuses in fiscal years 2017 and 2018. According to the Air National Guard's fiscal year 2017 aviation bonus implementation policy, retention bonuses are only offered to full-time Active Guard Reserve pilots from eligible communities.<sup>1</sup> Air Force Reserve officials stated that they also only offer bonuses to full-time Active Guard Reserve pilots from eligible communities. These officials stated that bonuses are used by the reserve component to recruit pilots who have chosen to leave active duty because if those pilots join the reserve component, the Air Force can still retain their skills. Air National

<sup>1</sup>Air National Guard, *Fiscal Year 2017 Aviation Bonus Implementation Policy*.



Guard officials stated that this is necessary because fewer pilots are recruited from active duty—currently about half of Air National Guard pilots are recruited from active duty, as opposed to about 80 percent in previous years. Officials noted that they believe the decrease in the number of pilots being recruited from active duty stems from an increase in the number of reservists being used to fill active duty positions and a high operational tempo.

The business cases prepared by the Air National Guard and Air Force Reserve provided similar information to the Air Force's business case and included the same pilot communities. The fiscal year 2018 business cases for both the Air National Guard and the Air Force Reserve include as a justification for their bonuses that the amount requested is necessary to influence retention behavior. They also discuss non-monetary incentives to improve retention, such as additional training opportunities, and the flexibility of a part-time or full-time position.

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# Appendix III: Scope and Methodology

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To assess the extent to which the Air Force, the Navy, and the Marine Corps had staffing gaps in their fixed-wing pilot communities, we compared staffing levels authorized by the services—for operational pilot positions in the active components of those services—with the actual number of pilots available to staff those positions for fiscal years 2013 through 2017.<sup>1</sup> Specifically, we analyzed data on service-authorized staffing levels for operational positions and actual pilot staffing levels to identify any gaps in staffing levels by pilot community in those services' fixed-wing, cockpit-operated communities (fixed-wing communities). Operational positions include both flying—i.e., combat pilot or instructor pilot positions—and non-flying positions, such as an air controller attached to an infantry unit. We did not include rotary-wing or unmanned aerial system pilots in our review because these pilots have not historically been a primary source of pilots for the commercial airlines. For the purposes of this report, when actual staffing levels are lower than service-authorized staffing levels, it is considered to be a staffing gap. We selected this timeframe to enable us to evaluate trends over 5 years, and fiscal year 2017 was the most recent year for which complete data were available at the time of our review. We did not include the Army in our review because its service-authorized fixed-wing community positions make up less than 7 percent of its total aviation force; however, details on staffing gaps in the Army's fixed-wing communities can be found in appendix I. For Army information, we compared staffing levels authorized by the Army—for active component fixed-wing pilot positions—with the actual number of pilots available to staff those positions for fiscal years 2013 through 2017. We also reviewed relevant documentation and interviewed Army officials about current and projected staffing challenges.

For the Navy and the Marine Corps, we also analyzed data on service-authorized staffing levels for operational positions and actual pilot staffing levels—presented by officer grade—to identify the concentration of gaps for fiscal years 2013 through 2017. We did not analyze similar data for the Air Force because it did not designate officer grade in the data it provided; therefore, we were unable to conduct a similar analysis by officer grade for the Air Force's fixed-wing pilot communities. For the Air Force and the Marine Corps, we also analyzed overall service-authorized

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<sup>1</sup>Gaps between actual staffing levels and service-authorized staffing levels for operational positions represent a difference in the number of pilots available to fill operational positions and the number of authorized positions. Reported gaps do not reflect how the services have staffed their operational positions. For example, a service may move pilots from one community to another to help mitigate a gap. This is not reflected in our analysis.

staffing levels (for both operational and non-operational positions) and actual pilot staffing levels to identify any gaps. Specifically, we compared overall service-authorized staffing levels for the Air Force and the Marine Corps' fixed-wing pilot communities with each service's actual staffing levels for fiscal years 2013 through 2017. The Navy's service-authorized staffing levels do not specify how many pilots were assigned to non-flying assignments, because the Navy does not fully assign non-flying authorized staffing levels to specific communities, unlike the Air Force and the Marine Corps. Therefore, we were unable to conduct an analysis comparing total Navy fixed-wing staffing levels with service-authorized levels, as we did for the Air Force and the Marine Corps. To assess the reliability of the services' data on service-authorized staffing levels (for both operational and non-operational positions) and actual staffing levels, we reviewed related documentation; assessed the data for errors, omissions, and inconsistencies; and interviewed officials. We determined that the data were sufficiently reliable to describe the services' staffing levels and associated gaps from fiscal years 2013 through 2017. We also met with service officials to discuss the results of our analysis and factors that may have contributed to gaps in fixed-wing community staffing levels.

