AUDIT REPORT

NOAA Must Take Action to Avoid Gaps in Hurricane Hunter Missions and Improve Oversight, Program Management, and Systems Engineering Practices

REPORT NO. OIG-25-023-A

JUNE 17, 2025

U.S. Department of Commerce
Office of Inspector General
Office of Audit and Evaluation

UNITED STATES DEPARTMENT OF COMMERCE
Office of Inspector General
Office of Audit and Evaluation
Washington, DC 20230

June 17, 2025

MEMORANDUM FOR: Laura Grimm
Chief of Staff, performing the duties of the Under Secretary for Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration

FROM: Kevin D. Ryan
Acting Assistant Inspector General for Audit and Evaluation

SUBJECT: *NOAA Must Take Action to Avoid Gaps in Hurricane Hunter Missions and Improve Oversight, Program Management, and Systems Engineering Practices*
Report No. OIG-25-023-A

Attached is the final report on our audit of the National Oceanic and Atmospheric Administration's (NOAA's) hurricane hunter aircraft replacement program. Our audit objective was to assess NOAA's progress in replacing its hurricane hunter aircraft. We will post the report on our website per the Inspector General Act of 1978, as amended (5 U.S.C. §§ 404, 420).

Within 60 calendar days, please provide an action plan addressing the report's recommendations, as required by Department Administrative Order 213-5.

Any nongovernmental organization or business entity specifically identified in this report can submit a written response to clarify or provide additional context on any specific reference (Pub. L. No. 117-263, § 5274). The response must be submitted to Robert Tetreault at rtetreault@oig.doc.gov and OAE_Projecttracking@oig.doc.gov within 30 days of the report's publication date. We will post the response on our website as well. If the response contains any classified or otherwise nonpublic information, the organization should identify the information and provide a legal basis for redacting it.

We appreciate your staff's cooperation and professionalism during this audit. If you have any questions or concerns about the report, please contact me at 202-750-5190 or Robert Tetreault, Director for Marine and Aviation Programs, at 443-842-5293.

Attachment

cc: Stephen Volz, Acting Assistant Secretary for Environmental Observation and Prediction
Vice Admiral Nancy Hann, Deputy Secretary for Operations, NOAA
Read Admiral Chad Cary, Director, NOAA Office of Marine and Aviation Operations and Director, NOAA Commissioned Officer Corps
Jeremy Weirich, Acting Chief Financial Officer, NOAA
David Robbins, Jenner & Block, LLP (Outside Counsel to Gulfstream Aerospace Corporation)

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What We Audited | Our objective was to assess the National Oceanic and Atmospheric Administration's (NOAA's) progress replacing its hurricane hunter aircraft. To satisfy our objective, we examined the design, planning, and execution of the replacement programs.

Why This Matters | NOAA's three hurricane hunter aircraft are highly specialized planes that collect environmental data to inform hurricane track and intensity forecasts. One plane has exceeded its estimated service life, and the other two will reach the end of their estimated service lives in 2030. NOAA has initiated replacement efforts and Congress has appropriated funds for replacement hurricane hunter aircraft.

Gaps in aircraft coverage have a high potential to degrade the quality of hurricane forecasts and warnings, which drive evacuation orders for coastal communities. Accurate forecasts can help save lives, avoid unnecessary evacuations, and in doing so provide economic benefits.

What We Found | We found that (1) hurricane hunter replacement programs started late, delayed definition of requirements, and did not identify and manage key risks; (2) hurricane hunter replacement programs need more effective management and executive oversight; and (3) technically complex acquisition and development programs require mature systems engineering practices.

We conclude that NOAA's severe storm forecasts and warnings are at risk due to the likelihood of gaps in aircraft mission capabilities.

What We Recommend | We made seven recommendations to help NOAA apply effective program management and oversight to these major acquisitions.

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Introduction

The National Oceanic and Atmospheric Administration's (NOAA's) Office of Marine and Aviation Operations (OMAO) operates NOAA's fleet of 10 specialized environmental data-collecting aircraft. Among these 10 aircraft, NOAA operates two classes of aging "hurricane hunter" aircraft that fly tropical cyclone data collection missions and, increasingly, non-hurricane winter storm missions. Hurricane track and intensity forecasts are highly dependent on data collected by these aircraft. Gaps in aircraft coverage have a high potential to degrade the quality of hurricane forecasts and warnings, which drive evacuation orders for coastal communities. Accurate forecasts can help save lives, avoid unnecessary evacuations, and in doing so provide economic benefits, for example:

- In 2020, a NOAA cost-benefit analysis identified the economic value of forecast improvements—specifically, cost avoidance of unnecessary evacuations—ranging from $391 million to over $600 million, in addition to over 100 lives saved, for two storms that served as case studies.[1]
- Including other economic factors, the value of accurate track and intensity forecasts for a Category 5 hurricane (the most severe) was determined to be nearly $1 billion and hundreds of lives saved, according to the analysis.

NOAA's hurricane hunter aircraft fleet consists of three aircraft: one Gulfstream-IV-SP (G-IV) that is 29 years old and flies high-altitude storm surveillance missions and two Lockheed WP-3D aircraft that are 48 and 49 years old and fly directly into tropical cyclones (low-altitude storm reconnaissance). The G-IV has exceeded its original estimated service life, and the WP-3Ds will reach the end of their estimated service lives in 2030. The G-IV and the WP-3Ds are all highly specialized, "one-of-a-kind" planes, with sensors that are only found on NOAA aircraft.

In 2016, NOAA identified the need to replace the G-IV due to its age. NOAA worked with the engine manufacturer to extend the lifespan to May 2025; however, no further extensions are possible without a significant investment in an engine overhaul.

In the 2018 Consolidated Appropriations Act,[2] Congress appropriated $121 million for a replacement for the G-IV, which will be a modified Gulfstream 550 (G550). NOAA initiated replacement efforts in the third quarter of fiscal year (FY) 2018. However, because NOAA had not yet identified the full scope and cost of the program, it later had to allocate an

[1] NOAA, *Cost-Benefit Analysis of G550 Procurement,* transmitted to the Office of Management and Budget on November 18, 2020, p. 13.

[2] Consolidated Appropriations Act, 2018, Pub. L. No. 115-141 (2018); 164 Cong. Rec. H2089, 2018.

additional $43 million to complete this first aircraft. In 2022, Congress appropriated an additional $100 million for a second jet as a backup capability to the G-IV.[3] NOAA awarded a contract option for a second modified G550 in July 2024. Officials told us, however, that NOAA will need significant additional funds to complete the second aircraft.

In FY 2021, NOAA conducted market research for a WP-3D replacement but did not initiate efforts to replace its WP-3Ds with Lockheed C-130Js until late 2022. In the 2023 Consolidated Appropriations Act, Congress appropriated $327.7 million for the acquisition of these aircraft.[4] In December 2024, an additional $399 million was appropriated for the completion and missionization of both C-130J aircraft.[5]

➤ Objective

Our objective was to assess NOAA's progress replacing its hurricane hunter aircraft. To satisfy our objective, we examined the design, planning, and execution of the replacement programs. See appendix 1 for a full description of our scope and methodology.

[3] Inflation Reduction Act of 2022, Pub. L. No. 117-169 (2022).

[4] Consolidated Appropriations Act, 2023, Division N – Disaster Relief Supplemental Appropriations Act, 2023, Pub. L. No. 117-328 (2022). To the extent that NOAA's aircraft recapitalization programs have been funded by Congress, such funding has not been in response to formally submitted budget requests for the necessary resources to complete mission-ready aircraft. NOAA's budget requests submitted through the annual appropriations process have not included requests for replacement aircraft.

[5] American Relief Act, 2025, Pub. L. No. 118-158 (2024).

Findings and Recommendations

Summary: We found that (1) hurricane hunter replacement programs started late, delayed definition of requirements, and did not identify and manage key risks; (2) hurricane hunter replacement programs need more effective management and executive oversight; and (3) technically complex acquisition and development programs require mature systems engineering practices.

