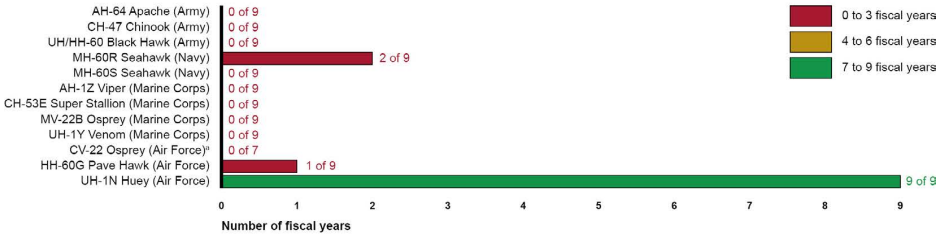
Rotary aircraft

Source: U.S. Marine Corps/Sgt. Jesus Sepulveda Torres. | GAO-21-101SP

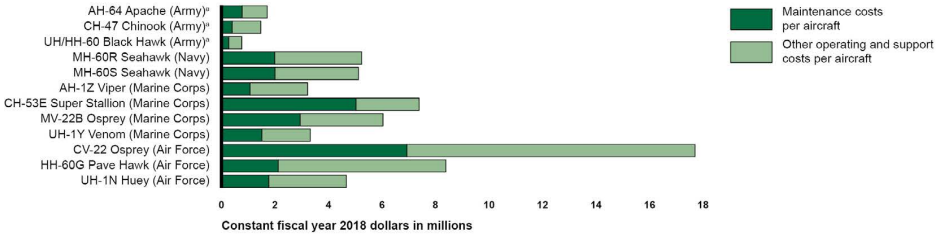
Number of Times Selected Rotary Aircraft Met Their Annual Mission Capable Goal, Fiscal Years 2011 through 2019



Source: GAO analysis of Army, Navy, and Air Force data. | GAO-21-101SP

[a]The Air Force did not provide the mission capable goals for all nine years for this aircraft.

Operating and Support Costs per Aircraft for Selected Department of Defense Rotary Aircraft, Fiscal Year 2018



Source: GAO analysis of Army, Navy, and Air Force data. | GAO-21-101SP

[a]We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Source: U.S. Army/Captain Brian Harris. | GAO-21-101SP

Program Essentials

Manufacturer: Boeing Company Integrated Defense Systems

Sustainment: Boeing and the Army sustain the airframe and Lockheed Martin sustains the sensors

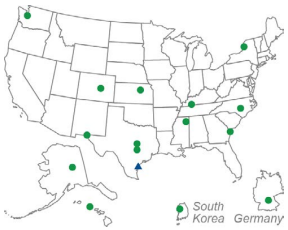
Program Office: Redstone Arsenal, Alabama

Fiscal Year 2019 Data

Average age: 11.6 years (AH-64D); 3.4 years (AH-64E)

Average lifetime flying hours: 5,574 hours (AH-64D); 1,236 hours (AH-64E)

Depot maintenance activity and combat aviation brigade locations:



Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The Army is upgrading its AH-64Ds to AH-64Es to improve capability and reduce unscheduled maintenance. In addition, the Army is working to improve the availability of spare parts.

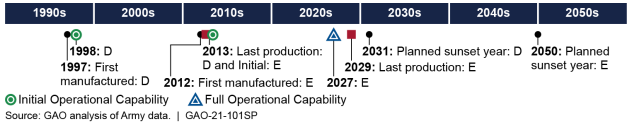
AH-64 Apache Sustainment Quick Look

Common Name: AH-64
Lead Service: Army

Background

The AH-64 Apache is an attack helicopter that was first manufactured in 1984 as the AH-64A and later re-manufactured as the AH-64D in 1997. The models of the Apache currently in use, the AH-64D and AH-64E, can perform a variety of missions including ground force security, fixed based operations, aerial escorts, reconnaissance, and single or multiple enemy combatant engagements.

Life Cycle of the AH-64



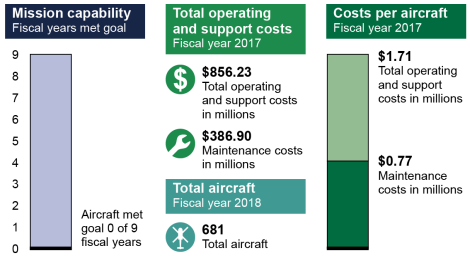
Source: GAO analysis of Army data. | GAO-21-101SP

Note: Many of the AH-64Ds were rebuilt from the original AH-64A models, which were first manufactured in 1985.

