



April 2023

NOAA ACQUISITIONS

Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates

Accessible Version

GAO Highlights

Highlights of [GAO-23-105808](#), a report to congressional committees

Why GAO Did This Study

NOAA's missions require complex and costly acquisitions, such as satellite systems, ships, aircraft, computer systems, and facilities. GAO has found that to produce reliable cost estimates for such acquisitions, agencies should follow best practices. GAO's *Cost Estimating and Assessment Guide* (Cost Guide) provides a consistent 12-step cost estimating methodology based on best practices.

The explanatory statement accompanying the Consolidated Appropriations Act, 2021, includes a provision for GAO to review NOAA's cost estimation procedures. This report (1) describes the key characteristics of NOAA's cost estimates for major acquisitions from fiscal years 2018 through 2022 and (2) assesses the extent to which NOAA's cost estimation procedures align with best practices in GAO's Cost Guide.

GAO reviewed acquisition data, interviewed NOAA officials to determine how they produce cost estimates, and compared the agency's procedures for developing cost estimates against the best practices described in GAO's Cost Guide.

What GAO Recommends

GAO recommends that NOAA (1) establish agency-wide policy and guidance that is aligned with best practices in GAO's Cost Guide and (2) require each office within NOAA to have documented cost estimating procedures that are fully aligned with the best practices established in its agency-wide policy and guidance. The Department of Commerce concurred with both recommendations.

View [GAO-23-105808](#). For more information, contact Cardell Johnson at (202) 512-3841 or JohnsonCD1@gao.gov.

April 2023

NOAA ACQUISITIONS

Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates

What GAO Found

According to National Oceanic and Atmospheric Administration (NOAA) officials, two offices—the National Environmental Satellite, Data, and Information Service for satellite systems and the Office of Marine and Aviation Operations for ships and aircraft—produced cost estimates for seven major acquisitions from fiscal years 2018 through 2022. The estimated costs of the acquisitions totaled \$27.4 billion. Two other offices—the National Weather Service and the Office of the Chief Administrative Officer—acquire computer systems and facilities, respectively, but did not produce cost estimates for major acquisitions during this time.

NOAA Produced Cost Estimates for Major Acquisitions, Including Satellite Systems, Ships, and Aircraft, from Fiscal Years 2018 through 2022



Source: National Oceanic and Atmospheric Administration (NOAA). | GAO-23-105808

NOAA employs a decentralized approach to cost estimating whereby each of the four offices follows different procedures. GAO found that two offices, the National Environmental Satellite, Data, and Information Service and the Office of the Chief Administrative Officer, have documented cost estimating procedures that do not fully align with the 12-step process in GAO's Cost Guide. The National Weather Service and the Office of Marine and Aviation Operations do not have documented cost estimating procedures and, instead, primarily outsource cost estimation to external partners.

NOAA officials told GAO that there is no agency-wide cost estimating policy or guidance because each office is best positioned to develop its own cost estimates based on internal knowledge and experience, and the expertise of external partners. In order to consistently develop reliable cost estimates, it is important for an agency to have defined policies and procedures to govern the process. Cost estimating best practices have been applied to cost estimating for a wide variety of unique programs across government and industry. These best practices allow flexibility for programs or offices to develop procedures that incorporate the practices in a manner that is most suitable for their specialized acquisitions. Furthermore, agency-wide policy and guidance will provide agency officials with a basis for assessing the extent to which cost estimates produced by external partners are reliable and aligned with best practices.

Contents

GAO Highlights		ii
	Why GAO Did This Study	ii
	What GAO Recommends	ii
	What GAO Found	ii
Letter		1
	Background	4
	NOAA Produced Cost Estimates for Seven Major Acquisitions, with a Total Value of \$27.4 Billion, between Fiscal Years 2018 and 2022	7
	NOAA Uses a Decentralized Approach to Cost Estimating, and Most Offices Do Not Have Procedures That Fully Align with Best Practices	9
	Conclusions	13
	Recommendations for Executive Action	14
	Agency Comments	14
Appendix I: Information on Cost Estimates for the National Oceanic and Atmospheric Administration's Major Acquisitions		16
Appendix II: Comments from the Department of Commerce		19
Accessible Text for Appendix II: Comments from the Department of Commerce		23
Appendix III: GAO Contact and Staff Acknowledgments		26
Tables		
	Table 1: Characteristics of Cost Estimates for the National Environmental Satellite, Data, and Information Service's (NESDIS) Major Acquisitions for Fiscal Years 2018 through 2022	17
	Table 2: Characteristics of Cost Estimates for the Office of Marine and Aviation Operations' (OMAO) Major Acquisitions for Fiscal Years 2018 through 2022	18
Figures		
	Figure 1: The Cost Estimating Process and 12 Cost Estimating Steps	6

Figure 2: Extent to Which the National Oceanic and Atmospheric Administration's (NOAA) Cost Estimating Procedures Align with GAO's Cost Estimating and Assessment Guide (Cost Guide) Steps	10
Accessible Data for Figure 2: Extent to Which the National Oceanic and Atmospheric Administration's (NOAA) Cost Estimating Procedures Align with GAO's Cost Estimating and Assessment Guide (Cost Guide) Steps	10

Abbreviations

Cost Guide	Cost Estimating and Assessment Guide
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OCAO	Office of the Chief Administrative Officer
OMAO	Office of Marine and Aviation Operations

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



April 25, 2023

The Honorable Jeanne Shaheen
Chair
The Honorable Jerry Moran
Ranking Member
Subcommittee on Commerce, Justice, Science, and Related Agencies
Committee on Appropriations
United States Senate

