



July 2014

# NOAA AIRCRAFT

## Aging Fleet and Future Challenges Underscore the Need for a Capital Asset Plan

# GAO Highlights

Highlights of [GAO-14-566](#), a report to congressional committees

## Why GAO Did This Study

NOAA's aircraft play a critical role in collecting scientific data to help NOAA advance understanding of changes in the environment and manage ocean and coastal resources. NOAA uses its aircraft for a wide range of scientific missions. In fiscal year 2013, NOAA's aircraft flew hundreds of flights and logged about 3,900 flight hours. NOAA officials predict that expanding mission needs will lead to increased demand for aircraft services. To address such challenges, NOAA has been working to improve its capital asset planning and management for aircraft.

A House committee report on the Consolidated and Further Continuing Appropriations Act, 2013, mandated GAO to examine various issues regarding NOAA's aircraft. This report examines (1) the status of NOAA's efforts to improve its aircraft planning and management and the extent to which these efforts reflect leading practices and (2) challenges NOAA faces in improving its aircraft asset planning and management. GAO analyzed aircraft cost and flight hour data from fiscal year 2004 through fiscal year 2013, reviewed agency planning and management documents, and interviewed agency officials. GAO reviewed capital asset planning guidance from OMB to identify leading practices.

## What GAO Recommends

GAO recommends that the NOAA Administrator ensure that the agency links and integrates its multiple planning efforts as it finalizes a comprehensive capital asset plan for aircraft. NOAA concurred with the recommendation.

View [GAO-14-566](#). For more information, contact Anne-Marie Fennell at (202) 512-3841 or [FennellA@gao.gov](mailto:FennellA@gao.gov).

July 2014

## NOAA AIRCRAFT

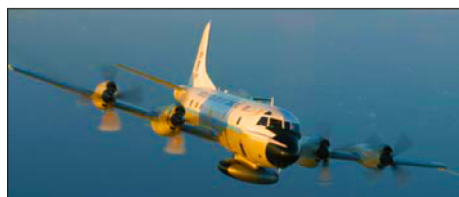
### Aging Fleet and Future Challenges Underscore the Need for a Capital Asset Plan

## What GAO Found

The National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce has 34 efforts aimed at improving its aircraft asset planning and management, some of which are ongoing, while others are under way or planned; however, because these efforts are not yet fully implemented, it is too early to determine whether they will reflect the leading practices in capital asset management that have been identified by the Office of Management and Budget (OMB). Among NOAA's initiatives are efforts to enhance its process for scheduling aircraft use among NOAA offices and to develop new aircraft performance metrics. NOAA's efforts also include the development of multiple long-term plans that together are intended to constitute a capital asset plan for aircraft. OMB leading practices encourage agencies to have capital asset plans—which help provide agencies with information and analysis to make long-term decisions about acquiring and managing capital assets—as a part of their strategic planning efforts, but NOAA currently does not have such a plan for its aircraft. NOAA expects to complete its various improvement efforts related to aircraft asset planning and management by fiscal year 2017.

#### Examples of NOAA Aircraft

Lockheed P-3 Orion



de Havilland Twin Otter



Source: National Oceanic and Atmospheric Administration. | GAO-14-566

NOAA faces challenges in improving its aircraft asset planning and management. NOAA's complex approach to creating a capital asset plan for aircraft may present challenges because it will comprise multiple stand-alone plans, and critical planning information and analysis on different types of assets will be spread across different documents. NOAA is in the early stages of some of these planning efforts and has not yet determined how, or whether, it will link and integrate the plans with one another to ensure that they will serve as a comprehensive plan. NOAA has faced challenges in finalizing a capital planning effort in the past. In 2009, NOAA leadership suspended a planning effort intended to address the agency's future aircraft needs in order to incorporate additional aircraft-related information, according to NOAA officials; the agency subsequently began its current planning effort 4 years later, in 2013. The importance of a capital asset plan is underscored by the significant decisions NOAA faces regarding its aircraft fleet, particularly its two operating P-3 Orion aircraft that are in high demand for hurricane work (see fig.). For example, given that the P-3 Orion aircraft are nearly 40 years old, NOAA faces decisions on whether to invest in additional costly service life extensions or replace the aircraft. Linking and integrating its multiple planning efforts could help NOAA demonstrate that it has a capital asset plan consistent with OMB guidance. Without a capital asset plan in place, NOAA risks making decisions that will not allow the agency to effectively address future challenges.

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### Abbreviations

NOAA	National Oceanic and Atmospheric Administration
OMAO	Office of Marine and Aviation Operations
OMB	Office of Management and Budget

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July 9, 2014

The Honorable Barbara Mikulski  
Chairwoman  
The Honorable Richard C. Shelby  
Ranking Member  
Subcommittee on Commerce, Justice, Science, and Related Agencies  
Committee on Appropriations  
United States Senate

The Honorable Frank Wolf  
Chairman  
The Honorable Chaka Fattah  
Ranking Member  
Subcommittee on Commerce, Justice, Science, and Related Agencies  
Committee on Appropriations  
House of Representatives

For the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce, aircraft play a critical role in collecting scientific data for advancing understanding of changes in the Earth's environment, collecting data necessary for weather and water forecasts, and conserving and managing ocean and coastal resources. In fiscal year 2013, NOAA's nine planes—which range in size from small twin-engine aircraft to large four-engine P-3 Orion aircraft—flew hundreds of flights in support of missions and logged about 3,900 flight hours. NOAA's Office of Marine and Aviation Operations (OMAO) provides aircraft services to NOAA's line offices through the management, maintenance, and operation of these NOAA-owned aircraft.<sup>1</sup> Scientists within NOAA's line offices rely on OMAO-operated aircraft to collect a wide range of data such as hurricane wind speeds, marine mammal population counts, and air pollution measurements. In addition, OMAO coordinates the chartering of commercial aircraft for approximately half of NOAA's line office mission needs because NOAA-owned and operated aircraft are unable to meet all of these needs, according to NOAA officials. NOAA predicts that

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<sup>1</sup>NOAA's six line offices are the National Environmental Satellite, Data, and Information Service; National Marine Fisheries Service; National Ocean Service; National Weather Service; the Office of Oceanic and Atmospheric Research; and Program Planning and Integration.

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expansion of line office mission needs will lead to increased demand for aircraft services in the future.