We conclude that NOAA's severe storm forecasts and warnings are at risk due to the likelihood of gaps in aircraft mission capabilities. Specifically:

- The G550 will not be mission ready for any of the 2025 Atlantic hurricane season (June 1 to November 30). Due to the need to retire NOAA's G-IV by May 2025, this may result in a gap in high-altitude hurricane surveillance. As of February 2025, NOAA had made significant progress on, but had not finalized, mitigations to address this risk to its mission.
- The C-130J program is at risk due to the same fundamental issues that contributed to the G550's delay, which may result in a gap in low-altitude storm surveillance capabilities when the WP-3Ds reach the end of their estimated service lives in 2030.

NOAA must address these issues to avoid gaps in data collected by aircraft that are critical for hurricane forecasting.

Finding 1: Hurricane Hunter Replacement Programs Started Late, Delayed Definition of Requirements, and Did Not Identify and Manage Key Risks

Capital asset planning for legacy systems requires a clear understanding of the mission requirements, system capabilities, and projected end of lifespan to properly plan investments in new systems.[6] This planning requires a disciplined process for defining the functional requirements of the new asset, analyzing risk, estimating acquisition and lifecycle costs, and developing a reasonable and achievable program schedule. Acquisitions must be planned and initiated in sufficient time to ensure that the new asset

[6] *Capital Programming Guide V3.1, Supplement to Office of Management and Budget Circular A-11: Planning, Budgeting, and Acquisition of Capital Assets,* 2023, Section I.6.2.

or capability is ready by the time of need, in this case, the end of service life or retirement of NOAA's aging aircraft.

To help ensure the success of its aircraft observation missions, we conclude that NOAA needs to monitor and annually report on aircraft acquisition progress, operations, and maintenance, and develop comprehensive mitigation plans to offset a gap in the hurricane hunter observations. We found that NOAA's initial identification of aircraft recapitalization[7] needs was incomplete, which delayed the provision of key information to support the resourcing of replacement programs. As a result, NOAA's G550 program started late and without adequate funding. In addition, NOAA did not identify key technical risks at the outset of its G550 program, which has suffered from delays defining and engineering the full scope of system capabilities. The C-130J program also started late, without defined system requirements, and has significant technical risks that must be managed to avoid mission impacts.

NOAA's Initial Identification of Aircraft Recapitalization Needs Was Incomplete

In 2016, NOAA completed analyses of alternatives (AoAs)[8] for both the G-IV and WP-3D that considered numerous options and scenarios but did not recommend courses of action and timelines to initiate replacement programs prior to the end of the service lives of these aircraft. In 2019, NOAA published its aircraft asset plan, which identified the expected service lives of the G-IV and WP-3Ds but did not explicitly identify their expected retirement dates. In addition, the plan did not address requirements for aircraft instruments, technology readiness, and projected timelines for development and production.

While NOAA depicted the planned service lives of the aircraft in its 2022 Aircraft Plan, it did not communicate its intent to retire the G-IV in 2025 until its FY 2024 budget justification. The planned retirement of its WP-3Ds in 2030 was first indicated in a footnote to its 2022 Aircraft Plan.[9]

Figure 1 summarizes the age of each aircraft at the end of its planned service life.

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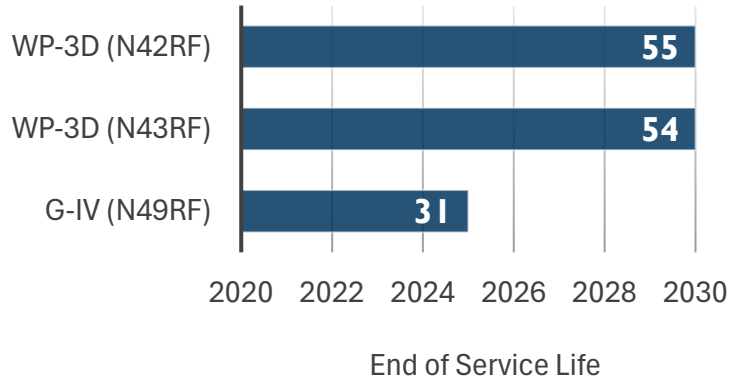
[7] Recapitalization is the process of retiring old units and replacing them with new ones that are optimized for current requirements and missions.

[8] The AoA process compares the operational effectiveness, cost, and risks of a number of potential alternatives to address needs and shortfalls in operational capability. This process helps ensure that the best alternative that satisfies the mission need is chosen on the basis of the selection criteria, such as safety, cost, or schedule. See GAO-20-195G, *Cost Estimating and Assessment Guide*, March 2020, p. 399.

[9] We are making a distinction between *planned service lives*, which are often extended with refurbishment or replacement of systems or components, and *retirements*, which definitively remove aircraft from service.

Figure 1. Age In Years at End of Service Life



Source: NOAA's *Update, Status, and Implementation of the NOAA Aircraft Plan,* August 2022, p. 35, Figure 3-4

The absence of clear plans regarding the retirement and recapitalization needs of its aircraft has hindered NOAA's efforts to adequately execute its replacement programs. Despite several analyses as early as 2016 that highlighted the challenges of continuing to operate and maintain an aging fleet of hurricane hunter aircraft, NOAA did not communicate the urgency for adequately resourced replacement programs along with the risk of gaps in the operational availability of these assets. As a result, both programs started late,[10] have budget shortfalls, and are at risk of mission gaps.

NOAA Did Not Identify Key Technical Risks at the Outset of Its G550 Program

There were early indications of significant technical risks for the G550 procurement that NOAA failed to identify and manage. Only one interested offeror—Gulfstream Aerospace (Gulfstream)—possessed the necessary capabilities to procure and modify an aircraft in accordance with NOAA's needs. However, the contractor's prior experience completing necessary aircraft modifications was limited. Because NOAA had not yet determined the full scope of the new aircraft's capabilities at the time of contract award, the extent of needed modifications to the aircraft was unknown. As a result, NOAA was unable to thoroughly evaluate the technical and schedule risks of the contractor's proposal and develop a realistic program master schedule.

In 2018, NOAA issued a request for information (RFI) seeking companies interested in replacing the G-IV aircraft. Gulfstream indicated its intent to respond to a solicitation for a replacement for the G-IV if issued. One other vendor expressed interest but stated that Gulfstream would not facilitate a third-party purchase of a new G550 to a competing

[10] The programs started late relative to when the new aircraft are needed to sustain NOAA's hurricane hunter missions and in terms of how long it typically takes to acquire and develop complex, one-of-a-kind systems. Key timeframes are described in later sections of this finding. An overall timeline is provided in appendix 2.

offeror, nor would Gulfstream act as a subcontractor to a competitor.[11] As a result, NOAA had no opportunity to compare the relative cost, schedule, and technical strengths of different procurement and development approaches and pursued a sole-source contract with Gulfstream.

Gulfstream's website highlights its experience in modifying aircraft for special weather research missions, one of which was a G550. However, we found that Gulfstream's previous experience modifying a G550 for weather-related missions was limited to initial engineering work on a single aircraft.[12] The actual aircraft modifications for this previous work were performed by another contractor, and Gulfstream did not maintain drawings of its final configuration.

Gulfstream's lack of experience modifying the G550 for weather-related missions was a significant schedule and technical risk that ultimately contributed to delayed delivery of the aircraft. However, NOAA did not include information regarding experience in its briefings for the Department's acquisition milestone review board and moreover did not identify and manage the lack of experience as a key risk for the program.[13]

The G550 Program Delayed Defining and Engineering the Full Scope of System Capabilities Until After the Contract Award

NOAA initiated the G550 acquisition without fully identifying the specific capabilities of the mission-ready aircraft. These capabilities are provided by a suite of instruments deployed on the aircraft, which must be modified and configured to accommodate the instruments.

NOAA awarded Gulfstream a contract for an unmodified "green"[14] G550 aircraft in July 2019. At that point, NOAA had not determined the specific configuration of the aircraft to meet its mission needs. Program management challenges (described in finding 2) and a lack of systems engineering practices (finding 3) likely explain why NOAA delayed defining the aircraft configuration. These challenges also likely contributed to NOAA's failure to construct an independent government cost estimate and master schedule, both of which are critical documents to evaluate contractor proposals and program risks.