The Honorable Hal Rogers
Chairman
The Honorable Matt Cartwright
Ranking Member
Subcommittee on Commerce, Justice, Science, and Related Agencies
Committee on Appropriations
House of Representatives

The National Oceanic and Atmospheric Administration’s (NOAA) missions include understanding and predicting changes in climate, weather, oceans, and coasts, and conserving and managing coastal and marine ecosystems and resources. Carrying out these missions requires complex and costly acquisitions, such as satellite systems, ships, aircraft, research facilities, and high-performance computing and information management systems. Located within the Department of Commerce, NOAA’s mission offices are responsible for producing the cost estimates used by the agency and Congress to develop budgets for these acquisitions.¹ The offices that make these acquisitions include (1) the National Environmental Satellite, Data, and Information Service (NESDIS) for satellite systems; (2) the Office of Marine and Aviation Operations (OMAO) for ships and aircraft; (3) the National Weather Service (NWS) for information technology; and (4) the Office of the Chief Administrative Officer (OCAO) for facility acquisitions.

GAO’s prior work has shown that reliable cost information is a necessary part of overseeing agencies’ stewardship of public funds. GAO’s Cost

¹For the purposes of this report, a cost estimate is the summation of individual cost elements, using established methods and valid data, to estimate the future costs of a program based on what is known today.

Estimating and Assessment Guide (Cost Guide) provides a consistent methodology based on best practices that can be used across the federal government for developing, managing, and evaluating cost estimates.² The Cost Guide presents a 12-step cost estimating process, and its guidance establishes roles and responsibilities for those preparing, reviewing, and updating cost estimates. Agencies and other organizations can use the Cost Guide to ensure that their cost estimating guidance, policies, and directives fully reflect industry and government standards for high-quality cost estimating.

The explanatory statement accompanying the Consolidated Appropriations Act, 2021, includes a provision for us to review NOAA's internal cost estimation procedures.³ This report (1) describes the key characteristics of NOAA's cost estimates for major acquisitions from fiscal years 2018 through 2022 and (2) assesses the extent to which NOAA's cost estimation procedures align with best practices in GAO's Cost Guide.

To describe the key characteristics of NOAA's cost estimates for major acquisitions from fiscal years 2018 through 2022, we interviewed NOAA officials from headquarters and from four offices—NESDIS, NWS, OCAO, and OMAO. The officials identified these four offices as those within NOAA that make major acquisitions, such as satellite systems, ships, aircraft, research facilities, and high-performance computing and information management systems. The officials defined major acquisitions as those that had been designated as a departmental "high-profile" project or program based on Commerce policy.⁴ We interviewed Commerce officials from the Office of Acquisition Management and

²GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: March 2020).

³Staff of H. Comm. on Appropriations, 116th Cong., *Legislative Text and Explanatory Statement on Consolidated Appropriations Act, 2021*, Pub. L. No. 116-260, 134 Stat. 1182 (2020), Book 1 of 2, at 234 (Comm. Print 2021).

⁴Under the policy, a program or project may be designated as "high profile" if it meets one or more of the following criteria: (1) warrants special management attention or is deemed high risk due to its criticality, complexity, technology, or visibility; (2) entails expenditure of specified significant levels of resources; or (3) is nominated as a high-profile program or project by a member of Commerce's Milestone Review Board and such nomination is approved by the Deputy Secretary. Acquisition programs and projects designated as high profile receive oversight from the Milestone Review Board, or a Department Operating Unit through delegation, at certain milestones. See U.S. Department of Commerce, *Acquisition Project Management*, Department Administrative Order 208-16 (Washington, D.C.: 2015). Commerce and NOAA equate a "high-profile acquisition" to a "major acquisition," according to agency officials. For purposes of this report, we use the terms "high-profile acquisition" and "major acquisition" synonymously.

reviewed documentation to describe the department's acquisition policy, guidance, and oversight of NOAA acquisitions.

We obtained documentation of acquisitions from fiscal years 2018 through 2022 from all four offices. For each office, we analyzed information for each major acquisition including, but not limited to, (1) the project name, (2) a general description, (3) the initial and final cost estimate's projected cost, (4) the reasons for any difference between the initial and final cost estimate's projected cost, (5) the actual cost, and (6) the reasons for any difference between the final cost estimate's projected cost and the actual cost. We reviewed the information provided to ensure consistent categorization of information across the offices. We determined that NOAA's data were sufficiently reliable for the purposes of our report.

To examine the extent to which NOAA's cost estimating procedures align with best practices in GAO's Cost Guide, we interviewed NOAA officials from headquarters and the four offices—NESDIS, NWS, OCAO, and OMAO. The officials told us that each office independently produces cost estimates, using its own policies and practices. NWS and OMAO do not have documented cost estimating procedures that we could assess using the Cost Guide. NESDIS and OCAO officials provided us with documented cost estimating procedures for their respective offices. We evaluated these two offices' documented cost estimating procedures to assess how well they aligned with the best practices identified in the Cost Guide's 12 steps for cost estimating.⁵ We used a five-point scale for our assessment:

- **Fully met.** The office provided evidence that satisfies all of the elements of the step.
- **Substantially met.** The office provided evidence that satisfies a large portion of the elements of the step.
- **Partially met.** The office provided evidence that satisfies about half of the elements of the step.