To address these needs, OMAO developed a strategic plan in 2012,<sup>2</sup> outlining a new approach for improving its capital asset planning for aircraft and the efficiency and effectiveness of its aircraft asset management. The importance of effective asset planning and management has been highlighted in the Office of Management and Budget's (OMB) Circular A-11 and its supplemental Capital Programming Guide,<sup>3</sup> which has been emphasized in our prior work. For example, as we previously found, the crux of the capital decision-making process is capital asset planning.<sup>4</sup> The ultimate product of capital asset planning is a comprehensive capital asset plan. These plans can provide critical information about evolving agency needs, analysis of performance gaps between capacity and needs, and analysis of the cost-effectiveness and performance implication of various alternative strategies for meeting those needs. This information helps agencies determine the best strategy for meeting their needs, for example by acquiring new aircraft, upgrading existing aircraft, increasing their reliance on nonagency assets, or other strategies. Our previous work has stressed the importance of developing a capital asset plan to help ensure that assets are managed to achieve performance goals and objectives with minimal risk, lowest life-cycle costs, and the greatest benefits to the agency's business.<sup>5</sup> In addition, OMB discusses the importance of effective asset management through such leading practices as collecting information on asset utilization and the extent to which assets contribute to strategic agency goals.

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<sup>2</sup>Office of Marine and Aviation Operations, *2012-2016 OMAO Strategic Plan* (Mar. 23, 2012).

<sup>3</sup>OMB, *Preparation, Submission, and Execution of the Budget*, Circular A-11 (revised 2013) and OMB, *Capital Programming Guide Supplement to Circular A-11: Planning, Budgeting, and Acquisition of Capital Assets* (revised 2013). Capital programming consists of four phases: (1) planning, (2) budgeting, (3) acquiring, and (4) managing assets. This report focuses on the planning and management phases of capital programming.

<sup>4</sup>GAO, *Budget Issues: Agency Implementation of Capital Planning Principles Is Mixed*, [GAO-04-138](#) (Washington, D.C.: Jan. 16, 2004).

<sup>5</sup>GAO, *Federal Capital: Three Entities' Implementation of Capital Planning Principles Is Mixed*, [GAO-07-274](#) (Washington, D.C.: Feb. 23, 2007).

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The House Appropriations Committee report for a Department of Commerce fiscal year 2013 appropriations bill mandated us to examine various issues associated with NOAA's aircraft.<sup>6</sup> This report examines (1) the status of NOAA's efforts to improve its aircraft planning and management and the extent to which these efforts reflect leading practices and (2) challenges NOAA faces in improving its aircraft asset planning and management.

To examine the status of NOAA's efforts to improve its aircraft asset planning and management, we identified and reviewed agency project and strategy documents stemming from OMAO's 2012 strategic plan and interviewed agency officials responsible for aircraft management, operations, and maintenance. We focused on efforts specific to aircraft assets and excluded efforts related to other aspects of NOAA's operations, such as those related to its ship fleet. To determine the extent to which NOAA's efforts reflect applicable guidance and leading practices, we reviewed OMB guidance to identify leading practices that are important for effective asset management. These leading practices are primarily found in OMB's Circular A-11 and the supplemental Capital Programming Guide. In addition, we reviewed OMB's Circular A-76, which provides guidance to federal agencies regarding the use of services provided by the private sector to meet agency needs, and Circular A-126, which provides guidance on the management and use of government aircraft.<sup>7</sup> To obtain additional insight into leading practices, we also reviewed our reports that discuss the application of these leading practices by various agencies.<sup>8</sup> To identify challenges NOAA faces in improving its aircraft asset planning and management, we reviewed agency documents and interviewed agency officials, including users of aircraft as well as officials responsible for aircraft asset planning and management. Appendix I provides additional information on our objectives, scope, and methodology.

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<sup>6</sup>H. R. Rep. No. 112-463, at 28-9 (2012); see also 159 Cong. Rec. S1287 (daily ed. Mar. 11, 2013) (explanatory statement with regard to H.R. 933, which became the Consolidated and Further Continuing Appropriations Act of 2013, Pub. L. No. 113-6, and which incorporated the House Report by reference).

<sup>7</sup>OMB, *Performance of Commercial Activities*, Circular A-76 (revised 2003) and OMB, *Improving the Management and Use of Government Aircraft*, Circular A-126 (revised 1992).

<sup>8</sup>See for example GAO, *U.S. Postal Service: Actions Needed to Strengthen the Capital Investment Process*, [GAO-14-155](#) (Washington, D.C.: Jan. 7, 2014) and [GAO-07-274](#).

We conducted this performance audit from July 2013 to July 2014 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.

## Background

Since NOAA was established in 1970, the agency has operated aircraft to aid in the collection of earth observation data to understand and predict changes in climate, weather, oceans, and coasts; collect data necessary for weather and water forecasts; and help conserve and manage coastal and marine ecosystems and resources. To help NOAA’s line offices accomplish this mission, OMAO—an administrative office organized under NOAA’s Deputy Undersecretary for Operations—is charged with maintaining and operating NOAA’s aircraft as a service to the line offices. The responsibilities of the line offices are widely varied, and their aircraft needs are similarly varied. For example, the National Weather Service relies on NOAA aircraft to determine the water content of snow and collect data to support its forecast and warning responsibilities. In contrast, the National Marine Fisheries Service uses NOAA aircraft to count marine mammals and track the location of whale pods. Table 1 provides information on NOAA’s line offices and how each uses NOAA aircraft to accomplish its work.

**Table 1: National Oceanic and Atmospheric Administration’s Line Offices and Aircraft Uses**

Line office	Line office mission	Example of how line office uses the National Oceanic and Atmospheric Administration’s aircraft
National Environmental Satellite, Data, and Information Service	Provide timely access to global environmental data from satellites and other sources to promote, protect, and enhance the nation’s economy, security, environment, and quality of life.	Gather information on surface wind speed and direction to help calibrate satellite data instruments.
National Marine Fisheries Service	Promote stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems.	Conduct marine mammal surveys and population counts.
National Ocean Service	Provide science-based solutions through collaborative partnerships to address evolving economic, environmental, and social pressures on the nation’s oceans and coasts.	Conduct gravity studies, coastal and habitat mapping, and emergency response surveys.