To assess the state of the commercial pilot labor market, we analyzed data from the Department of Labor's Bureau of Labor Statistics' (BLS) Current Population Survey on the unemployment rate, employment, and median weekly earnings from 2012 through 2017, in accordance with economic literature we reviewed for a prior report.<sup>2</sup> These data can be used as indicators of whether labor market conditions are consistent with a shortage. We analyzed data for the Standard Occupational Classification for aircraft pilots.<sup>3</sup> We chose this period because we had previously reported on the data from 2000 through 2012.<sup>4</sup> We did not assess whether there are shortages by geographic area or sector of the commercial aviation industry because the economic indicators we reviewed do not provide this type of specificity. We reviewed documentation about the BLS data and the systems that produced them,

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<sup>2</sup>[GAO-14-232](#).

<sup>3</sup>"Pilots and Flight Engineers" in the BLS Current Population Survey includes airline pilots (those who pilot and navigate the flight of fixed-wing, multi-engine aircraft, usually on scheduled airline routes, for the transport of passengers and cargo) and commercial pilots (those involved in other flight activities, such as piloting helicopters, crop dusting, charter flights, and aerial photography).

<sup>4</sup>[GAO-14-232](#).

as well as our prior report that used the data. Based on prior testing of the data from these systems, we determined the data were sufficiently reliable for the purposes of our indicator analysis to provide context on the labor market.

To identify trends in supply sources for qualified airline pilots we reviewed Federal Aviation Administration (FAA) data on pilot certificates issued and held from 2000 through 2017. We selected this timeframe to enable us to evaluate trends over time and 2017 was the most complete data available at the time of our review. We also reviewed data from the Department of Education on the number of completions for degree or certificate programs that might prepare individuals to work as airline pilots for academic years 2000-2001 through 2015-2016. To assess the reliability of the FAA and the Department of Education data, we reviewed related documentation, the agencies' websites, and interviewed knowledgeable government officials about the quality of the data.<sup>5</sup> We determined that the data were sufficiently reliable to describe general sources of supply of airline pilots and to support broad conclusions about trends in these sources over recent years. To identify trends in hiring demand for airline pilots, we obtained and reviewed information from Future and Active Pilot Advisors (FAPA.aero) from 1990 through 2016.<sup>6</sup> To assess the reliability of the data, we reviewed related documentation and interviewed a knowledgeable official. We determined the data were sufficiently reliable for our reporting purposes. To understand the extent to which employers have historically had difficulty attracting airline pilots and trends in U.S. commercial pilot compensation, we reviewed a prior GAO report.<sup>7</sup> We also interviewed and collected data from the FAA and several industry stakeholders, including associations representing airlines and airline pilots. Specifically, we conducted interviews with the Air Line Pilots Association, Airlines for America, and the Regional Airline Association.

To determine how the Air Force, the Navy, and the Marine Corps monitor pilot retention, we conducted interviews with relevant service officials and calculated pilot loss rates for those services for fiscal years 2013 through 2017. To calculate the loss rates, we obtained data from the services on the number of pilots that left each service during each fiscal year (for

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<sup>5</sup>See [GAO-18-403](#) for additional discussion of the FAA and Department of Education data.

<sup>6</sup>FAPA.aero is a career and financial advisory service for pilots and aspirants.

<sup>7</sup>[GAO-14-232](#).

reasons such as separation or retirement). We computed loss rates by dividing the number of pilots that left each service during a given fiscal year by the number of pilots the service had at the start of the fiscal year. We calculated the total pilot loss rates for each service as well as the loss rates for specific fixed-wing pilot communities within each service. To assess the reliability of the data, we reviewed related documentation and interviewed officials. We determined that the data were sufficiently reliable to describe pilot loss rates during this timeframe.