The "green" aircraft was completed in December 2019 and placed in storage pending a contract line-item award for modifications. In late 2019 and early 2020, NOAA and

[11] NOAA deemed a third offeror not to be technically qualified.

[12] NOAA managers confirmed their knowledge of this information when we discussed our findings with them.

[13] We attribute this deficiency to lack of oversight, program management, and systems engineering practices discussed in findings II and III.

[14] "Green aircraft" refers to an unmodified aircraft that is also delivered without interior cabin seating, upholstery, and other amenities that are typical in a passenger-carrying production version.

Gulfstream engaged in a series of discussions regarding six different aircraft configurations, seeking to balance capability and affordability.

In early 2020, NOAA asked for pricing for a seventh configuration, called Configuration D, which combined elements from different configurations that had not previously been combined on a single aircraft. This configuration would provide additional capability beyond the G-IV and support future data collection requirements. In September 2020, NOAA awarded Gulfstream the contract line item for the Configuration D aircraft modifications, with a delivery date of May 2024.

With the aircraft modification work on contract, Gulfstream began the engineering and design work in the fall of 2020. However, Configuration D and the aircraft's full operational envelope[15] required Gulfstream to perform more extensive engineering and design work than anticipated. In March 2022, Gulfstream initiated a full airframe structural analysis (FASA) due to the extent of the needed modifications.

In September 2022, Gulfstream informed NOAA that it projected the delivery of the aircraft to be as late as November 2025. In the spring of 2023, Gulfstream completed the FASA and revised the projected delivery date to April 2025. However, as of February 2025, program officials communicated to oversight bodies that they estimated the aircraft will not be delivered until March 2026.

After Gulfstream delivers the modified G550, NOAA must then install and test the suite of weather-observing instruments the G550 will host—a process NOAA projects will take 11 weeks. As a result, it is likely that the aircraft will not be operational before May 2026. NOAA had indicated its need to retire the G-IV by May 2025 due to the aging of the aircraft. As such, it was relying on the timely completion of the G550 to provide high-altitude aircraft observations for the 2025 hurricane season.

Until recently, NOAA did not recognize the high likelihood that the G550 would not be operational until after the planned retirement of the G-IV and therefore did not conduct adequate mitigation planning to ensure mission continuity. NOAA has begun working to extend the service life of the G-IV, so that it will remain operational and mission-ready until the G550 has been delivered and mission equipment installed.

NOAA had also previously signed an agreement with the National Aeronautics and Space Administration (NASA) for use of its jet as a backup capability. NOAA is working to update that agreement and is working to establish an agreement with the National Science Foundation (NSF) to use its jet if needed to fulfill the hurricane surveillance mission. NOAA

[15] "Full operational envelope" refers to the capabilities of a design in terms of minimum and maximum airspeed and altitude.

anticipates both agreements will be finalized in the spring of 2025. However, neither NASA aircraft nor NSF aircraft have the doppler radar systems that NOAA aircraft have, which is a key capability for hurricane surveillance. Further, NOAA's ability to employ these mitigations is contingent upon the availability of NASA and NSF aircraft, which have other missions to fulfill.

The C-130J Program Also Started Late, Without Defined System Requirements, and Has Significant Technical Risks that Must Be Managed to Avoid Mission Impacts

The 2016 AoA identified several potential replacement platforms, in addition to a service life extension for the WP-3D to continue its hurricane reconnaissance mission. NOAA determined that it is not feasible to continue to operate the WP-3D beyond 2030 due to the substantial increase in maintenance costs as the aircraft ages and availability of logistical support and parts for the P-3[16] airframe decline as it is retired from service by U.S. and foreign operators.

NOAA issued an updated AoA for the WP-3D replacement in October 2021, again identifying potential replacement platforms, as well as options to keep the WP-3D operational. The updated AoA also identified the need to explore mitigation strategies associated with WP-3D maintenance and parts obsolescence issues as a "hedge" against schedule delays for replacement aircraft. It further identified the replacement aircraft's radar as a "significant source of cost, schedule, and technical risk" and said that NOAA must define technical requirements in greater detail and "make detailed engineering, cost, and performance trades."

While NOAA undertook some early program formulation activities in March 2021, it did not initiate the C-130J acquisition and development program until late 2022 due to a lack of funding. In December 2023, the program released a request for proposals (RFP) for the engineering, design, and construction of two modified C-130J aircraft. However, the RFP did not include clearly defined and measurable system capabilities and requirements, which are needed to analyze the proposals for aircraft configuration and modifications.

In September 2024, NOAA awarded a contract for two C-130J aircraft. However, key aspects of the aircraft modifications are dependent on the design of doppler radar instruments, which has not yet been initiated.[17] Although the contract award includes a line item for the completion of an AoA for this radar and NOAA has provided the contractor with the radar's required performance and physical characteristics, any material solution will have cost, schedule, and performance risks and require developmental and operational

[16] The WP-3D is a variant of the Lockheed P-3 Orion that has been modified to support hurricane hunter missions.

[17] See finding 3 for additional details.

testing. NOAA's schedule will need to account for a test program for the radar and integration with the aircraft.[18] Therefore, the risk of engineering-related schedule delays—like those the G550 program experienced—will be increased.

The 2023 National Defense Authorization Act[19] requires NOAA to acquire at least one fully operational replacement aircraft before its last WP-3D is retired. A review of program documentation from the Department's acquisition milestone review board events, however, showed that key events for the C-130J program are already trending toward delivery later than originally briefed to the review board. Additionally, the contract award was delayed 6 months from those briefed schedules. Considering the complexity of the aircraft and the reliance on the as-yet-undeveloped radar, it is reasonable to consider that the overall schedule has shifted by the same amount of time. As such, NOAA should consider whether to extend the services lives of WP-3Ds beyond 2030 to comply with the law and avoid a gap in low-altitude aircraft observations.

Recommendations

We recommend that the NOAA Administrator ensure that OMAO:

1. Monitors and annually reports on acquisition status, program accomplishments, operations, maintenance, and planned actions for the coming year. It should also identify year-over-year changes to aircraft service life and planned retirements, major repairs or service life extensions, updated condition assessments, and new validated observational collection capability requirements.
2. Develops comprehensive mitigation plans to offset a likely gap in both hurricane hunter missions that includes major maintenance work packages, cost estimates, and required scheduling to ensure that the WP-3Ds remain mission-ready until the C-130Js are mission ready.

[18] NOAA intends to present a comprehensive schedule that includes testing and integration at the planned milestone 3 event that is projected for November or December 2025.

[19] James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, Pub. L. No. 117-263, § 11708 (2022).

Finding 2: Hurricane Hunter Replacement Programs Need More Effective Management and Executive Oversight

Effective program management and oversight of major system acquisitions are needed to ensure successful delivery of system capabilities within cost and schedule constraints. Department Administrative Order (DAO) 208-16,[20] titled *Acquisition Project Management*, and the *Department of Commerce Acquisition Program and Project Management Guidebook* provide requirements and guidance for the management and oversight of major system acquisition programs.

Program management offices (i.e., the teams managing the efforts) should be sufficient for the size, scope, and complexity of the system being developed and acquired. Further, to ensure success, acquisition programs must implement adequate management controls. Examples of controls include an overarching program management plan that clearly defines roles, responsibilities, and controls for managing costs, schedule, requirements, and risks.

Programs also require effective oversight through rigorous and continuous evaluation against established progress benchmarks. The Department's acquisition framework is a structured sequence of phases and milestones, from concept initiation to project delivery. The Department's Milestone Review Board (MRB) is the authorizing body that approves programs to proceed to the next phase, ensuring adequate planning has occurred and controls are in place through the examination of artifacts submitted in support of each milestone. Ongoing programmatic oversight is delegated to NOAA and performed by its Program Management Council (PMC).

We found that NOAA has not established adequate program management offices and controls for its hurricane hunter aircraft development and acquisition efforts, and the Department and NOAA have not performed effective oversight of the hurricane hunter acquisition programs.