Line office	Line office mission	Example of how line office uses the National Oceanic and Atmospheric Administration's aircraft
National Weather Service	Provide weather, water, and climate data, forecasts, and warnings for the protection of life and property and enhancement of the national economy.	Conduct hurricane reconnaissance when needed, hurricane research in coordination with the Office of Oceanic and Atmospheric Research, winter storm research, snowpack water content, and soil moisture measurements. <sup>a</sup>
Office of Oceanic and Atmospheric Research	Provide the research foundation for understanding the complex systems that support the planet.	Conduct weather, climate, and air quality atmospheric research, ocean salinity, current, and wave profiling, sea spray and temperature profiling, and arctic flux research.



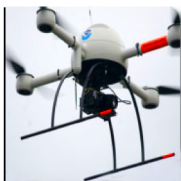




Source: GAO analysis of National Oceanic and Atmospheric Administration documents. | [GAO-14-566](#)

Note: A sixth line office, Program Planning and Integration, does not perform NOAA mission work, but it instead coordinates agency administrative functions among the line offices, such as budget formulation and strategic planning.

<sup>a</sup>Hurricane reconnaissance involves flying directly into the center of a hurricane to determine the location of the eye of a storm and measure wind speed in real time. Although hurricane reconnaissance is largely performed by the Air Force's 53rd Weather Reconnaissance Squadron, NOAA's heavy aircraft are also capable of conducting hurricane reconnaissance when needed. Reconnaissance data are used to improve existing hurricane track and intensity forecasts. In contrast, hurricane research focuses on gathering the data required to improve methods and measurements, as well as to improve accurate forecasting and prediction models for future use. These models are used to make decisions related to storm preparation, such as whether or not to evacuate an area.

To meet the diverse needs of the line offices, OMAO procures, manages, operates, and maintains a fleet of aircraft capable of functioning in demanding environments such as over open ocean, mountains, coastal wetlands, arctic pack ice, and in and around hurricanes and other severe weather systems. NOAA-owned aircraft are unique in that they have been altered to accommodate a wide range of specialized scientific data collection instruments, some of which are specifically designed for use in NOAA aircraft. For example, NOAA's Gulfstream IV-SP and P-3 Orion planes can carry a tail Doppler radar, which is used to gather information about winds and precipitation within tropical storms and cyclones. These planes are the only government-owned aircraft used for hurricane research to improve the forecasting of a hurricane's track and intensity. NOAA's P-3 Orion aircraft also facilitate testing of new scientific instrumentation and data collection strategies. NOAA operates heavy aircraft capable of flying in tropical cyclones; light aircraft that conduct shoreline change assessments, oil spill investigations, snow surveys for spring flood forecasts, and other missions; and unmanned aircraft systems. For fiscal years 2009 to 2013, OMAO's costs associated with operating and maintaining heavy aircraft accounted for, on average, 85 percent of its total aircraft costs. Figure 1 shows NOAA's aircraft fleet.

**Figure 1: National Oceanic and Atmospheric Administration's Office of Marine and Aviation Operations-Managed Aircraft Fleet**

Heavy	Light	Unmanned Aircraft Systems
<p><b>Gulfstream IV-SP</b></p>  <p><b>Number in fleet:</b> 1  <b>Wingspan:</b> Approximately 78 feet  <b>Airspeed:</b> 440-460 knots  <b>Altitude:</b> Up to 45,000 feet  <b>Usage:</b> Hurricane surveillance, atmospheric research</p>	<p><b>de Havilland Twin Otter</b></p>  <p><b>Number in fleet:</b> 4  <b>Wingspan:</b> 65 feet  <b>Airspeed:</b> 80-160 knots  <b>Altitude:</b> Up to 25,000 feet with supplemental cabin oxygen  <b>Usage:</b> Snowpack water content and soil moisture measurements, gravity research</p>	<p><b>Quadrocopter</b></p>  <p><b>Number in fleet:</b> 2  <b>Wingspan:</b> Approximately 2 feet, 5 feet  <b>Usage:</b> Marine animal surveys, hydrographic surveys  <b>Features:</b> Flies quietly, hovers, takes clear, high-resolution photos, remotely-operated</p>
<p><b>Lockheed WP-3D Orion (P-3)</b></p>  <p><b>Number in fleet:</b> 2  <b>Wingspan:</b> Approximately 100 feet  <b>Airspeed:</b> 170-250 knots  <b>Altitude:</b> Up to 27,000 feet  <b>Usage:</b> Hurricane reconnaissance and surveillance, ocean winds research</p>	<p><b>Gulfstream Jet Prop Commander</b></p>  <p><b>Number in fleet:</b> 1  <b>Wingspan:</b> 52 feet  <b>Airspeed:</b> 120-250 knots  <b>Altitude:</b> Up to 35,000 feet with a pressurized cabin  <b>Usage:</b> Snowpack water content and soil moisture measurements, gravity research</p>	<p><b>AeroVironment PUMA</b></p>  <p><b>Number in fleet:</b> 2  <b>Wingspan:</b> Approximately 9 feet  <b>Airspeed:</b> 20-45 knots  <b>Altitude:</b> Up to 10,500 feet  <b>Usage:</b> Living marine mammal surveys, national marine sanctuary vessel use surveys</p>
	<p><b>Hawker Beechcraft King Air</b></p>  <p><b>Number in fleet:</b> 1  <b>Wingspan:</b> Approximately 58 feet  <b>Airspeed:</b> 192-245 knots  <b>Altitude:</b> Up to 35,000 feet  <b>Usage:</b> Coastal mapping and emergency response</p>	