⁵[GAO-20-195G](#). The 12-step process addresses best practices, including defining the program's purpose, developing the estimating plan, defining the program's characteristics, determining the estimating approach, identifying ground rules and assumptions, obtaining data, developing the point estimate, conducting sensitivity analysis, performing a risk or uncertainty analysis, documenting the estimate, presenting it to management for approval, and updating it to reflect actual costs and changes. Following these steps ensures that realistic cost estimates are developed and presented to management, enabling them to make informed decisions.

-
- **Minimally met.** The office provided evidence that satisfies a small portion of the elements of the step.
 - **Not met.** The office provided no evidence that satisfies any of the elements of the step.

We conducted this performance audit from February 2022 to April 2023 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

NOAA's Organization and Responsibilities

NOAA's missions include understanding and predicting changes in climate, weather, oceans, and coasts, sharing that knowledge and information with others, and conserving and managing coastal and marine ecosystems and resources. NOAA's products and services—such as weather forecasts, severe storm warnings, climate monitoring, fisheries management, coastal restoration, and support for marine commerce—have economic impacts that affect more than one-third of the nation's gross domestic product. NOAA's scientists use cutting-edge research and high-tech equipment to provide reliable and timely information to a wide variety of users, including researchers, emergency managers, and other decision-makers domestically and internationally.

To carry out its missions, NOAA is organized into line offices, staff offices, and corporate services.⁶ According to NOAA officials, three line offices and one supporting corporate services office are responsible for executing complex and costly acquisitions—satellite systems, ships, aircraft, research facilities, and high-performance computing and

⁶NOAA's offices and services are organized under the leadership of the Under Secretary of Commerce for Oceans and Atmosphere and the NOAA Administrator. NOAA's line offices include NESDIS, NWS, OMAO, National Marine Fisheries Service, National Ocean Service, and Office of Oceanic and Atmospheric Research. NOAA has six corporate services offices, including OCAO, and six staff offices.

information management systems—in support of their missions. Specifically:

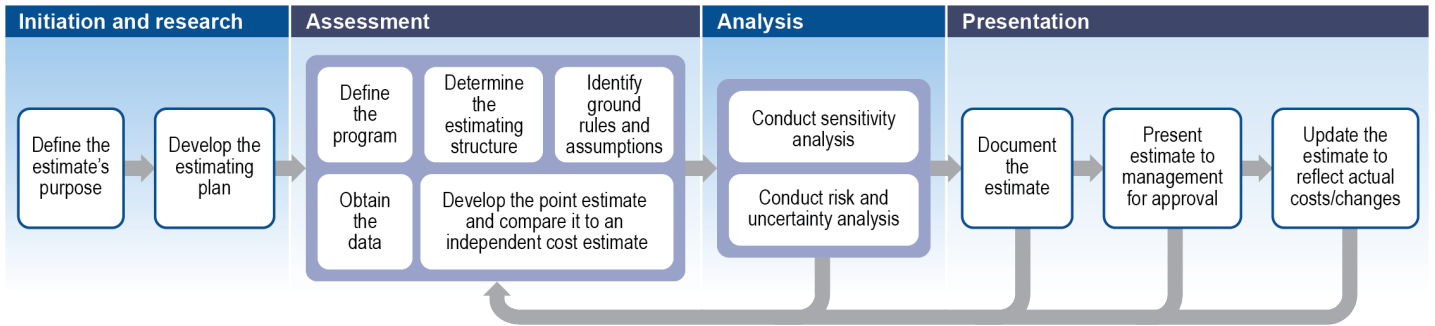
- **NESDIS.** This line office acquires and operates next-generation earth and space weather observation satellites in collaboration with the National Aeronautics and Space Administration (NASA), provides U.S. and global climate assessments, and maintains archives of environmental data.
- **NWS.** This line office acquires high-performance computing systems to support its mission of providing weather, water, and climate data; forecasts; and warnings for the protection of life and property and the enhancement of the national economy.
- **OMAO.** This line office acquires, manages, and operates NOAA's fleet of 15 research and survey ships and its fleet of nine aircraft outfitted with specialized instrument packages to conduct research for the agency's missions.
- **OCAO.** This corporate services office acquires facilities as part of its mission to provide project planning and management services in support of NOAA's line and staff offices.

GAO's Cost Estimating and Assessment Guide

The cost estimating process provides the foundational framework for initiating, researching, assessing, analyzing, and presenting a cost estimate. GAO's Cost Guide provides a consistent methodology based on best practices that can be used across the federal government for developing, managing, and evaluating program cost estimates.⁷ The Cost Guide provides a 12-step cost estimating process (see fig. 1).

⁷[GAO-20-195G](#).

Figure 1: The Cost Estimating Process and 12 Cost Estimating Steps



Source: GAO. | GAO-23-105808

Each of the 12 steps is important for ensuring that cost estimates are developed and delivered in time to support important program decisions. By following a process of repeatable methods, agencies should be able to produce reliable estimates that can be clearly traced, replicated, and updated to better manage their programs and inform decision makers of the risks involved. Relying on a standard process that requires defining the technical scope of the work, communicating the basis on which the estimate is built, identifying the quality of the data, determining the level of risk, and thoroughly documenting the effort generally results in cost estimates that are defensible, consistent, and trustworthy.

Furthermore, this process treats a cost estimate as a “living document,” meaning that it is continually updated as actual costs begin to replace the original estimates. Examining the reasons for variances between the estimate and the final cost allows for lessons learned and an assessment of the effects of risk. It also provides valuable information for strengthening the credibility of future cost estimates by allowing for continuous process improvement.