NOAA Has Not Established Adequate Program Management Offices and Controls for Its Hurricane Hunter Aircraft Development and Acquisition Efforts

NOAA did not staff a program management office sufficient for the scale and complexity of its G550 development and acquisition effort. The G550 program management office was staffed by a single employee serving as the designated program manager, lead systems integrator, and sensor/instrument project manager, while also serving as the C-130J program manager for a period of 18 months, from September 2022 until March 2024. This employee had part-time assistance, but we found the project team lacked the skills to

[20] DAO 208-16, *Acquisition Project Management*, May 2015.

adequately analyze the complexity of the design decisions made for the G550 and the associated technical and schedule risks to the delivery schedule of the aircraft. The program also lacked assigned technical experts to verify the information provided by Gulfstream, making NOAA overly reliant on information provided by the contractor.

NOAA's C-130J program staffing was marginally better. As noted, the G550 program manager had simultaneously served as the C-130J program manager for approximately 18 months until March 2024, most of that time without supporting staff. In late 2023, after funds became available, NOAA created a program management office for aircraft acquisitions and began filling new positions that were created as part of that planned program office framework. These new positions included a deputy director for aircraft programs and a dedicated C-130J program manager. As of December 2024, the program was staffed with four positions.

Neither program has established adequate management controls. Both lack management control plans that define roles, responsibilities, and specific cost, schedule, risk, and systems engineering controls. The deputy director for aircraft programs has begun to improve program management practices across both programs. As of February 2025, NOAA was working to create management control plans for each acquisition program.

These shortcomings had consequences for the G550 program's progress and threaten the success of the C-130J acquisition and fielding. With a single person managing it who did not have the capacity to fulfill all program management needs, the G550 program failed to perform numerous processes that would have identified the complexity of the effort. For example, the program lacks an integrated master schedule (IMS) that depicts all tasks necessary to complete an operational, mission-ready aircraft. Such a schedule would enable improved analysis of risks and identify likely sources of schedule delays sooner. Without an IMS, NOAA has insufficient basis for projecting when the G550 will be operationally ready.

Without adequate controls, the C-130J program is at risk of cost growth, schedule delays, and capability gaps. Most significantly, the C-130J program has not identified candidate systems or initiated a viable research and development program to replace the WP-3D's doppler radar, which is a critical instrument for hurricane reconnaissance. NOAA forecasters have identified the C-130J's doppler radar (called a Vertically Scanned Doppler Radar, or VSDR) as critical in developing more accurate hurricane track and intensity forecasts. The VSDR's final design requirements, development, selection, and production will affect the scope, complexity, cost, and schedule of the design, engineering, and completion of the required aircraft modifications—directly impacting the estimated delivery of the fully capable aircraft.

NOAA officials told us that NOAA does not have the funding resources to staff and manage the hurricane hunter aircraft replacement programs to a level consistent with their size, scope, and complexity. This was manifested in NOAA's 2018 and 2020 sponsor commitment memos[21] for the G550 program, which stated that the program would be minimally staffed. However, NOAA did receive $121 million in appropriations and allocated an additional $43 million for the G550 and chose not to use any of the funding to increase staffing for the program. This minimal staffing approach contributed to G550 delays and may risk critical mission gaps in the coming hurricane seasons.

The Department and NOAA Have Not Performed Effective Oversight of the Hurricane Hunter Acquisition Programs

Department-Level Oversight

Reviews of the G550 program by Department's MRB did not fully evaluate the program's development and failed to identify and address missing documentation,[22] contradictory programmatic information, and unrealistic schedule assumptions.

The *DOC Scalable Acquisition Project Management Guidebook* (Guidebook) requires that all high-profile programs define three baselines beginning at milestone 2. These are cost (lifecycle cost and development cost), schedule (program time planned from milestone 2 to achievement of operational readiness at milestone 4), and performance (key performance parameters or metrics that define the program's operational capabilities).

However, the decision memorandum for the G550 program's combined milestones 2 and 3,[23] signed in 2020, did not define a performance baseline, did not define a schedule baseline,[24] and relied on future unprogrammed resourcing from Congress to set a cost baseline.[25] As a

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[21] As identified in the *DOC Scalable Acquisition Project Management Guidebook,* a sponsor commitment memo ensures that the program sponsor understands what is being proposed and is prepared to commit the staff, finances, and other resources to see to the project's successful completion.

[22] Required documentation that was missing from milestone reviews included an initial risk report, mission needs statement, independent cost estimate, project management plan, requirements document update, cost analysis requirements document, and updates to previously provided documents. These documents are necessary for oversight bodies' assessment of programmatic and enterprise risk as well as the overall maturity and readiness to execute the program.

[23] The Department combined milestones 2 and 3 in August 2020 rather than conducting separate events as called for in the Guidebook.

[24] The schedule baseline was not able to be defined because the aircraft delivery date was not agreed to by NOAA and Gulfstream until a subsequent contract modification in December 2021, 16 months after the decision memorandum was signed.

[25] The resource baseline was established in the absence of an independent government estimate—required by the Guidebook—and the additional funds required for completion were not submitted in the Department's FY 2021 budget request.

result, there were minimally defined benchmarks for an oversight body to evaluate program performance. In July 2024, the Deputy Secretary approved milestone 3 for the second G550 jet acquisition and directed OMAO to establish baselines for the program but did not set a timeline for it to do so.

The Guidebook also requires programs subject to MRB oversight to report baseline deviations of 20 percent or more to the MRB Executive Secretariat. We found that, as of September 2022, the contractor's schedule had grown by approximately 40 percent.[26] The schedule improved somewhat with a contract modification that revised the delivery date of the first aircraft to April 30, 2025, but the schedule growth was still approximately 25 percent. More recently, NOAA has communicated that delivery is now expected in December 2025, which would represent schedule growth of over 60 percent from the program's baseline. Although senior leadership has been made aware of the delays, there was no evidence of a formal communication from NOAA to the MRB Executive Secretariat of these deviations, in accordance with Department policy.

The MRB milestone 2 review of the C-130J program was postponed from January 2024 to September 2024. This delay allowed the newly hired C-130J program manager to assume control over the program and help ensure completion of key supporting documentation, which should improve the program's formulation and put it on a better path for success. As a result of the September 2024 review, the program was authorized to contract for a green aircraft, an AoA for the VSDR, and design of aircraft modifications. The program was directed to return for a milestone 3 review before contracting for the actual modifications to the aircraft to accommodate its instruments. Baselines for the program were not established at milestone 2, however.

NOAA-Level Oversight

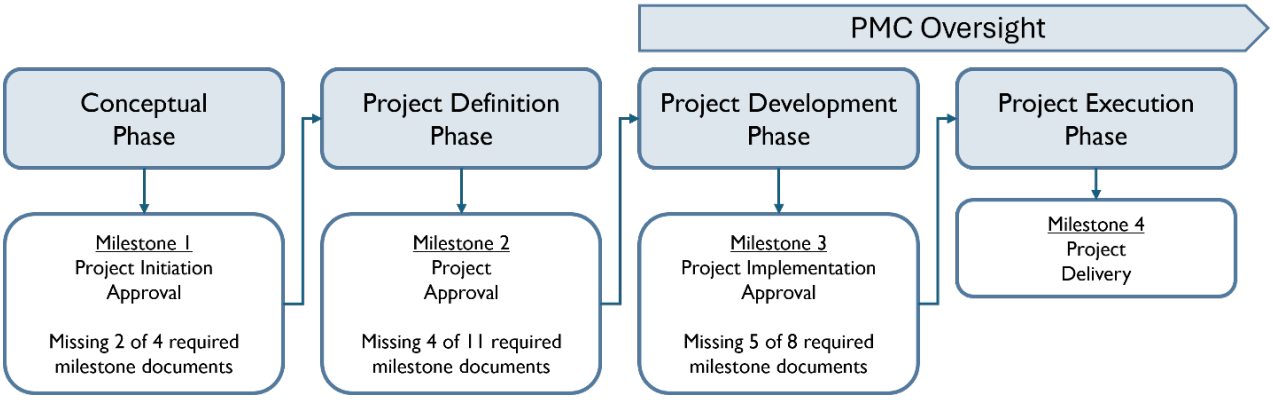
NOAA's PMC provides ongoing oversight of select programs, projects, and activities. The PMC is an enterprise risk management body that assesses performance based on budget, schedule, and technical and risk factors and reports on NOAA's progress meeting enterprise objectives. However, it has not effectively overseen the management and execution of NOAA's hurricane hunter aircraft acquisition programs.