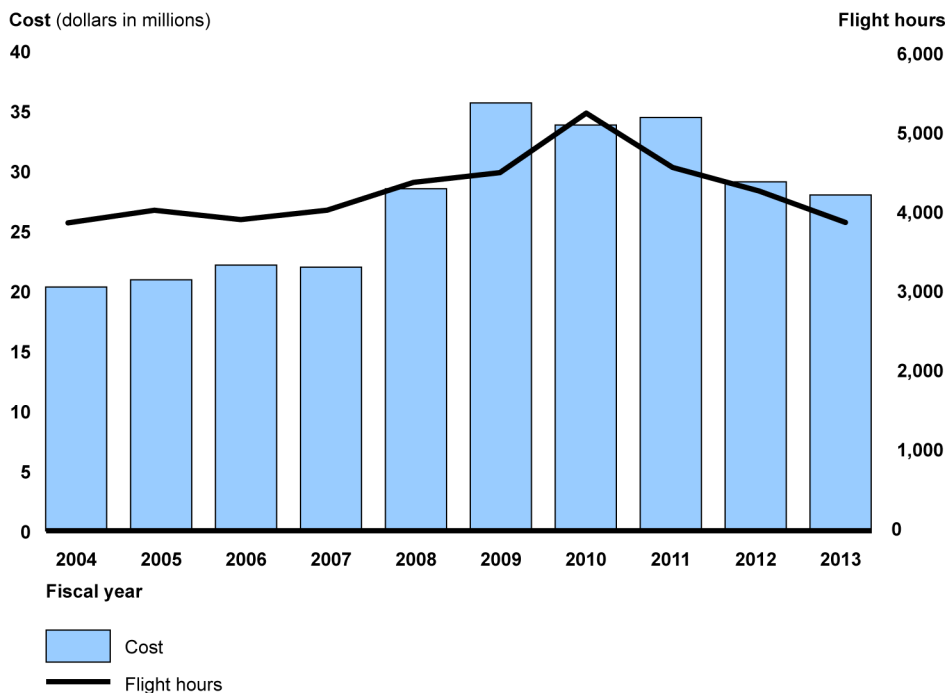
Source: National Oceanic and Atmospheric Administration. | GAO-14-566

Notes: The National Oceanic and Atmospheric Administration (NOAA) is in the process of disposing of one P-3 Orion aircraft and has recently disposed of two Rockwell Shrike Commander aircraft. Because these aircraft are not in operation, they are not shown in this figure.

NOAA also has six PUMA and 1 MANTA that are both unmanned aircraft systems being evaluated by the Office of Oceanic and Atmospheric Research for transition into routine operations.

NOAA's aircraft fly approximately 3,800 to 5,200 flight hours per year. The majority of these hours are funded by OMAO's budget. However, line offices may also request flight time on NOAA-owned planes that is paid for with line office funds. For example, the National Marine Fisheries Service is funding 210 flight hours to conduct Steller sea lion and harbor seal surveys for June to September 2014. NOAA's planes conduct missions for other agencies on a reimbursable basis, as well. Figure 2 shows NOAA's aircraft flight hours and associated costs for fiscal years 2004 to 2013.

**Figure 2: National Oceanic and Atmospheric Administration's Office of Marine and Aviation Operations-Managed Aircraft Fleet Flight Hours and Associated Costs, Fiscal Years 2004-2013**



Source: GAO analysis of National Oceanic and Atmospheric Administration data. | GAO-14-566

Note: Total costs include Office of Marine and Aviation Operations funds, reimbursable funds, and line office funds that include all agency transfers for aircraft support, purchase of scientific equipment, catastrophic maintenance, and other support.

As noted, NOAA's aircraft fleet capacity is limited, and line office needs exceed capacity. When NOAA line office scientists are unable to obtain

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time on NOAA-owned aircraft, they must wait until NOAA aircraft become available, rely on chartered aircraft, contract for data, or forgo the use of aircraft. NOAA's ability to meet line office needs for aircraft is further affected by the requirements placed on NOAA's aircraft by the National Hurricane Operations Plan, which details interdepartmental agreements and responsibilities related to tropical cyclone forecasting.<sup>9</sup> Although most hurricane reconnaissance is conducted by Air Force aircraft, NOAA is required to make its P-3 Orion aircraft available if the Air Force is unable to meet the reconnaissance needs posed by severe weather events. One of NOAA's two operating P-3 Orion planes must be configured and available to conduct reconnaissance each hurricane season from June 1 to November 30, and the other P-3 Orion must be available from July 15 to September 30. During these months, the P-3 Orion planes are generally not available for other uses. NOAA officials also told us that they expect the line offices' missions will expand in the future, thereby increasing their need for aircraft services. For example, one National Weather Service official told us that agency has recently been tasked with additional responsibilities related to measuring soil moisture for agricultural purposes, which will require additional aircraft time to carry out. The OMAO strategic plan likewise notes that the agency faces challenges in providing services to meet a growing demand for scientific data.

To help agencies address capacity limitations such as these, OMB guidance suggests agencies should engage in effective capital asset planning and management to ensure that their assets are acquired, operated, and maintained at the right size, cost, and condition to support agency missions and objectives. Regarding capital asset planning, both OMB guidance and our past work stress the importance of linking capital asset investments to an organization's overall mission and long-term strategic goals. The guidance also emphasizes evaluating a full range of alternatives to bridge any identified performance gap, informed by agency asset inventories that contain condition information. Further, the guidance calls for a comprehensive decision-making framework to review, rank,

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<sup>9</sup>Office of the Federal Coordinator for Meteorological Services and Supporting Research, *National Hurricane Operations Plan* (May 2013). The plan provides the basis for implementing agreements reached at the Interdepartmental Hurricane Conference, which is sponsored annually by the Office of the Federal Coordinator for Meteorological Services and Supporting Research. The goal of the conference is to bring together federal agencies to achieve agreement on items of mutual concern related to tropical cyclone forecasting and warning services for the Atlantic and Pacific Oceans.

and select from among competing project proposals. The ultimate product of the planning phase is a comprehensive capital asset plan, which defines the long-term capital decisions that resulted from the agency’s capital planning process. Both OMB guidance and our past work highlight the importance of developing a capital asset plan. Appendix II provides additional information on the key principles in capital asset planning. Regarding capital asset management, OMB guidance encourages agencies to adopt leading practices such as monitoring of asset inventory, operations, and performance. Table 2 shows examples of OMB leading practices in capital asset management.