NOAA Produced Cost Estimates for Seven Major Acquisitions, with a Total Value of \$27.4 Billion, between Fiscal Years 2018 and 2022

Two NOAA offices—NESDIS and OMAO—produced cost estimates for seven major acquisitions from fiscal years 2018 through 2022, with a total estimated acquisition cost of \$27.4 billion, according to NOAA officials.⁸ NWS and OCAO did not produce any cost estimates for major acquisitions during this time.

- **NESDIS.** NESDIS produced four cost estimates for satellite projects, with a total acquisition cost of \$26.6 billion, or about 97 percent of NOAA’s total. NESDIS has completed the acquisition process for all four of these satellite projects. For three of the projects, the actual acquisition costs were less than, or equal to, the final cost estimates.

⁸The officials defined major acquisitions as those that had been designated as a departmental “high-profile” project or program based on Commerce policy. Under the policy, a program or project may be designated as “high profile”—which Commerce and NOAA officials equate to a “major acquisition”—if it meets one or more specific criteria. For purposes of this report, we use the terms “high-profile acquisition” and “major acquisition” synonymously.

Specifically, the Joint Polar Satellite Systems had an actual cost that was less than the final cost estimate, and the actual costs of the Space Weather Follow-On project and the Polar Follow-On project were equal to their final cost estimates.⁹ NESDIS officials attributed these results, in part, to streamlined program management procedures; robust communication between engineering and program support departments; and management refinements to the programs' scope, cost, and schedules. One of the projects—the Geostationary Operational Environmental Satellites-R Series—had an actual cost that exceeded its final cost estimate by about \$4 billion. NESDIS officials attributed this difference to doubling the project scope from two to four satellites, among other things.

- **OMAO.** OMAO produced three cost estimates for aircraft and ships, with a total acquisition cost of \$797 million, or about 3 percent of NOAA's total. OMAO had not yet completed these acquisitions as of the time of this report and, thus, actual cost information for the three projects was not yet available. OMAO officials said that for two of these projects, the final cost estimates exceeded the initial estimates for several reasons. For example, OMAO officials cited significant changes in project scope as the reason for the \$29 million (31 percent) increase between the initial and final cost estimates for a project to acquire and modify a new Gulfstream 550 aircraft for weather research and data collection. In addition, OMAO officials said the project to acquire a new ship class that would strengthen U.S. economic and national security strategic goals had a \$97 million (38 percent) increase between the initial and final cost estimates. OMAO officials attributed this difference to changes in project scope and requirements, an increase in the period of performance, the impact of the COVID-19 pandemic and global supply chain challenges, and rising labor rates and prices of raw materials.
- **NWS and OCAO.** NWS and OCAO officials told us that their offices did not have any major acquisitions, or high-profile acquisitions, as designated under Commerce policy, from fiscal years 2018 through 2022.¹⁰ According to NOAA officials, Commerce's Milestone Review Board has unilateral authority to make the "high-profile" designation. Although Commerce did not designate any acquisitions as "high profile," NWS and OCAO officials told us that their acquisitions during

⁹NESDIS officials informed us that although the Space Weather Follow-On project remains under development, their establishment of its life cycle cost—at the time of this report—enabled them to determine its actual cost.

¹⁰NWS and OCAO officials noted that their offices had produced major acquisition cost estimates prior to this time frame.

this time frame were important to carrying out the mission of each office. These acquisitions included, for example, NWS's Operational Supercomputing System and the Radiosonde Frequency Migration Project, and OCAO's Charleston Pier (2-Ship) project.

See appendix I for additional information on the cost estimates for NOAA's major acquisitions from fiscal years 2018 through 2022.

NOAA Uses a Decentralized Approach to Cost Estimating, and Most Offices Do Not Have Procedures That Fully Align with Best Practices

NOAA employs a decentralized approach to cost estimating whereby each of the four NOAA offices follow different procedures for their acquisitions. Two of these offices, NESDIS and OCAO, have documented cost estimating procedures that do not fully align with best practices. The remaining two offices, NWS and OMAO, do not have documented cost estimating procedures and, instead, primarily outsource cost estimation to external partners. Therefore, we did not assess NWS's and OMAO's cost estimating procedures.

After reviewing documentation of NESDIS's and OCAO's cost estimating procedures, conducting interviews, and examining other relevant sources, we determined that:

- NESDIS's procedures for major satellite acquisition programs aligned with all 12 steps of a reliable cost estimating process. However, NESDIS's procedures for other acquisitions met one, substantially met one, partially met four, minimally met four, and did not meet two of 12 steps of a reliable cost estimating process; and
- OCAO's procedures for cost estimating met one, substantially met one, partially met three, minimally met six, and did not meet one of 12 steps of a reliable cost estimating process.

Figure 2 summarizes the 12 cost estimating steps documented in GAO's Cost Guide and our assessments of NESDIS's and OCAO's procedures.