PMC oversight of major acquisitions typically begins following milestone 2, which is after much of the program's foundational aspects have been established through the MRB (see figure 2). Additionally, the PMC is not part of the formal review and approval process for

[26] DAO 208-16 establishes the schedule baseline as the elapsed time from milestone 2 to milestone 4 (operational readiness of the system). However, as of June 2024, NOAA had not developed a detailed installation and integration schedule for instruments on the aircraft following delivery from Gulfstream to achieve operational readiness. See appendix 1 for a description of how we assessed schedule growth.

acquisition documentation submitted for Department milestone events. As a result, the PMC misses an opportunity to evaluate initial program and enterprise risk; direct mitigations to those risks; and influence the cost, schedule, and technical baseline of the program. The PMC also lacks critical information needed to monitor and report on the cost, schedule, and performance of the programs.

Figure 2. Executive Oversight Timing and Issues



Source: Office of Inspector General (OIG) analysis of Department and NOAA program oversight

We observed monthly PMC meetings for the hurricane hunter acquisition programs and found them to be cursory reviews of events or accomplishments since the last meeting, with a short discussion of updated funds obligations and expenditures, and risks and issues. These discussions did not consider all or the most significant program and related enterprise risks and issues, such as the mission impact of late delivery of the aircraft and mitigations to offset that impact. There also was no discussion related to the lack of VSDR development and the subsequent impact on the required delivery schedule.

Program Performance Monitoring

Neither the PMC nor any other executive body performs continuous analysis and monitoring of program performance indicators, detailed root cause analysis of declining trends, and needed improvements. The PMC failed to note the complexity of the G550 program from its outset, the lack of experience resident in NOAA concerning the sum of the modifications by Gulfstream, and declining program performance trends until well into the program's timeline. As a result, the PMC missed opportunities to direct early mitigation planning and increase NOAA's chances of preserving mission continuity for the 2025 hurricane season.

NOAA's C-130Js, like the G550, will be one-of-a-kind aircraft with a combination of elements from several other aircraft that have not yet been combined on a C-130J platform. This condition, the required modifications, and associated risks have not yet been

discussed before the PMC. Neither the PMC nor any other oversight body has conducted detailed root cause analysis of the G550 program delays; as a result, the C-130J program is repeating many of the mistakes of the G550 program, such as delayed requirements definition and unrealistic schedule estimates.

Because the PMC does not review milestone documents, it has missed an opportunity to review and direct action to mitigate schedule and cost risks created by the low technology readiness level of the VSDR and the potential impact that it may have on mission continuity for the 2030 hurricane season timeframe.

Causes and Effects of Inadequate Oversight

Oversight weaknesses stem from a lack of resources and expertise. A manager with responsibility for MRB activities told us the board does not have the resources for more in-depth reviews. NOAA officials also told us that the PMC does not have the capacity to perform detailed, ongoing oversight and that its function is limited to enterprise risk management.

The lack of effective program management and executive oversight leaves NOAA's hurricane hunter acquisition programs overly reliant on contractor performance and lacking the ability to identify and manage risks before they manifest as issues that cause delays. Establishing program-level management controls will ensure more efficient and effective program execution and improve the likelihood of success of the hurricane hunter acquisitions.

We conclude that NOAA must improve its program management and oversight of technically complex and challenging aircraft acquisitions.[27] NOAA should consider using tailored acquisition support to leverage the experience and knowledge of expert U.S. government organizations in designing and acquiring highly modified aircraft (similar to the model that NOAA is following for its Class A ship acquisition).[28] Additionally, NOAA should conduct a detailed root cause analysis and lessons-learned review of the G550 program to identify opportunities for improvement in the management and oversight of these challenging acquisitions.

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[27] We have made similar conclusions with respect to NOAA's ship acquisitions. See Commerce OIG, OIG-24-016-I, *Management Alert: NOAA Must Take Action to Address Significant Ship Fleet Recapitalization Risks*, March 12, 2024.

[28] Naval Sea Systems Command is leading the design and acquisition of NOAA's Class A ships. Tailored support can include, for example, bringing in specialized engineering support to aid the program office's cost estimating, schedule development, and risk management practices.

Recommendations

We recommend that the NOAA Administrator ensure that:

3. Program-level management controls are designed and documented for its G550 and C-130J programs, in accordance with Department policy and guidance.
4. OMAO or another appropriate office conducts cost-benefit and business case analyses for using tailored acquisition support (e.g., from the U.S. Navy or U.S. Air Force) to bolster NOAA's ability to execute complex and challenging aircraft acquisitions.
5. NOAA develops and implements a program oversight structure that can perform rigorous and continuous evaluation of program risks, opportunities, and progress against established benchmarks for complex and technically challenging acquisitions.
6. NOAA conducts a detailed root cause analysis and lessons-learned review of the G550 program to identify opportunities for improvement in the management and oversight of the second G550 acquisition and the C-130J program.

➤ Finding 3: Technically Complex Acquisition and Development Programs Require Mature Systems Engineering Practices

The practice of systems engineering provides a structured approach to increasing the technical maturity of a system and increasing the likelihood that the capability being developed balances mission performance with cost, schedule, risk, and design constraints.[29] The Department of Defense[30] and Government Accountability Office (GAO)[31] have both identified the critical role of systems engineering performed by the government in successful acquisition programs. Key systems engineering processes include requirements and risk management.

The implementation of systems engineering is dependent on mature policies and procedures. Within NOAA, the National Environmental Satellite Data and Information

[29] Department of Defense, *Systems Engineering Guidebook,* February 2022, Section 1.3.

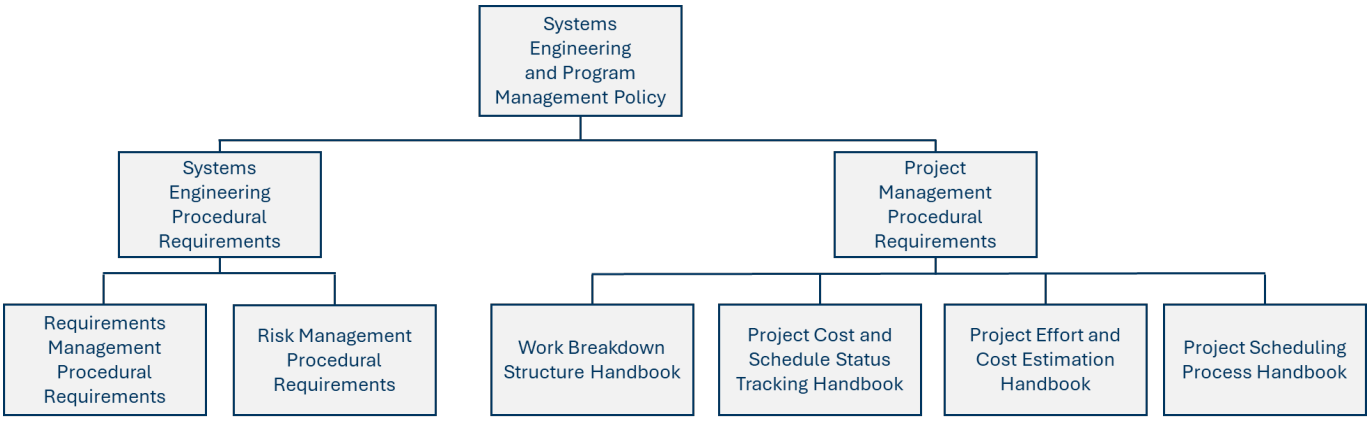
[30] Department of Defense, *Systems Engineering Guidebook*, February 2022.

[31] GAO Report to Congressional Committees, GAO-17-77, *Weapon System Requirements Detailed Systems Engineering Prior to Product Development Positions Programs for Success,* November 2016.