Table 2: Examples of Office of Management and Budget Leading Practices in Asset Management	
Asset management practices	Information required
Monitor inventory	Cost and condition of assets
Monitor operations	Operations and maintenance data and strategies
Monitor performance	Operating costs, utilization measures, mission dependency measures, customer satisfaction measures, and measures of contributions to strategic and financial goals

Source: GAO analysis of Office of Management and Budget guidance. | [GAO-14-566](#)

NOAA Has Numerous Efforts to Improve Aircraft Asset Planning and Management, but It Is Too Early to Determine Whether They Reflect Leading Practices

NOAA has 34 efforts aimed at improving its aircraft asset planning and management, according to agency officials, some of which are ongoing while others are under way or planned; however, because most of these efforts are not yet fully implemented, it is too early to determine whether they will reflect OMB leading practices in capital asset programming. Many of the efforts are designed to obtain additional or enhanced information about the use or condition of NOAA’s aircraft assets, according to agency officials. For example, NOAA has completed an effort to automate and integrate its various software applications for tracking aircraft use, maintenance, and repair. In addition, according to agency officials, many of NOAA’s efforts are intended to contribute to the development of a capital asset plan for its aircraft—a plan that NOAA does not currently have.

Generally, NOAA’s efforts fall into the following categories:

- **Assets:** NOAA has eight efforts related to upgrading, using, or disposing of certain aircraft assets. For example, in 2013, NOAA

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completed an extensive multi-year process to identify and validate NOAA line offices' information needs. NOAA also updated its annual process for scheduling and allocating aircraft flight hours to better prioritize aircraft use in meeting these needs. NOAA is in the process of disposing of a non-operational P-3 Orion aircraft. Other efforts include a project to replace the wings of its two remaining operational P-3 Orion aircraft and upgrade the camera systems on its PUMA unmanned aircraft system.

- *Collaboration:* NOAA has five efforts related to improving collaboration with other federal agencies. For example, NOAA has an effort to improve collaboration regarding the use of unmanned aerial systems and an effort to evaluate opportunities for placing NOAA personnel with other federal agencies, such as the National Science Foundation and the Office of Naval Research, to learn about their operations and gain expertise that could be transferred to NOAA.
- *Measures:* NOAA has three efforts that are intended to improve the quantity or accuracy of performance measures regarding aircraft. For example, NOAA has an effort under way to improve the accuracy and comprehensiveness of the information it gathers and analyzes to measure aircraft performance. Currently, NOAA uses the number of hours flown by its aircraft on missions as its aircraft performance measure, but the agency is working to potentially expand its measures to include the information on the amount and quality of scientific data collected during those hours.
- *Plans:* NOAA has eight efforts involving the creation of long-term plans that together are intended to serve as a comprehensive capital asset plan. For example, NOAA is developing a broad "airborne composition plan" that is being designed to analyze information on future aircraft needs and guide the future composition of NOAA's fleet. According to NOAA officials, this plan will rely on the recently completed effort that identified the information needs of NOAA's line offices. The plan is also expected to assess whether these needs can be met with existing assets or whether other options should be considered, such as acquiring additional aircraft or other assets, relying on aircraft operated by other federal agencies, chartering commercial aircraft, or other options. In a related effort, NOAA is also working to develop an analysis of options for repairing or replacing its heavy aircraft in the future. NOAA also intends to develop a plan related to unmanned aircraft systems, as well as workforce plans that will cover aircraft administration, management, and operations personnel.

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- *Policies and data:* NOAA has 10 efforts related to updating existing policies and conducting data analysis. For example, NOAA has an effort to revise its safety management policies and is working to analyze the organizational structure of OMAO to identify opportunities for improving its ability to deliver aircraft services.

Regarding the status of these 34 NOAA efforts aimed at improving aircraft asset planning and management, 5 efforts have been completed, 23 efforts are ongoing, and 6 efforts are scheduled to begin within the next 3 years. NOAA expects to complete all 34 efforts by fiscal year 2017. Figure 3 shows the status of NOAA's 34 efforts aimed at improving aircraft capital asset planning and management.

**Figure 3: National Oceanic and Atmospheric Administration’s Office of Marine and Aviation Operations Aircraft Asset Planning and Management Improvement Efforts**

Office of Marine and Aviation Operations (OMAO) improvement effort		Status		
		Complete	Ongoing	Planned
<b>Assets</b>	Automate tracking applications software	●		
	Develop new prioritization and scheduling process	●		
	Dispose of one WP-3D aircraft		●	
	Dispose of two Shrike aircraft	●		
	Identify and validate line office information needs	●		
	Re-wing two WP-3D aircraft		●	
	Test aerial launched unmanned systems		●	
	Upgrade PUMA camera systems		●	
<b>Collaboration</b>	Collaborate with unmanned systems partners		●	
	Enhance federal fleet partnerships		●	
	Evaluate strategic placement opportunities			●
	Highlight and create interagency agreements	●		
	Strengthen interagency groups’ participation		●	
<b>Measures</b>	Develop new performance measures		●	
	Develop utilization measures		●	
	Improve safety measures		●	
<b>Plans</b>	Conduct heavy aircraft analysis of alternatives			●
	Contribute to civilian workforce plan		●	
	Contribute to unmanned systems road map		●	
	Develop aircraft composition plan		●	
	Develop OMAO data management road map		●	
	Develop OMAO strategic plan			●
	Develop National Oceanic and Atmospheric Administration (NOAA) Corps workforce plan <sup>a</sup>		●	
	Prepare for technology integration		●	
<b>Policies and data</b>	Assess availability of airborne assets			●
	Assess OMAO organizational structure		●	
	Complete fuel consumption analysis		●	
	Consolidate personnel information		●	
	Consolidate policy information		●	
	Evaluate competencies and training		●	
	Implement safety management policies		●	
	Increase marketing and public relations			●
	Perform workforce analyses			●
	Utilize common scheduling tool		●	
<b>Total</b>		<b>5</b>	<b>23</b>	<b>6</b>

Source: GAO analysis of National Oceanic and Atmospheric Administration data. | GAO-14-566

<sup>a</sup>NOAA Corps is one of the seven U.S. federal uniformed services, along with the Army, Marine Corps, Navy, Air Force, Coast Guard, and the Public Health Service Commissioned Corps. The NOAA Corps consists of 321 commissioned officers with specialized training in engineering, earth



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sciences, oceanography, meteorology, fisheries science, and other related disciplines. In addition to flying NOAA aircraft, NOAA Corps officers operate NOAA ships, manage research projects, conduct diving operations, and serve in staff positions throughout NOAA.