To assess the extent to which commercial airline market conditions have influenced Department of Defense (DOD) pilot retention, we conducted a literature search and review to identify research studies that discussed the effects of the commercial pilot labor market—in particular, commercial airline hiring and compensation practices—on DOD pilot retention. Specifically, we conducted a literature search for studies published in books, reports, peer-reviewed journals, and dissertations since February 2014. We chose February 2014 as a starting point because that was when we last reported on this topic, and to reflect more recent trends in airline hiring and compensation, and DOD pilot retention.<sup>8</sup> We searched six databases including ProQuest, Scopus, and the National Academies Press. Our search used Boolean search phrases including variations of words such as pilot, retention, salary, and compensation. We identified and screened 54 studies using a multi-step process to gauge their relevance and evaluate their methodology. We excluded studies that did not specifically focus on our objective, military pilots, or the U.S. commercial airline industry. We retained 5 studies after screening and reviewed their methodologies, findings, and limitations. Four GAO staff (two analysts, a methodologist, and an economist) were involved in the screening and a systematic review of each of the 5 studies, which were determined to be sufficiently relevant and methodologically rigorous.<sup>9</sup> None of the 5 studies we reviewed presented causal findings.

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<sup>8</sup>[GAO-14-232](#).

<sup>9</sup>The five studies that we reviewed were: (1) RAND Project AIR FORCE, *Retaining U.S. Air Force Pilots When the Civilian Demand for Pilots Is Growing* (Santa Monica, Calif.: Rand Corporation, 2016); (2) RAND Project AIR FORCE, *Can the Air Force and Airlines Collaborate for Mutual Benefit: An Exploration of Pilot and Maintenance Workforce Options* (Santa Monica, Calif.: Rand Corporation, 2016); (3) N. Sweeney, “Predicting Active Duty Air Force Pilot Attrition Given an Anticipated Increase in Major Airline Pilot Hiring” (dissertation, Pardee RAND Graduate School, 2015); (4) P. Imhoff, “The Impact of Commercial Aviation on Naval Aviation” (master’s thesis, Naval Postgraduate School 2016); and (5) J. Hodges “The Career Cost: Does it Pay for a Military Pilot to Leave the Service for the Airlines?” (master’s thesis, Naval Postgraduate School 2015).

In addition to the literature review, we interviewed officials from the Air Force, the Navy, the Marine Corps, the Office of the Secretary of Defense, the FAA, and airline associations about available data on former military pilots employed by the airlines. We also spoke with researchers from the RAND Corporation regarding relevant research they have conducted in this area. We compared information from the interviews with DOD and service officials to *Standards for Internal Control in the Federal Government* related to quality information and monitoring activities.<sup>10</sup>

To assess the non-monetary and monetary incentives the Air Force, the Navy, and the Marine Corps have developed to help retain pilots, we obtained and reviewed information from the services—briefing documents, press releases, and memorandums—about the non-monetary incentives they have developed to retain pilots, such as increasing flying time. In addition, we analyzed their use of monetary incentives, such as aviation incentive pay and aviation retention bonuses from fiscal years 2013 through 2017. Specifically, we analyzed budget information from the military services' annual budget justification documents for this timeframe to determine total costs for aviation incentive pay and aviation retention bonuses. We also reviewed projected costs—included in the services' budget justification documents—for aviation incentive pay and aviation retention bonuses for the Air Force, the Navy, and the Marine Corps for fiscal years 2018 and 2019. To assess the reliability of the services' budget data, we discussed the data with relevant officials and manually tested the data. We determined that the data were sufficiently reliable to describe the services' aviation special and incentive pay spending from fiscal years 2013 through 2017 and projected spending for fiscal years 2018 and 2019. We normalized the cost data to constant fiscal year 2017 data using the services of military personnel deflators for fiscal years 2013 through 2017 published in DOD's *National Defense Budget Estimates for Fiscal Year 2017*. Additionally, we analyzed the Air Force and the Navy's aviation retention bonus take rates (the number of pilots accepting a bonus out of the number of pilots eligible to receive a bonus) for fiscal years 2013 through 2017. Finally, we conducted interviews with relevant officials from the Air Force, the Navy, the Marine Corps, and the Office of the Secretary of Defense to determine the extent to which DOD has assessed the effectiveness of the various pilot retention incentives.