Service (NESDIS)[32] has systems engineering policy and procedures (depicted in figure 3) that are typical in mature, large-scale acquisition programs.

However, we found that neither NOAA-level or OMAO acquisition and program management policies provide a systematic methodology for complex aircraft system acquisition and development efforts. Further, systems engineering practices at NOAA and specific to OMAO are limited and not incorporated in policy. When discussing NOAA's aircraft programs, Department personnel told us that the approach taken with these aircraft was to make systems engineering the responsibility of the contractors. However, that approach neglects government responsibility for systems engineering tasks that are critical to defining technical requirements and capabilities of a new system, developing independent cost and schedule estimates, and evaluating proposals from contractors.

Figure 3. NESDIS Systems Engineering and Program Management Governance



Source: OIG analysis of NOAA's NESDIS policy documentation

NOAA's aircraft acquisition programs are undertaking development of new and unique aircraft systems. Yet, policies applicable to OMAO do not include processes to analyze, plan, and execute developmental programs.[33] The policies fail to define a systems-based approach for complex acquisition and development efforts such as aircraft systems. Without a disciplined systems engineering approach, beginning with the early phases of an acquisition, there is a lack of processes to mature new technologies or designs.

[32] NESDIS provides secure and timely access to global environmental data and information from satellites and other sources to promote and protect the nation's security, environment, economy, and quality of life.

[33] Federal Acquisition Regulation, Part 35, Research and Development Contracting, FAR 35.001, states that "development" means the systematic use of scientific and technical knowledge in the design, development, testing, or evaluation of a potential new product or service (or of an improvement in an existing product or service) to meet specific performance requirements or objectives.

In 2021, we issued a report that recommended that OMAO develop systems engineering management plan and program management practices.[34] OMAO implemented the report's recommendation through an update of its *Fleet Acquisition Handbook* (i.e., for ships). However, systems engineering principles apply to any complex system acquisition and development effort and the need applies to all OMAO observation systems, including aircraft and uncrewed systems.

The lack of comprehensive systems engineering policy has hindered the ability of NOAA program managers and oversight entities to critically assess the hurricane hunter replacement programs' maturity and readiness to advance in the acquisition process. This has manifested in deficiencies in the programs' management of requirements and risk.

Requirements Management Weaknesses

Requirements management is a key systems engineering activity throughout a system acquisition and development effort. NOAA's requirements management policy[35] centers around identifying and managing mission requirements; it does not include steps for developing technical requirements and attributes of sensing systems, instruments, and the platforms that host them.

NOAA did not finalize G550 program requirements until mid-2020, nearly 2 years after initiating the program. Further, these final requirements and the resulting aircraft configuration were not formalized in the program requirements documentation, which has not been updated since early 2019.

The C-130J program currently lacks fully defined requirements for the set of sensors the aircraft will host and the associated modifications to the aircraft. The program's lack of defined requirements led to the postponement of its milestone 2 review from January to September 2024.

Risk Management Weaknesses

Managing risk is another activity that must occur continuously to ensure a successful systems engineering effort. We noted weaknesses in the aircraft programs' risk management.

The G550 program failed to identify, manage, and report the risk posed by the aircraft modifications needed to support a tail doppler radar on the G550 and the integration of numerous sensors into a new aircraft configuration. These design decisions drove the need

[34] Commerce OIG, OIG-21-027-1, *OMAO Must Define and Implement a Disciplined Requirements Management Process to Ensure Future Acquisitions Meet User Needs,* May 25, 2021.

[35] NOAA Administrative Order 216-108.

for a structural analysis of the aircraft frame, which was a primary contributor to the schedule delay. In addition, NOAA did not assess in a timely manner the mission risk of late delivery of an operationally ready G550 prior to the retirement of the G-IV.

The C-130J program is dependent on a technology—the VSDR—currently in research and development. However, while this concern was identified in its initial risk analysis report, the program did not conduct additional assessment to further define, analyze, monitor, and mitigate development risks prior to awarding a contract for a new aircraft. Had NOAA completed an AoA, determined the material solution, and published a more fully defined set of VSDR system requirements before awarding a contract, it would have significantly reduced the technical and schedule risk of its replacement aircraft for the hurricane reconnaissance mission. The not-yet-designed or built VSDR must be matured to an operationally ready state in time for the C-130Js' mission starting in 2030.

Maturing new technologies inherently poses risk, and the uncertainty of the VSDR design has ramifications for the modifications that will be needed to accommodate the instrument on the aircraft. However, NOAA awarded a contract in September 2024 for two C-130J aircraft, including the design and engineering of modifications to the aircraft to integrate the not-yet-designed or built VSDR solution. As such, the extent to which NOAA can have confidence in the cost certainty and program schedule and manage technical risks of these aircraft will be limited due to the uncertainty of the VSDR design.

Recommendation

We recommend that the NOAA Administrator ensure that:

7. NOAA develops and implements systems engineering policy and processes in accordance with best practices and applicable guidance.

Summary of NOAA's Response and OIG Comments

NOAA reviewed a draft version of this report and responded to our findings and recommendations. In its response, NOAA concurred or partially concurred with all our recommendations and described actions it has taken or plans to take to address them. NOAA provided a number of discrete comments; we considered these comments and revised the report where appropriate. NOAA also raised concerns that the potential monetary benefits reported in the draft could be misinterpreted, potentially leading to the reallocation of $399 million to another program, which was not our intent. After further review and careful consideration, we have decided not to report the previously identified monetary benefits in the final report, as they were not material to the audit findings.

With respect to the recommendations, we held multiple discussions with OMAO to provide clarification and better understand NOAA's reason for its partial concurrences and other implementation details. From these discussions, we revised recommendations 1, 4, and 6, which we subsequently shared with NOAA. In an email dated April 10, 2022, NOAA concurred with the revised recommendations. These three recommendations, as well as recommendation 3, are discussed below. NOAA's complete response is included in this report as appendix C.

Draft Report Recommendation 1:
[Ensure that OMAO:] Annually updates NOAA's aircraft plan to identify year-over-year changes to aircraft service life and planned retirements, new aircraft needs, major repairs or service life extensions, updated condition assessments, new observational collection capability requirements, and any associated changes to funding requirements, and submit this update to relevant stakeholders.

NOAA partially concurred with the draft recommendation, stating that its aircraft recapitalization plan is a multi-year effort and updating it annually would require significant additional resources. However, NOAA indicated that it would be able to annually evaluate the items mentioned in the draft recommendation and provide an internal report to the director of OMAO.

OIG Comment. We believe that NOAA's alternative proposed action is adequately responsive to the issues our draft recommendation intended to address and have modified the recommendation accordingly.

Draft Report Recommendation 3:
[Ensure that:] Program-level management controls are designed and documented for its G550 and C-130J programs, in accordance with Department policies and guidance.

NOAA concurred with the draft recommendation and stated that the controls are already in place within the Aircraft Acquisition Program Management Office.

OIG Comment. While we acknowledge that OMAO has begun implementing some controls, added personnel, and committed to further improvements, including a program management plan, we maintain that the full extent of necessary controls to manage programs of this complexity were not originally in place. These corrective actions appear to be responsive to our concerns; however, once we receive NOAA's corrective action plan, we will determine whether these measures will fully satisfy the intent of the recommendation.

Draft Report Recommendation 4:
[Ensure that:] OMAO or another appropriate office conducts cost-benefit and business case analyses for using assisted acquisitions (e.g., from the U.S. Navy or U.S. Air Force) to bolster NOAA's ability to execute complex and challenging aircraft acquisitions.

NOAA partially concurred with the draft recommendation and referenced OMAO's ongoing consultation with external entities, including the Department of Defense. NOAA cited its internal knowledge of its complex systems and performance parameters as reasons for maintaining its current approach and asserted that an assisted acquisition would risk cost overruns, schedule delays, and performance failures.

OIG Comment. Our discussions with NOAA clarified the scope of our recommendation, which we have amended in the final report for NOAA to evaluate using tailored acquisition support.