Given the preliminary or planned status of many of NOAA's efforts, we cannot determine the extent to which these efforts, once completed, will reflect leading practices. For example, NOAA's effort to create a capital asset plan through the development of several separate planning efforts may give the agency the information and analysis it needs to identify potential gaps between capacity and needs and evaluate the cost-effectiveness and performance implications of various alternative strategies, two areas discussed in OMB guidance. However, until all of the component plans have been completed, NOAA's plans cannot be evaluated against OMB leading practices. Similarly, OMB leading practices in capital asset management discuss the importance of continuous monitoring of agency operations and assets to ensure that assets are used efficiently and effectively in support of its mission. NOAA's efforts to improve its aircraft performance measures may provide the agency with additional information with which to monitor its assets, but these efforts have not been fully implemented—and thus cannot be evaluated against leading practices as of the time of this report.

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## NOAA Faces Challenges in Improving Its Aircraft Asset Planning and Modernizing Its Fleet

In its efforts to improve aircraft asset planning and management, NOAA faces challenges related to the development of a comprehensive and integrated capital asset plan, and decisions regarding the modernization of its fleet. Without a comprehensive and integrated capital asset plan, NOAA risks not having sufficient analysis or justification to make sound critical decisions.

- *NOAA's approach to capital asset planning presents challenges.* As noted, NOAA does not currently have a capital asset plan for aircraft even though leading practices OMB has identified encourage agencies to have capital asset plans as a part of their strategic planning efforts.<sup>10</sup> Leading practices for capital decision making note the importance of a long-term capital plan as the central document an agency uses for its capital decision making; as such, it should be comprehensive in nature and include information on all planned

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<sup>10</sup> *Capital Programming Guide Supplement to Circular A-11.*

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assets.<sup>11</sup> As noted, NOAA is working to develop a capital asset plan through an approach under which it is creating multiple stand-alone plans that together are intended to serve as the agency's capital asset plan for aircraft. Under this approach, each individual planning effort has a different schedule and scope of assets. For example, NOAA is separately working to develop (1) an airborne composition plan that covers its entire fleet, which it expects to complete in 2014; (2) an analysis of alternatives for its heavy aircraft, expected by 2016; and (3) a plan to guide the use of unmanned aircraft systems, expected by fiscal year 2017. In addition, some of these planning efforts are being led by OMAO, while others (such as the unmanned aircraft systems plan) are agency-wide efforts, according to NOAA officials. These differences in schedule, scope, and responsibilities add to the overall complexity of NOAA's approach to capital asset planning for aircraft. In addition, critical planning information and analysis on different types of assets will be spread across different documents, which may add to NOAA's challenge of ensuring that information is sufficiently linked and integrated to serve as a single comprehensive plan. NOAA is in the early stages of some of these planning efforts and has not yet determined how, or whether, it will link and integrate the plans with one another. Without such integration, it will be difficult for NOAA to use these plans for defining long-term decisions about assets because important information will be located within different plans and plans may contain varying levels of detail. NOAA faced challenges in finalizing a planning effort in the past; in 2009, OMAO developed a draft "aircraft recapitalization plan" intended to address the agency's future aircraft needs. However, NOAA leadership did not approve the recapitalization plan and suspended this planning effort in order to incorporate additional information NOAA had received, according to NOAA officials. The agency began its current planning effort 4 years later, in 2013.

- *NOAA faces critical decisions regarding the composition of its aircraft fleet.* NOAA faces challenges in determining how to optimize the

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<sup>11</sup>Leading practices we have identified for capital decision making are described in GAO, *Executive Guide: Leading Practices in Capital Decision-Making*, [GAO/AIMD-99-32](#) (Washington, D.C.: Dec. 1998). To identify leading practices, we conducted literature searches of professional journals, academic articles, and financial reports and interviewed experts in the field of capital planning and decision making. Additional information about these leading practices can be found in our reports that discuss the application of these practices by various agencies, including [GAO-04-138](#) and [GAO-07-274](#).

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composition of its fleet to obtain the right mix of heavy, light, and unmanned aircraft systems for meeting mission needs. For example, NOAA's two operational P-3 Orion planes are in high demand for hurricane work. At nearly 40 years of age, these aircraft are also the oldest planes in the fleet. According to NOAA officials, the useful life expectancy for the P-3 Orion aircraft will be another 15 years once re-winging is completed in fiscal year 2017 as planned. However, even with the re-winging, NOAA officials noted that the ongoing operation and maintenance costs of these aircraft may increase. The manufacturer will not be constructing new P-3 aircraft in the future. Because large capital assets such as aircraft may take many years to acquire, NOAA faces decisions about whether to invest in additional costly service life extensions or replace the two operational P-3 Orions and another aging plane in its fleet, one of its de Havilland Twin Otter aircraft.<sup>12</sup> NOAA also faces decisions about the use of unmanned aircraft systems. Demand for these systems is expected to increase for use in scientific research. According to NOAA officials, unmanned aircraft systems may be an alternative to existing aircraft in some situations, but their cost-effectiveness is not yet proven, and there are uncertainties regarding the situations in which they may be used.<sup>13</sup> NOAA has faced similar decision points in the past without the benefit of a capital asset plan to aid decision making. For example, NOAA purchased a third P-3 Orion aircraft for approximately \$9 million to meet additional agency needs that NOAA officials said could not be met with its two existing P-3 Orion planes. Subsequently, NOAA learned that both of its existing P-3 Orion planes needed new wings sooner than previously expected, and that the newly purchased plane could not become operational without new wings. However, NOAA had not anticipated or planned for these additional expenses and determined that the investment in re-winging the newly acquired P-3 Orion plane was not feasible, according to NOAA officials; as a

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<sup>12</sup>To assist with these decisions, as noted, NOAA is planning to conduct an analysis of alternatives to determine how best to meet its heavy aircraft needs.

<sup>13</sup>According to NOAA officials, NOAA must generally obtain authorization to use unmanned aircraft systems from the Federal Aviation Administration, which authorizes their use for specific time frames (generally 12 to 24 months), locations, and operations. NOAA may need to seek multiple authorizations to operate one unmanned system.

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result, the plane was never put to use and NOAA is currently attempting to dispose of it.<sup>14</sup>

Collectively, the expected increase in NOAA line offices' needs for aircraft, the aging of NOAA's aircraft fleet, and the need to address coming changes in technology underscore the importance of NOAA completing a comprehensive, integrated capital asset plan that reflects leading practices. Linking and integrating its multiple planning efforts could help NOAA demonstrate that it has a capital asset plan consistent with these leading practices. Without such a plan, NOAA risks making decisions that will make it difficult for the agency to effectively address future challenges.