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

To assess the extent to which the Air Force's annual business case includes key information to justify aviation retention bonuses, we analyzed the Air Force's business cases for fiscal years 2017 and 2018.<sup>11</sup> We selected these years because the requirement for the military services to conduct annual business cases for aviation bonus payments started in fiscal year 2017 and fiscal year 2018 was the most recent business case available.<sup>12</sup> We also reviewed related analyses, bonus program proposals, related program documentation, and DOD's annual reports to Congress on the department's aviation continuation pay programs.<sup>13</sup> We also conducted interviews with officials from the Air Force, the Air National Guard, the Air Force Reserve Command, and the Office of the Secretary of Defense. We compared bonus program documentation and information from our interviews with the statutory authority granted to the services to offer special aviation incentive pay and bonuses, and *Standards for Internal Control in the Federal Government* related to quality information.<sup>14</sup>

We conducted this performance audit from December 2017 to June 2018 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>11</sup>Details on the Air Force Reserve and the Air National Guard's business cases for their aviation retention bonuses as well as their fixed-wing pilot staffing levels for fiscal years 2013 through 2017 are provided in appendix II. For the appendix, we compared service-authorized staffing levels for fixed-wing pilot positions with the actual number of pilots available to staff those positions for the Air Force Reserve Command and the Air National Guard. To assess the reliability of the reserve components' service-authorized staffing levels and actual staffing levels, we reviewed related documentation; assessed the data for errors, omissions, and inconsistencies; and interviewed officials. We determined that the data were sufficiently reliable to describe staffing levels and associated gaps for the Air Force's reserve component during this timeframe.

<sup>12</sup>Section 334(c)(2)(A) of Title 37 of the U.S. Code states that the services shall determine the amount of the aviation bonus payable solely through a business case analysis of the amount required to be paid in order to address anticipated staffing shortfalls for such fiscal year by aircraft type category.

<sup>13</sup>Department of Defense, *Report to Congress: Aviation Continuation Pay Programs for Fiscal Year 2016* (June 2017) and *Report to Congress: Aviation Continuation Pay Programs for Fiscal Year 2015* (June 2016).

<sup>14</sup>37 U.S.C. § 334 and [GAO-14-704G](#).

# Appendix IV: Comments from the Department of Defense



MANPOWER AND  
RESERVE AFFAIRS

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE  
1500 DEFENSE PENTAGON  
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JUN - 5 2018

Ms. Brenda S. Farrell  
Director, Defense Capabilities and Management  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Ms. Farrell,

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report GAO-18-439, "Military Personnel: Collecting Additional Data Could Enhance Pilot Retention Efforts," dated April 26, 2018 (GAO Code 102510).

DoD is providing official written comments for inclusion in the report and concurs with the four report recommendations. DoD will work with the Military Services to improve the existing exit surveys to more directly capture information on the intended post-service employment of aviators. Both DoD and GAO recognize that these surveys capture the intent of members to obtain post-service employment in specific areas, and both believe that there is likely a high correlation between expressed intent prior to separating from service and actual post-service employment. DoD will also investigate a more robust annual business case for the aviation retention bonus program. DoD provides other substantive comments from the Services, below.

- Navy commented that their actual total fighter pilot gaps were only 9% in FY17, while the 26% gaps reported by GAO were only the O-1 through O-3 paygrades.
- Army notes that, although not addressed in this study, regional airlines are actively recruiting their rotary-wing pilots and pose a possible challenge to aviator retention.
- Air Force believes the report underestimates the forecasted number of future airline hires and their average compensation. Further, the Air Force disagrees with GAO's conclusion that leaving non-operational pilot positions unfilled would pose acceptable risk.

The Department appreciates the opportunity to comment on the draft report.

Sincerely,

A handwritten signature in black ink, appearing to read "Larnes J. Hebert".