Figure 2: Extent to Which the National Oceanic and Atmospheric Administration’s (NOAA) Cost Estimating Procedures Align with GAO’s Cost Estimating and Assessment Guide (Cost Guide) Steps

GAO’s Cost Guide steps	National Environmental Satellite Data and Information Service (NESDIS): Major acquisitions	NESDIS: Other acquisitions	Office of the Chief Administrative Officer
1. Define the estimate’s purpose	●	◐	◐
2. Develop the estimating plan	●	○	○
3. Define the program	●	◐	●
4. Determine the estimating structure	●	●	◐
5. Identify ground rules and assumptions	●	◐	◐
6. Obtain the data	●	◐	◐
7. Develop the point estimate	●	◐	◐
8. Conduct sensitivity analysis	●	○	◐
9. Conduct risk and uncertainty analysis	●	◐	◐
10. Document the estimate	●	◐	◐
11. Present the estimate to management for approval	●	◐	◐
12. Update the estimate to reflect actual costs and changes	●	◐	◐

- Fully met ●
- Substantially met ◐
- Partially met ◑
- Minimally met ◒
- Not met ○

Source: GAO analysis of NOAA documentation and GAO’s Cost Guide. | GAO-23-105808

Accessible Data for Figure 2: Extent to Which the National Oceanic and Atmospheric Administration’s (NOAA) Cost Estimating Procedures Align with GAO’s Cost Estimating and Assessment Guide (Cost Guide) Steps

GAO’s Cost Guide Steps	National Environmental Satellite Data and Information Service (NESDIS): Major Acquisitions	NESDIS: Other Acquisitions	Office of the Chief Administrative Officer
1. Define the estimate’s purpose	Met	Minimally Met	Substantially Met
2. Develop the estimating plan	Met	Not Met	Not Met
3. Define the program	Met	Substantially Met	Fully Met
4. Determine the estimating structure	Met	Met	Minimally Met
5. Identify ground rules and assumptions	Met	Partially Met	Minimally Met
6. Obtain the data	Met	Minimally Met	Minimally Met

GAO's Cost Guide Steps	National Environmental Satellite Data and Information Service (NESDIS): Major Acquisitions	NESDIS: Other Acquisitions	Office of the Chief Administrative Officer
7. Develop the point estimate	Met	Partially Met	Minimally Met
8. Conduct sensitivity analysis	Met	Not Met	Minimally Met
9. Conduct risk and uncertainty analysis	Met	Minimally Met	Minimally Met
10. Document the estimate	Met	Partially Met	Partially Met
11. Present the estimate to management for approval	Met	Partially Met	Partially Met
12. Update the estimate to reflect actual costs and changes	Met	Minimally Met	Partially Met

Note: Fully met – NOAA provided evidence that satisfies the entire criterion; Substantially met – NOAA provided evidence that satisfies a large portion of the criterion; Partially met – NOAA provided evidence that satisfies about half of the criterion; Minimally met – NOAA provided evidence that satisfies a small portion of the criterion; and Not met – NOAA provided no evidence that satisfies any of the criterion.

NOAA officials from each of the offices provided varying reasons for their offices' cost estimating procedures not being fully aligned with best practices or not having formal documented procedures. For example:

- NESDIS officials agreed that for major acquisitions, it is important for the office's procedures to align with cost estimating best practices, as its NASA-based procedures for satellite acquisitions do. For other acquisitions, the officials suggested that best practices should be followed in proportion to the significance of the acquisitions to the office.

Commerce's Office of Inspector General Has Reported on NOAA's Lack of Cost Estimating Policy

In September 2012, Commerce's Office of Inspector General reported that NOAA did not have a policy that ensured consistent and reliable cost estimating for its major system acquisitions. The report recommended that NOAA should ensure that a policy that requires major system acquisition programs to adhere to cost estimating best practices is developed. NOAA concurred, indicating that the agency would benefit from Commerce-level policies that ensure that NOAA's procedures are consistent with other Commerce bureaus' cost estimating procedures. In May 2015, Commerce issued its revised policy governing cost estimates, Department Administrative Order 208-16, and

the associated guidebook, Department of Commerce Scalable Acquisition Project Management Guidebook. Commerce's revised policy was in response to a GAO recommendation to address weaknesses identified in Commerce's policies for cost estimating. See GAO, *Information Technology Cost Estimation: Agencies Need to Address Significant Weaknesses in Policies and Practices*, GAO-12-629 (Washington, D.C.: July 2012).

More recently, in May 2021, Commerce's Office of Inspector General reported that NOAA and OMAO lack internal written processes that augment and expand in detail on the minimum processes described in Department Administrative Order 208-16 and the associated guidebook, particularly as they relate to acquiring ships. NOAA concurred with the report's findings and recommendations, which focused on OMAO's lack of standards and processes for managing ship fleet requirements. Defining key functional requirements and performance characteristics is part of the GAO Cost Guide's Step 3: Define the program. According to the Cost Guide, a lack of defined requirements can lead to cost increases and delays in delivering services.

Source: Department of Commerce Office of Inspector General. | GAO-23-105808

- OCAO officials stated that its cost estimating guidance was last updated in 2005 and needs to be updated to better incorporate best practices. Cost estimating expertise has been lost within OCAO's staff, and its historical project cost information is not reliable, according to officials.
- OMAO and NWS officials told us that their offices do not have a formal cost estimating process in place because of the range of specialized acquisitions they manage and their reliance on collaboration with external partners to produce cost estimates.

NOAA does not have agency-wide cost estimating policy or guidance that is aligned with best practices and, as a result, guidance and practices vary across offices. For example, in response to our request for cost estimating procedures, OCAO referenced 11 different documents, of which only five were included in OCAO policy and, therefore, within the scope of our assessment. Additionally, NESDIS uses different sets of cost estimating procedures, depending on the type of acquisition. The NESDIS procedures for major acquisitions primarily follow NASA's cost estimating handbook, which we found fully aligns with every step in the Cost Guide. However, NESDIS procedures for other acquisitions are not fully aligned with all 12 steps of a reliable cost estimating process.