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## Conclusions

Recognizing the critical importance of aircraft to help accomplish its mission, NOAA has developed an ambitious approach to improving the efficiency and effectiveness of its aircraft management through 34 improvement efforts that it expects to complete by fiscal year 2017. A key component of these efforts is the development of several separate long-term plans that together are intended to represent NOAA's aircraft capital asset plan—a critical tool for equipping agencies with information and analysis to make long-term decisions. Developing a comprehensive plan is especially important in light of the decisions NOAA will face in the future regarding the composition of its aircraft fleet and how best to incorporate new technologies. The potential usefulness of such a plan can be seen in NOAA's decision—made without a capital asset plan—to purchase a third P-3 for \$9 million. That plane was never put into operation and is currently being disposed of. NOAA's complex approach to developing a capital asset plan presents challenges. Each plan requires the approval of NOAA leadership, which was difficult to obtain as part of a prior planning effort. Further, it is important that the individual plans collectively reflect OMB leading practices to be most useful to the agency, and that the plans each contain sufficient clarity and detail, as well as being linked and integrated with one another. Without taking these steps, NOAA may find itself with a capital asset plan of limited comprehensiveness and usefulness, and may consequently struggle to address its future needs.

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<sup>14</sup>NOAA was provided \$44.5 million for repairs and upgrades in the Disaster Relief Appropriations Act of 2013 following Hurricane Sandy, and it is using this funding to rewing the two P-3 Orion aircraft in operation. Pub. L. No. 113-2, 127 Stat. 4.

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## Recommendation for Executive Action

To ensure that NOAA has sufficient information and analysis to guide long-term decisions regarding its aircraft, we recommend that the Secretary of Commerce direct the NOAA Administrator to ensure that the agency links and integrates its multiple planning efforts as it finalizes a capital asset plan for aircraft.

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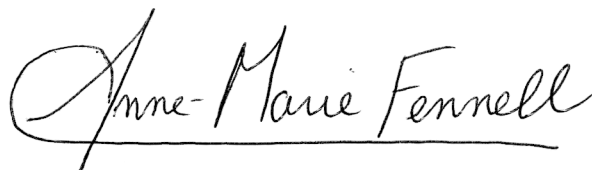
## Agency Comments and Our Evaluation

We provided the Department of Commerce with a draft of this report for its review and comment. In its written comments, reprinted in appendix III, NOAA, responding on behalf of the Department of Commerce, concurred with our recommendation and provided a technical comment that we incorporated.

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

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



Anne-Marie Fennell  
Director, Natural Resources and Environment

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# Appendix I: Objectives, Scope, and Methodology

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This report examines (1) the status of the National Oceanic and Atmospheric Administration's (NOAA) efforts to improve its aircraft asset planning and management and the extent to which these efforts reflect leading practices and (2) the challenges NOAA faces in improving its aircraft asset planning and management.

To examine the status of NOAA's efforts to improve its aircraft asset planning and management, we identified and reviewed relevant agency project and strategy documents detailing their improvement efforts, encompassing all projects and activities undertaken in support of the agency's strategic planning objectives laid out in the Office of Marine and Aviation Operations (OMAO) 2012 strategic plan. We reviewed these documents to identify efforts specific to aircraft asset management and excluded efforts related to other aspects of NOAA's operations, such as efforts related to its ship fleet. We identified efforts that were completed, ongoing, or planned as of fiscal year 2013, when we initiated our work. Altogether, we identified 34 efforts related to aircraft asset planning management. For each improvement effort, we reviewed associated goals, methods, estimated schedules, and progress made to date. Based on the descriptions of the efforts found in NOAA documents we reviewed, and in consultation with NOAA officials, we grouped these into one of five categories related to: (1) assets—upgrading, using, or disposing of certain aircraft assets; (2) collaboration—improving collaboration with other federal agencies; (3) measures—improving the quantity or accuracy of performance measures; (4) plans—creating long-term plans; or (5) policies and data—updating existing policies and conducting data analysis. To determine the extent to which NOAA's efforts reflect applicable guidance and leading practices, we reviewed Office of Management and Budget (OMB) guidance to identify leading practices that are important for effective asset planning and management. These leading practices are primarily found in OMB's Circular A-11 and the supplemental Capital Programming Guide.<sup>1</sup> In addition, we reviewed OMB's Circular A-76, which provides guidance to federal agencies regarding the use of services provided by the private sector to meet agency needs, and Circular A-126, regarding the use of government

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<sup>1</sup>OMB, *Preparation, Submission, and Execution of the Budget*, Circular A-11 (revised 2013) and OMB, *Capital Programming Guide Supplement to Circular A-11: Planning, Budgeting, and Acquisition of Capital Assets* (revised 2013).

aircraft.<sup>2</sup> To obtain additional insight into leading practices, we also reviewed previous GAO reports that discuss the application of these leading practices by various agencies.<sup>3</sup> We then analyzed NOAA's improvement efforts and compared them to leading practices.

To identify the challenges NOAA faces in improving its aircraft asset planning and management, we reviewed relevant agency documents, including the NOAA strategic plan,<sup>4</sup> the OMAO strategic plan,<sup>5</sup> and documents related to NOAA's improvement efforts, and we interviewed NOAA and OMAO officials responsible for implementing these efforts. We also interviewed officials in NOAA's six line offices: the National Environmental Satellite, Data, and Information Service; the National Marine Fisheries Service; the National Ocean Service; the National Weather Service; the Office of Oceanic and Atmospheric Research; and Program Planning and Integration. In these interviews, we discussed NOAA's long-term strategic planning and management for aircraft, NOAA's previous efforts to issue an aircraft capital asset plan, and NOAA's work to complete and implement the 34 aircraft planning and management efforts, among other things. From these discussions, we identified two key challenges related to NOAA's approach to capital asset planning and the critical decisions NOAA faces regarding the composition of its aircraft fleet.

We conducted this performance audit from July 2013 to July 2014 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>2</sup>OMB, *Performance of Commercial Activities*, Circular A-76 (revised 2003) and OMB, *Improving the Management and Use of Government Aircraft*, Circular A-126 (revised 1992).

<sup>3</sup>See, for example, [GAO-14-155](#), [GAO-07-274](#), and [GAO-04-138](#).