Larnes J. Hebert  
Acting Deputy Assistant Secretary  
(Military Personnel Policy)



GAO DRAFT REPORT DATED APRIL 26, 2018  
GAO-18-439 (GAO CODE 102510)

“MILITARY PERSONNEL: COLLECTING ADDITIONAL DATA COULD ENHANCE  
PILOT RETENTION EFFORTS”

DEPARTMENT OF DEFENSE COMMENTS  
TO THE GAO RECOMMENDATION

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense should ensure that the Secretary of the Air Force develops and implements mechanisms to consistently capture information on pilots’ post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DoD collects.

**DoD RESPONSE:** Concur. Air Force already conducts an exit survey offered to all departing officers with questions specific to aviators on “job opportunities in the commercial sector.” The Department of Defense (DoD) will work with the Air Force to further target and refine the questions in this survey to collect information on post-service employment intent. Furthermore, the Office of People Analytics (OPA) and Deputy Assistant Secretary of Defense for Military Personnel Policy are actively pursuing a short-term research project to identify where pilots are transitioning after separation and data sources available for analysis, to include the National Pilot Sourcing Forum.

**RECOMMENDATION 2:** The GAO recommends that the Secretary of Defense should ensure that the Secretary of the Navy develops and implements mechanisms to consistently capture information on pilots’ post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DoD collects.

**DoD RESPONSE:** Concur. Navy already conducts an exit survey offered to all aviation Department Head “Decliners”, and is already working to develop a more robust exit survey for all departing aviators. DoD will work with the Navy to further target and refine the questions in this survey to collect information on post-service employment intent.

**RECOMMENDATION 3:** The GAO recommends that the Secretary of Defense should ensure that the Commandant of the Marine Corps develops and implements mechanisms to consistently capture information on pilots’ post-service employment, including the number of those going to the commercial airlines, such as through revising existing exit surveys, or working in coordination with the National Pilot Sourcing Forum specifically to monitor commercial airline hiring to supplement the information DoD collects.

**DoD RESPONSE:** Concur. United States Marine Corps (USMC) already conducts an exit survey that collects data on exiting personnel which captures intent of existing Marines to pursue civilian employment. DoD will work with the USMC to further target and refine the questions in this survey to collect information on post-service employment intent.

**RECOMMENDATION 4:** The GAO recommends that the Secretary of Defense should ensure that the Secretary of the Air Force analyzes staffing levels by officer grade for each pilot community as part of its annual business case for aviation retention bonus payments to help ensure that aviation retention bonuses are targeted to the appropriate pilot communities.

**DoD RESPONSE:** Concur. DoD will work with the Air Force on its annual business case analysis to analyze staffing levels within the pilot community to ensure that aviation retention bonuses are targeted appropriately.

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# Appendix V: GAO Contact and Staff Acknowledgments

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## GAO Contact

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## Staff Acknowledgments

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*Unmanned Aerial Systems: Further Actions Needed to Fully Address Air Force and Army Pilot Workforce Challenges.* [GAO-16-527T](#). Washington, D.C.: March 16, 2016.

*Unmanned Aerial Systems: Actions Needed to Improve DOD Pilot Training.* [GAO-15-461](#). Washington, D.C.: May 14, 2015.

*Air Force: Actions Needed to Strengthen Management of Unmanned Aerial System Pilots.* [GAO-14-316](#). Washington, D.C.: April 10, 2014.

*Aviation Workforce: Current and Future Availability of Airline Pilots.* [GAO-14-232](#). Washington, D.C.: February 28, 2014.

*Aviation Workforce: Current and Future Availability of Aviation Engineering and Maintenance Professionals.* [GAO-14-237](#). Washington, D.C.: February 28, 2014.

*Initial Pilot Training: Better Management Controls Are Needed to Improve FAA Oversight.* [GAO-12-117](#). Washington, D.C.: November 4, 2011.

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*Military Cash Incentives: DOD Should Coordinate and Monitor Its Efforts to Achieve Cost-Effective Bonuses and Special Pays.* [GAO-11-631](#). Washington, D.C.: June 21, 2011.

*Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions.* [GAO-10-789](#). Washington, D.C.: July 29, 2010.

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