The other two offices collaborate with external partners and OCAO to produce cost estimates. OMAO officials told us that the office does not have formal cost estimating procedures. The office outsources some of its cost estimating to OCAO for facilities, the U.S. Navy, and the U.S. Air Force and bases its own cost estimating on information gathered from industry sources, such as shipyards and aircraft manufacturers. Similarly, NWS officials told us that the office does not have formal cost estimating procedures and primarily outsources cost estimating to OCAO or other external partners.

NOAA officials told us that there is no formal agency-wide cost estimating policy or guidance because, given the unique nature of their acquisitions, each office is best positioned to develop its own cost estimates based on internal knowledge and experience, and the expertise of external partners. According to NOAA and Commerce officials, NOAA's offices are subject to overarching departmental acquisition guidance documented in Commerce's 2015 Department Administrative Order 208-16 Acquisition Project Management and the associated guidebook. However, the departmental guidance pertaining to cost estimating is limited. For example, although the order and guidebook refer to GAO's Cost Guide as a detailed source of guidance for cost estimating, they do not fully

incorporate the 12-step process and associated best practices. Commerce officials told us that they are updating the guidance, including making it more prescriptive so that users in the offices know exactly what cost estimating practices are required. However, Commerce officials told us that this is a challenge because the unique acquisitions of the various agencies and offices make it difficult to produce one-size-fits-all procedures.¹¹

In order to consistently develop reliable cost estimates, it is important for an agency to have defined policies and procedures to govern the process. Cost estimating best practices were developed to help agencies establish appropriate policies and procedures for producing estimates that adhere to the characteristics of high-quality cost estimation. These best practices are not just applicable to major system acquisitions but have been applied to cost estimating for a wide variety of unique programs across government and industry. Therefore, there is flexibility under an agency's best practices-based cost estimating policy for programs or offices to develop procedures that incorporate the practices in a manner that is most suitable for their specialized acquisitions. Furthermore, agency-wide policy and guidance, along with office-specific procedures based on cost estimating best practices, will provide agency officials with a basis for assessing the extent to which cost estimates produced by external partners are reliable and aligned with best practices.

Conclusions

NOAA relies on complex and costly acquisitions, such as satellites, ships, and aircraft, to fulfill its important scientific mission of understanding and predicting changes in climate, weather, oceans, coasts, and marine ecosystems. While NESDIS and OCAO have documented acquisition cost estimating procedures, these procedures do not all fully align with best practices. Further, NWS and OMAO do not have documented cost estimating procedures, and NOAA does not have agency-wide cost estimating policy and guidance that is aligned with best practices. By

¹¹In September 2022, Commerce formed a workgroup to collaborate on the development of a cost estimating guide. On January 20, 2023, Commerce adopted *The U.S. Department of Commerce Cost Estimating Guide* to assist the department's acquisition community in accomplishing the cost estimating requirements in Department Administrative Order 208-16. The document incorporates standards and guidance from GAO's Cost Guide, as well as the Office of Management and Budget and the Department of Defense.

establishing agency-wide cost estimating policy and guidance aligned with best practices, NOAA can reduce the risk of cost overruns, missed deadlines, and performance shortfalls associated with unreliable cost estimates for its acquisitions.

Recommendations for Executive Action

We are making the following two recommendations to NOAA:

The Administrator of NOAA should establish agency-wide policy and guidance that is aligned with best practices in GAO's Cost Guide. (Recommendation 1)

The Administrator of NOAA should require each office within NOAA to have documented cost estimating procedures that are fully aligned with the best practices established in its agency-wide policy and guidance. (Recommendation 2)

Agency Comments

We provided a draft of this report to the Department of Commerce for its review and comment. In its written comments, reproduced in appendix II, the Department concurred with both recommendations. The Department further stated that a NOAA-wide working group will oversee the development and implementation of internal cost estimating guidance in NOAA offices using a risk-based approach that incorporates GAO's 12-step process for specific programs.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Commerce, the Administrator of NOAA, 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 have any questions about this report, please contact me at (202) 512-3841 or johnsoncd1@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

Letter

A handwritten signature in black ink, appearing to read "Cardell Johnson". The signature is fluid and cursive, with a large loop at the end of the last name.

Cardell D. Johnson
Director, Natural Resources and Environment

Appendix I: Information on Cost Estimates for the National Oceanic and Atmospheric Administration's Major Acquisitions

This appendix provides additional details on the cost estimates for the National Oceanic and Atmospheric Administration's (NOAA) major acquisitions from fiscal years 2018 through 2022. Table 1 provides the characteristics of cost estimates for the National Environmental Satellite, Data, and Information Service's (NESDIS) major acquisitions, and Table 2 provides the characteristics of cost estimates for the Office of Marine and Aviation Operations' (OMAO) major acquisitions.