<sup>4</sup>NOAA, *NOAA's Next-Generation Strategic Plan* (Dec. 2010).

<sup>5</sup>OMAO, *2012-2016 OMAO Strategic Plan* (Mar. 23, 2012).

# Appendix II: Key Principles in Capital Asset Planning

While there are four phases in capital programming—planning, budgeting, acquiring, and managing—we previously noted that planning is the most important phase in the capital decision-making process.<sup>1</sup> Because the results of the planning phase are used throughout the remaining phases, not following key principles during this phase may have repercussions on agency operations if poor capital investment decisions are made. Table 3 further elaborates on the five key capital asset planning principles highlighted in Office of Management and Budget guidance and our previous work.

Table 3: Five Key Capital Asset Planning Principles

Planning principle	Description
Strategic linkage	Capital planning is an integral part of an agency's strategic planning process. It provides a long-range plan for the capital asset portfolio in order to meet the goals and objectives in the agency's strategic and annual performance plans. Agency strategic and annual performance plans should identify capital assets and define how they will help the agency achieve its goals and objectives. Leading organizations also view strategic planning as the vehicle that guides decision making for all spending.
Needs assessment and gap identification	A comprehensive needs assessment identifies the resources needed to fulfill both immediate requirements and anticipated future needs based on the results-oriented goals and objectives that flow from the organization's mission. A comprehensive assessment of needs considers the capability of existing resources and makes use of an accurate and up-to-date inventory of capital assets and facilities, as well as current information on asset condition. Using this information, an organization can properly determine any performance gap between current and needed capabilities.
Alternatives evaluation	Agencies should determine how best to bridge performance gaps by identifying and evaluating alternative approaches, including nonphysical capital options such as human capital. Before choosing to purchase or construct a capital asset or facility, leading organizations carefully consider a wide range of alternatives such as contracting out, privatizing the activity, leasing, and whether existing assets can be used.
Review and approval framework with established criteria for selecting capital investments	Agencies should establish a formal process for senior management review and approval of proposed capital assets. The cost of a proposed asset, the level of risk involved in acquiring the asset, and its importance to achieving the agency mission should be considered when defining criteria for executive review. Leading organizations have processes that determine the level of review and analysis based on the size, complexity, and cost of a proposed investment or its organization-wide impact. As a part of this framework, proposed capital investments should be compared to one another to create a portfolio of major assets ranked in priority order.

<sup>1</sup>[GAO-04-138](#)



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**Appendix II: Key Principles in Capital Asset Planning**

<b>Planning principle</b>	<b>Description</b>
<b>Long-term capital investment plan</b>	The long-term capital plan should be the final and principal product resulting from the agency's capital planning process. The capital plan, covering 5 years or more, should be the result of an executive review process that has determined the proper mix of existing assets and new investments needed to fulfill the agency's mission, goals, and objectives, and should reflect decision makers' priorities for the future. Leading organizations update long-term capital plans either annually or biennially. Agencies are encouraged to include certain elements in their capital plans, including a statement of the agency mission, strategic goals, and objectives; a description of the agency's planning process; baseline assessments and identification of performance gaps; and a risk management plan.

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Source: GAO analysis of Office of Management and Budget guidance and [GAO-07-274](#) and [GAO-04-138](#). | [GAO-14-566](#)

# Appendix III: Comments from the Department of Commerce



**THE DEPUTY SECRETARY OF COMMERCE**  
Washington, D.C. 20230

June 23, 2014

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

Dear Ms. Fennell:

Thank you for the opportunity to review and comment on the Government Accountability Office (GAO) draft report entitled *NOAA Aircraft: Aging Fleet and Future Challenges Underscore the Need for a Capital Asset Plan* (GAO-14-566). On behalf of the Department of Commerce, I have enclosed the National Oceanic and Atmospheric Administration's programmatic comments to the draft report.

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

Sincerely,

A handwritten signature in black ink, appearing to read "BHC", is written over a faint circular stamp that says "CAPITOL HONOR".

Bruce H. Andrews  
Acting Deputy Secretary of Commerce

Enclosure

**Department of Commerce  
National Oceanic and Atmospheric Administration Response to  
GAO Draft Report “NOAA Aircraft: Aging Fleet and  
Future Challenges Underscore the Need for a Capital Asset Plan”  
(GAO-14-566)**

**General Comments**

The Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Government Accountability Office (GAO) draft report on NOAA’s aircraft. Working with our internal and external partners, NOAA’s Office of Marine and Aviation Operations (OMAO) has made significant strides in the development of an aircraft plan. While highlighting some of the challenges that remain, the report also reflects the significant work in progress and the work OMAO has already accomplished.

**NOAA Response to GAO Recommendations**

**Recommendation 1:** “To ensure that NOAA has sufficient information and analysis to guide long-term decisions regarding its aircraft, we recommend that the Secretary of Commerce direct the NOAA Administrator to ensure that the agency links and integrates its multiple planning efforts as it finalizes a capital asset plan for aircraft.”

**NOAA Response:** NOAA agrees with this recommendation and has linked the methodology of the Fleet Composition Report with that of the Aircraft Composition Report. The legal driver for these reports, Public Law 110-386, specifically asks the Administration to submit three separate plans: (A) the Administration’s ship recapitalization plan for fiscal years 2010 through 2024; (B) the Administration’s aircraft modernization plan; and (C) supporting workforce management plans. Given the specific requirement to submit three separate plans, it is difficult to accomplish a fully integrated capital asset plan.

**Recommended Changes for Factual or Technical Information**

***Page 9, first paragraph, third sentence:***

The draft report currently states, “For example, NOAA is in the process of automating and integrating its various software applications for tracking aircraft use, maintenance, and repair.” We recommend updating the draft report to reflect that this process has been completed. OMAO is now looking at ways to improve this product.

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# Appendix IV: GAO Contact and Staff Acknowledgments

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## GAO Contact

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

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## Staff Acknowledgments

In addition to the individual named above, Steve Gaty (Assistant Director), Cheryl Arvidson, Casey L. Brown, Antoinette Capaccio, Nicole Dery, and Richard P. Johnson made key contributions to this report. Important contributions were also made by Mark Braza, Carol Henn, Armetha Liles, Melissa Swearingen, and Kiki Theodoropoulos.

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