Draft Report Recommendation 6:
[Ensure that:] NOAA considers engaging an independent review team with expertise in acquiring, developing, and fielding new aircraft platforms to perform a detailed root cause analysis of G550 program delays, and identify applicable lessons learned for the C-130J program.

NOAA concurred with the draft recommendation. However, it indicated that "independent evaluation may be considered once the G550 acquisition is complete, but is not planned at this time."

OIG Comment. From our subsequent discussions with OMAO, we understand that it is undertaking a lessons-learned program and root cause analysis of some of the problems

experienced in the G550 acquisition. We believe this to be an adequate alternative to address the issues in finding 2 and have modified the recommendation accordingly.

We appreciate NOAA's response to the report, including the cooperation and subsequent discussions with OMAO to attain NOAA's full concurrence with the final report recommendations. We look forward to reviewing NOAA's action plan for implementing the recommendations.

Appendix 1. Scope and Methodology

The objective of our audit was to assess NOAA's progress replacing its hurricane hunter aircraft. To accomplish our objective, we compared aspects of the planning, initiation, and execution of the G550 and C-130J acquisition programs with relevant criteria, reviewed detailed documentation, interviewed appropriate personnel, and performed other analyses.

To assess NOAA's plan and timeline for transition between airframes and the potential for mission execution gaps, we compared the contracted delivery schedules with the program schedules presented at monthly PMC meetings, interviewed NOAA, OMAO, and OMAO Aircraft Operations Center personnel, and reviewed the service life limits of each aircraft type as presented in the 2022 Aircraft Plan and AoAs for each aircraft program.

To assess the executive oversight, program management, and project planning activities for the replacement of the G-IV and WP-3D hurricane hunters, we reviewed the PMC Terms of Reference and PMC Guidebook, Office of Management and Budget (OMB) Circular A-11 and associated *Capital Programming Guide,* Federal Acquisition Regulations Part 7, *DOC Scalable Acquisition Project Management Guidebook v1.2 and 2.0, Commerce Acquisition Manual,* and *NOAA Acquisition Manual,* and compared that information with interviews of personnel from the Office of Acquisition Management (OAM), NOAA, and OMAO. We also reviewed and analyzed Gulfstream Aerospace Corporation's response to an RFI in 2018, artifacts submitted by OMAO for the milestone review process, G550 contract award documents, and the C-130J RFP. Finally, we conducted an interview with a senior Gulfstream Aerospace Corporation representative and the Airborne Phased Array Radar project team at the National Center for Atmospheric Research.

To assess whether NOAA conducted sufficient and appropriate communication on mission continuity, possible mission impacts/gaps, and communication with key stakeholders, we interviewed NOAA and OMAO executive leadership and analyzed monthly PMC slide submissions and annual congressional budget justification submissions.

To evaluate and assess NOAA and OMAO's acquisition policy maturity and applicability to complex aircraft acquisitions and its systems engineering practices, we interviewed the G550 and C-130J program manager, OAM staff, and NOAA and OMAO executive leadership. We also reviewed the *Commerce Acquisition Manual, NOAA Acquisition Manual,* and NOAA Administrative Order 216-08, and compared those with GAO reports relevant to similar major acquisitions, GAO guidebooks on cost estimating and schedule assessment, and analogous Department of Defense policy and guides related to program management and systems engineering.

In addition, we assessed internal controls that are significant within the context of our objective through document reviews and interviews with key personnel to determine adherence to procedures and plans. Specifically, we observed OMAO's participation in monthly PMC briefings with NOAA leadership. We also reviewed Department guidance for MRB processes and interviewed OAM officials to assess how the programs met requirements for the transition from the planning phase to the development phase to the execution phase. Our findings and recommendations are inclusive of our internal control assessments.

Although we could not independently verify the reliability of all the information we collected, we compared it with other available supporting documents to determine data consistency and reasonableness. Based on these efforts, we believe the information we obtained is sufficiently reliable for the purposes of this report.

We conducted our audit from August 2023 through December 2024 under the authority of the Inspector General Act of 1978, as amended (5 U.S.C. §§ 401-424), and Department Organization Order 10-13, as amended October 21, 2020. We performed our fieldwork remotely.

We conducted this audit 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 objective. We believe that the evidence obtained provides a reasonable basis for our findings, conclusions, and recommendations based on our audit objective.

Appendix 2. Timeline of Hurricane Hunter Program Events

▪ G550 Program Events ▪ C-130J Program Events ▪ NOAA/OMAO Events

2016

August 2016: AoAs completed for G-IV and WP-3D

March 2018: $121 million appropriated for G-IV replacement

May 2018: Sources Sought RFI issued for G-IV replacement

July 2019: G550 contract awarded (expected delivery 12/2023)

October 2019: Aircraft Plan published

October 2021: AoA for WP-3D replacement updated

August 2022: Updated Aircraft Plan published

September 2022: Gulfstream schedule deviation letter

November 2022: NOAA cure notice issued re: Gulfstream schedule deviation letter

December 2023: C-130J RFP issued

July 2024: Contract award to Gulfstream for second G550 purchase and modification

September 2024: Contract award to Lockheed Martin for 2 C-130Js (expected delivery 2029)

November 2024: NOAA PMC indicates G550 delivery from Gulfstream is 12/2025 (IOC is +11 weeks)

Appendix 3. NOAA's Response

NOAA's response to our draft report begins on the next page.

UNITED STATES DEPARTMENT OF COMMERCE
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

MEMORANDUM FOR: Frederick J. Meny Jr.
Assistant Inspector General for Audit and Evaluation
U.S. Department of Commerce
Office of Inspector General

FROM: VADM Nancy Hann
Nancy Hann, VADM/NOAA
2025.01.31 11:32:35 -05'00'
Deputy Under Secretary for Operations
Performing the duties of Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator

SUBJECT: *NOAA Must Take Action to Avoid Gaps in Hurricane Hunter Missions and Improve Oversight, Program Management, and Systems Engineering Practices*
Draft Report

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) is pleased to submit the attached response to the draft report on the NOAA Hurricane Hunter Aircraft Program. We reviewed the report and partially/concurred with the recommendations.

We appreciate the opportunity to review and respond to your draft report. If you have questions, please contact Mia Forgy, Director, Audit and Information Management Office on (301) 427-7893.

Attachment

Department of Commerce
National Oceanic and Atmospheric Administration
Response to the OIG Draft Report Entitled
NOAA Must Take Action to Avoid Gaps in Hurricane Hunter Missions and Improve Oversight, Program Management, and Systems Engineering Practices
(December 2024)

General Comments

1) NOAA has addressed many concerns since the initial evaluation commenced in CY2023, and has made considerable improvements in personnel, process and reporting practices.

2) Cover memorandum page 1, paragraph 2: NOAA plans to replace its current hurricane hunter fleet with two (2) Gulfstream 550 aircraft (G550s) and at least two (2) Lockheed Martin C-130J aircraft on contract with options to order up to four (4). NOAA has authorization for up to six (6) aircraft.

3) Cover memorandum page 1, sub-paragraph I add, "High altitude research jet" prior to Hurricane hunter replacement.

4) Cover page 1, sub-paragraph II add, "High altitude research jet" prior to Hurricane hunter replacement.

5) Page 5, subsection B, paragraph 1: While only one interested offeror could provide a consolidated aircraft and modification, these two sentences contradict each other. The main issue is more specific to the requirement to purchase and modify the aircraft from the same contractor. There are other companies that conduct significant modifications of commercial aircraft such as L3 Harris, Sierra Nevada Corp., and BAE.

6) Page 8, paragraph 3, this audit/assessment was completed prior to September 2024. The Vertically Scanned Doppler Radar (VSDR) portion of the C-130J Acquisition Program was to involve industry experts in proposing a recommended solution. Well defined key performance indicators of the VSDR were provided to the contractor following contract award. The delays experienced by the G550 are Gulfstream modification related. Gulfstream has a history of delivering modified aircraft late to the Government; the C-130J is a Lockheed Martin effort.

7) Page 8, paragraph 4: Current program schedule allows for retirement of WP-3Ds by the end of CY 2030. There is no trend of schedule slippage noted. There were delays in contract award, but no delay in delivery is expected.