**Appendix I: Information on Cost Estimates for
the National Oceanic and Atmospheric
Administration's Major Acquisitions**

Table 1: Characteristics of Cost Estimates for the National Environmental Satellite, Data, and Information Service's (NESDIS) Major Acquisitions for Fiscal Years 2018 through 2022

Dollars in billions

Name of acquisition ^a	Description of acquisition	Initial cost estimate projected cost	Final cost estimate projected cost	Actual cost	Reason(s) provided for difference between the final cost estimate and the actual cost
Geostationary Operational Environmental Satellites - R Series	Geostationary weather satellite with terrestrial and space weather instrument suites	7.7	7.7	11.7	Scope increase, redesign, and sequestration
Space Weather Follow-On	The Space Weather Follow On is a spacecraft that will be used in future deep-space missions by providing continuous measurements of the sun's corona and solar wind, while transmitting continuous real-time data to Earth.	0.693	0.693	Unknown	The acquisition is currently under development, and actual costs will be unknown until its scheduled launch date of February 2025.
Joint Polar Satellite System	Polar Orbiting Satellite Program	11.9	11.4	11.3	During 2010, the National Oceanic and Atmospheric Administration (NOAA) took over sole responsibility of this acquisition, which it had previously managed with the National Aeronautics and Space Administration and the U.S. Air Force. Subsequently, NOAA refined its scope, schedule, and cost.
Polar Follow-On	Polar Orbiting Satellite Program includes Joint Polar Satellite System satellite missions' development.	7.6	6.8	6.8	Streamlined program management and robust communication between engineering and program support offices

Source: NESDIS. | GAO-23-105808

^aNESDIS officials told us that their office initiated two additional major acquisitions during the period under review. We did not include information on the cost estimates for these major acquisitions in this table because reliable estimates are not yet available. Specifically, the Geostationary Extended Observations is a relatively new project and NESDIS has only produced its initial cost estimate, and the Space Weather Next has not yet reached the stage where a cost estimate is required.

**Appendix I: Information on Cost Estimates for
the National Oceanic and Atmospheric
Administration's Major Acquisitions**

Table 2: Characteristics of Cost Estimates for the Office of Marine and Aviation Operations' (OMAO) Major Acquisitions for Fiscal Years 2018 through 2022

Dollars in millions

Name of acquisition^a	Description of acquisition	Initial cost estimate projected cost	Final cost estimate projected cost^b	Reason(s) provided for difference between the initial and the final cost estimate projected costs
High-Altitude G-550 Aircraft	Commercial Business-Class Jet Aircraft (modified for scientific instrumentation and missions)	91.4	123	Large change in project scope
Class A Ship AGOR Variant	General Oceanographic Research Vessels	321	321	Not applicable
Class B Ship Hydrographic Vessel	General Oceanographic Charting and Survey Vessels	256	353	<ul style="list-style-type: none"> • Change in requirements • Refined estimated weights (based on data from the Class A program) • Period of performance increased by 6 months • Delays stemming from the COVID-19 pandemic • Rising labor rates increased material costs • Raw materials price increases (e.g., steel) • Global supply chain concerns • Overall inflation

Source: OMAO. | GAO-23-105808

^aOMAO officials told us that their office initiated one additional major acquisition during the period under review. We did not include information on the cost estimate for this major acquisition—Class C Ship—in this table because the acquisition is in its early development stage, and a reliable cost estimate is not yet available.

^bOMAO had not yet completed these acquisitions as of the time of this report and, thus, actual cost information for the three projects was not yet available.

Appendix II: Comments from the Department of Commerce

**Appendix II: Comments from the Department
of Commerce**



UNITED STATES DEPARTMENT OF COMMERCE
Office of the Acting Chief Financial Officer and
Assistant Secretary for Administration
Washington, D.C. 20230

April 5, 2023

Cardell D. Johnson
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Johnson:

Thank you for the opportunity to respond to the Government Accountability Office (GAO) draft report entitled, *GAO-23-105808 NOAA ACQUISITIONS: Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates*.

The Department agrees with the recommendation(s) and will prepare a formal action plan upon issuance of GAO's final report.

If you have any questions, please contact MaryAnn Mausser, Department GAO Audit Liaison, at (202) 482-8120 or mmausser@doc.gov.

Sincerely,

**JEREMY
PELTER**

Digitally signed by
JEREMY PELTER
Date: 2023.04.04 17:35:55
-04'00'

Jeremy Pelter
Acting Chief Financial Officer
and Assistant Secretary for Administration

Enclosure

**Appendix II: Comments from the Department
of Commerce**

**Department of Commerce's
Comments on GAO Draft Report Entitled
NOAA ACQUISITIONS
Fully Aligning Procedures with Best Practices Could Improve the
Reliability of Cost Estimates (GAO-23-105808)**

The Department of Commerce has reviewed the draft report and we offer the following comments for GAO's consideration.

General Comments

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Government Accountability Office's (GAO) Draft report on *NOAA ACQUISITIONS: Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates*. GAO did a fair and thorough job in assessing potential deficiencies in NOAA's current cost estimation processes. The report's discussion regarding the importance of an agency-wide, cost-estimate procedure that better incorporates GAO's 12-step process is reasonable.

NOAA Response to GAO Recommendations

The Government Accountability Office (GAO) made 2 recommendations to the Department of Commerce (DOC) in the report.

Recommendation 1: The Administrator of NOAA should establish agency-wide policy guidance that are aligned with best practices in GAO's Cost Guide.

NOAA Response: *DOC agrees with this recommendation.*

1. A NOAA-wide Working Group, led by the Office of the Chief Financial Officer (OCFO) and the Acquisitions and Grants Office (AGO), will oversee the development and implementation of internal cost-estimate guidance in NOAA offices using a risk-based approach that incorporates GAO's 12-step procedures for specific programs; includes an option for outsourcing; and references DOC/NOAA cost-estimate guidance for general acquisitions and will be completed during fiscal year (FY) 2024.
2. OCFO and AGO will continue to provide training and development opportunities, reinforce risk-based approaches, and participate in appropriate working groups to ensure the furtherance of disciplined cost-estimating procedures and processes throughout NOAA.