8) Page 9, paragraph II, A: NOAA recommends stating that NOAA OMAO Platform and Infrastructure Acquisition Division (PIAD) established the Aircraft Acquisition Project Management Office (PMO) in February 2024 with a Deputy Director responsible for managing the performance of an Assistant Director of Operations, G550 Project Manager, Logistics Lead and Engineering Lead.

9) Page 13, paragraph 1, last sentence: There is a plan for the Analysis of Alternatives (AoA) and response. Currently, there is no impact to the delivery schedule.

10) Page 13, last paragraph, last sentence: The proposed number in Appendix C was not coordinated with the program office. Their analysis that $399+M could be (quoting from the last sentence in appendix C): "Put these funds to better use" implies that they are not being utilized as effectively as possible. The OIG performed a cost analysis without input from the Aircraft Acquisition PMO, nor were the results shared with them. The recommendation does not include information regarding a return on investment number nor identify overages or shortfalls. NOAA is concerned that there could be a misinterpretation that could result in the PMO being directed to re-appropriate $399M to another program. NOAA aircraft perform a highly specialized mission and are configured/equipped with assets that are not common, or available, within the Department of Defense (DoD) or other U.S. Government Agencies. These specialized data require higher costs for aircraft acquisition, configuration, and initial fielding.

11) Page 14, paragraph 1, sentence 2: This does not apply to aircraft acquisitions as there are no DoD aircraft which are designed to do the same missions, and thus no joint use, unlike the University-National Oceanographic System (UNOLS) ships which are directly applicable to meet some prioritized at-sea requirements. The additional costs would be prohibitive.

12) Page 14, paragraph 1, sentence 2: NOAA aircrew and aircraft perform a highly specialized mission set, personnel possess an intricate knowledge of systems and performance parameters. Sourcing the acquisition, missionization and configuration effort to a servicing agency under an assisted agency model would increase the risk of cost overruns, schedule delays, and performance failures. NOAA discussed with the U.S. Air Force and U.S. Coast Guard prior to developing an acquisition strategy; their input informed the NOAA acquisition strategy.

13) Page 16, last paragraph, sentence 2: There is an AoA ongoing and initiated at contract award in Sep 2024.

14) Page 19, paragraph 3: it is stated, “August 2023 through August 2024”; however, several times in this report, there are assessments of dates after August 2024. As examples: page 3, “As of November 2024.”; page 7, “as of November 2024”; page 8, “In September 2024,”; page 12, “postponed from January 2024 to September 2024”; page 12 “As a result of the September 2024 review”; page 17, “awarded a contract in September 2024.” Recommend the dates be adjusted to be consistent throughout the report.

15) Page 20, October 2019: Aircraft plan published: Multiple comments on the VSDR not being planned for: The VSDR Request for Information (RFI) was released in 2020 with responses in September 2020.

16) To distinguish from report pages, which also start at 1, recommend re-numbering the cover pages to pages (i) and (ii) to avoid this confusion.

NOAA Response to OIG Recommendations

Recommendation 1: Annually updates NOAA's aircraft plan to identify year-over year changes to aircraft service life and planned retirements, new aircraft needs, major repairs or service life extensions, updated condition assessments, new observational collection capability requirements, and any associated changes to funding requirements, and submit this update to relevant stakeholders.

NOAA Response: Partially concur. Updating the aircraft recapitalization plan is a multi-year effort and updating annually would require significant additional resources. However, the Acquisition Program Management Office can annually (calendar or fiscal year) evaluate all the items mentioned in the recommendation and provide an internal OMAO memo to the Director, OMAO, to address these (and other) areas of concern. The aircraft plan will continue to be updated with a target of a 5-year interval or when a major change to requirements or lifecycle management plans occurs.

Recommendation 2: Develops comprehensive mitigation plans to offset a likely gap in both hurricane hunter missions that include major maintenance work packages, cost estimates, and required scheduling to ensure that the WP-3Ds remain mission-ready until the C-130Js are mission ready.

NOAA Response: Concur. The Aircraft Acquisitions Program Management Office has developed a High-Altitude Research Jet Capabilities remediation plan for the CY2025 Hurricane and Winter Storms seasons. The WP-3D is not scheduled to retire the mission until the end of CY 2030 and currently recognizes no schedule delays affecting the replacement timeline of the WP-3D. All necessary scheduled maintenance requirements to ensure operability through this date are being scheduled and budgeted.

Recommendation 3: Program-level management controls are designed and documented for its G550 and C-130J programs, in accordance with Department policy and guidance.

NOAA Response: Concur. Controls are already in place within the Aircraft Acquisition Program Management Office.

Recommendation 4: OMAO or another appropriate office conducts cost-benefit and business case analyses for using assisted acquisitions (e.g., from the U.S. Navy or U.S. Air Force) to bolster NOAA's ability to execute complex and challenging aircraft acquisitions.

NOAA Response: Partially concur. OMAO already consults with the NOAA Acquisitions and Grants Office (AGO) and leverages existing relationships with the DoD Unites States Navy (USN) and the Department of Homeland Security (DHS) United States Coast Guard (USCG) to maximize cost benefit to current and future contracts. Due to the NOAA highly specialized mission set, the aircrew and personnel possess an intricate knowledge of the complex and unique systems and performance parameters, which require extensive training before external analysis can be relevant. Sourcing the acquisition, missionization, and configuration effort to a servicing

agency under an assisted agency model would invite cost overruns, schedule delays, and potential performance failures.

Recommendation 5: NOAA develops and implements a program oversight structure that can perform rigorous and continuous evaluation of program risks, opportunities, and progress against established benchmarks for complex and technically challenging acquisitions.

NOAA Response: Concur. NOAA adheres to the DOC and NOAA major acquisition milestone processes per the Commerce Acquisition Manual and provides briefings and receives clearances/approval at all major decision points in the process.

Recommendation 6: NOAA considers engaging an independent review team with expertise in acquiring, developing, and fielding new aircraft platforms to perform a detailed root cause analysis of G550 program delays, and identify applicable lessons learned for the C-130J program.

NOAA Response: Concur. Independent evaluation may be considered once the G-550 Acquisition is complete, but is not planned at this time.

Recommendation 7: NOAA develops and implements systems engineering policy and processes in accordance with best practices and applicable guidance.

NOAA Response: Concur. The Acquisition Management Program Office will formalize policies to implement best practices.

Recommended Changes for Factual/Technical Information

1) Page 13 paragraph 6 and footnote 26 referencing appendix C should be removed because FY26 budget requests are administratively confidential until the release of the FY26 PB.

2) Page 8 paragraph 4: "[r]ecent program updates, however, show that the C-130J program is already trending toward late delivery." This is inaccurate. While there was a delay in the MS 2 and contract award from our original targets, the early award of the pre-production contract in September 2023 has removed this from the critical path. Delivery of the production and modified aircraft are on schedule. There has been no formal program update that highlight any risk to the current program schedule.

3) Page 13 paragraph 1, last sentence: Delete *"There also was no discussion related to the lack of VSDR development and the subsequent impact to the required delivery schedule."* OMAO is conducting an AoA for a June 1, 2025 delivery which will outline capabilities, cost, and schedule. The VSDR AoA is on schedule and there is no impact to the delivery. The NOAA Project Management Council (PMC) is ultimately a committee to discuss unmitigated risks or issues that require leadership's attention, not unrecognized contingency planning for aspects of the program that are on-track. There is no impact to the delivery schedule known at this time.

4) Page 14, paragraph 1, sentence 2: NOAA aircrew and aircraft perform a highly specialized mission set, personnel possess an intricate knowledge of the complex and unique systems and performance parameters. Sourcing the acquisition, missionization and configuration effort to a

servicing agency under an assisted agency model would increase the risk of cost overruns, schedule delays, and performance failures.

5) Appendix B: The report and timeline suggest that no development has been conducted on the VSDR. This omits the TDR Replacement AoA released in 2020 with responses collected September 2020. This informed the budget and timeline for the VSDR program and associated, ongoing VSDR AoA being conducted by Lockheed Martin.

REPORT

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