**Appendix II: Comments from the Department
of Commerce**

Recommendation 2: The Administrator of NOAA should require each office within NOAA to have documented cost-estimating procedures that are fully aligned with the best practices established in its agency-wide policy and guidance.

NOAA Response: *DOC agrees with this recommendation.*

Taking a risk-based approach, NOAA will require that its offices utilize DOC's newly developed cost-estimate guidance and GAO's Cost Estimating and Assessment guide. NOAA's Office of the Chief Financial Officer (lead office) will help develop and implement NOAA procedures that strengthen DOC's released cost-estimate procedures. As part of these procedures, some offices may continue to outsource cost-estimation activities. Planned completion and implementation is during FY24.

Recommended Changes for Factual/Technical Information

None.

Editorial Comments

None.

Accessible Text for Appendix II: Comments from the Department of Commerce

April 5, 2023

Cardell D. Johnson
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Johnson:

Thank you for the opportunity to respond to the Government Accountability Office (GAO) draft report entitled, GAO-23-105808 NOAA ACQUISITIONS: Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates.

The Department agrees with the recommendation(s) and will prepare a formal action plan upon issuance of GAO's final report.

If you have any questions, please contact MaryAnn Mausser, Department GAO Audit Liaison, at (202) 482-8120 or mmausser@doc.gov.

Sincerely,

Jeremy Pelter

Acting Chief Financial Officer
and Assistant Secretary for Administration

Enclosure

**Department of Commerce's
Comments on GAO Draft Report Entitled
NOAA ACQUISITIONS
Fully Aligning Procedures with Best Practices Could Improve the
Reliability of Cost Estimates (GAO-23-105808)**

The Department of Commerce has reviewed the draft report and we offer the following

comments for GAO's consideration.

General Comments

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Government Accountability Office's (GAO) Draft report on NOAA ACQUISITIONS: Fully Aligning Procedures with Best Practices Could Improve the Reliability of Cost Estimates. GAO did a fair and thorough job in assessing potential deficiencies in NOAA's current cost estimation processes. The report's discussion regarding the importance of an agency-wide, cost-estimate procedure that better incorporates GAO's 12-step process is reasonable.

NOAA Response to GAO Recommendations

The Government Accountability Office (GAO) made 2 recommendations to the Department of Commerce (DOC) in the report.

Recommendation 1: The Administrator of NOAA should establish agency-wide policy guidance that are aligned with best practices in GAO's Cost Guide.

NOAA Response: DOC agrees with this recommendation.

1. A NOAA-wide Working Group, led by the Office of the Chief Financial Officer (OCFO) and the Acquisitions and Grants Office (AGO), will oversee the development and implementation of internal cost-estimate guidance in NOAA offices using a risk-based approach that incorporates GAO's 12-step procedures for specific programs; includes an option for outsourcing; and references DOC/NOAA cost-estimate guidance for general acquisitions and will be completed during fiscal year (FY) 2024.
2. OCFO and AGO will continue to provide training and development opportunities, reinforce risk-based approaches, and participate in appropriate working groups to ensure the furtherance of disciplined cost-estimating procedures and processes throughout NOAA.

Recommendation 2: The Administrator of NOAA should require each office within NOAA to have documented cost-estimating procedures that are fully aligned with the best practices established in its agency-wide policy and guidance.

NOAA Response: DOC agrees with this recommendation.

Taking a risk-based approach, NOAA will require that its offices utilize DOC's newly developed cost-estimate guidance and GAO's Cost Estimating and Assessment guide. NOAA's Office of the Chief Financial Officer (lead office) will help develop and implement NOAA procedures that strengthen DOC's released cost-estimate procedures. As part of these procedures, some offices may continue to outsource cost-estimation activities. Planned completion and implementation is during FY24.

Recommended Changes for Factual/Technical Information

None.

Editorial Comments

None.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Cardell D. Johnson, (202) 512-3841 or johnsoncd1@gao.gov

Staff Acknowledgments

In addition to the contact named above, Casey L. Brown (Assistant Director), Brad C. Dobbins (Analyst in Charge), Danny Baez, Jennifer K. Echard, Ellen L. Fried, Jason T. Lee, Teague A. Lyons, Matthew C. McLaughlin, Rona H. Mendelsohn, Patricia A. Moyer, Paula M. Rascona, Anne K. Rhodes-Kline, Jessica D. Steele, Kevin C. Walsh, and Mary T. Weiland made key contributions to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through our website. Each weekday afternoon, GAO posts on its [website](#) newly released reports, testimony, and correspondence. You can also [subscribe](#) to GAO's email updates to receive notification of newly posted products.

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, <https://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

Connect with GAO

Connect with GAO on [Facebook](#), [Flickr](#), [Twitter](#), and [YouTube](#).
Subscribe to our [RSS Feeds](#) or [Email Updates](#). Listen to our [Podcasts](#).
Visit GAO on the web at <https://www.gao.gov>.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact FraudNet:

Website: <https://www.gao.gov/about/what-gao-does/fraudnet>

Automated answering system: (800) 424-5454 or (202) 512-7700

Congressional Relations

A. Nicole Clowers, Managing Director, ClowersA@gao.gov, (202) 512-4400, U.S. Government Accountability Office, 441 G Street NW, Room 7125, Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548

Strategic Planning and External Liaison

Stephen J. Sanford, Managing Director, spel@gao.gov, (202) 512-4707
U.S. Government Accountability Office, 441 G Street NW, Room 7814,
Washington, DC 20548



Please Print on Recycled Paper.