Overview

From fiscal year 2011 to fiscal year 2019, the AH-64 fleet did not meet its mission capable goal. According to Army officials, not mission capable rate trends were due to spare parts quality and reliability issues, which required replacement and maintenance actions. Operating and support (O&S) costs per aircraft decreased from about $1.89 million in fiscal year 2011 to $1.71 million in fiscal year 2017.

AH-64 Sustainment Status



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data was inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S cost data.

Sustainment Strategy

- The Apache Block III Life-Cycle Sustainment Plan (2012) documents plans to execute the upgrade program for the AH-64. The plan focuses on delivering warfighter required capabilities and implementing a comprehensive support strategy to support near-term and future sustainment strategy decisions. According to officials, the AH-64 program office is currently drafting a new version of the sustainment plan that will incorporate follow-on test and evaluation results and updated performance-based logistics contracts numbers. There was no planned release date for the sustainment plan at the time of this review.

- To provide sustainment support to the AH-64, the Army entered into performance-based logistics contracts with Boeing and Lockheed Martin. Boeing and the Army are responsible for supporting the sustainment of the airframe and Lockheed Martin provides sustainment support for the AH-64's sensors. Under these contracts, Boeing and Lockheed Martin provide management of the supply chain, maintenance, transportation, configuration, and reliability and obsolescence. Further, Boeing is responsible for establishing and conducting Army depot maintenance capability for the AH-64E.

- According to officials, the AH-64 has various initiatives to support sustainment, such as addressing acquisition lead times, corrosion prevention, obsolescence issues, and intellectual property rights problems.

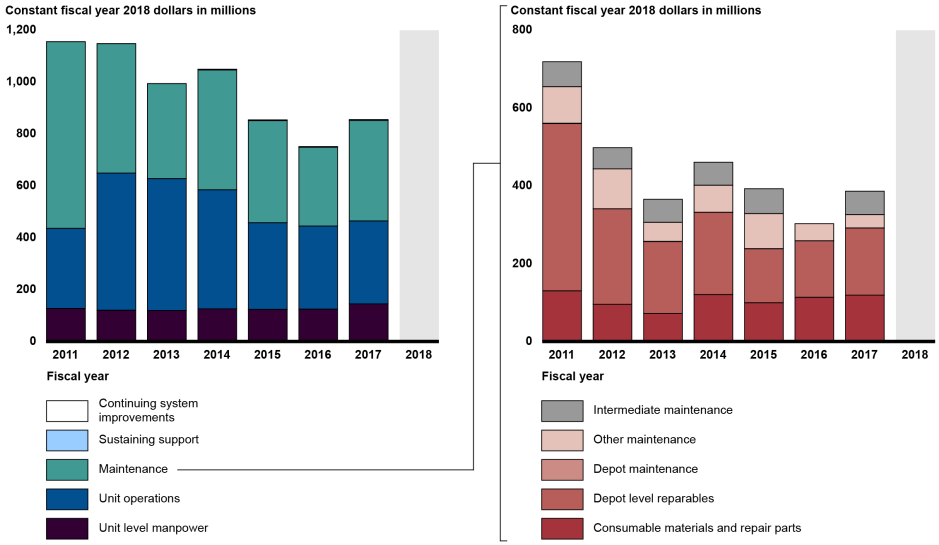
Availability and Condition

From fiscal year 2011 through fiscal year 2019, the AH-64 fell short of its mission capable goal each year. Further, from fiscal year 2011 through fiscal year 2019, the not mission capable maintenance (NMCM) and not mission capable supply (NMCS) rates varied. Officials explained that the NMCM and NMCS rate trends were due to spare parts quality and reliability issues, which required replacement and maintenance actions. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

The AH-64's overall O&S costs decreased from $1.16 billion in fiscal year 2011 to about $856.23 million in fiscal year 2017. Maintenance costs accounted for 46 percent of O&S costs over the period, and decreased overall by $332.55 million from fiscal years 2011 through 2017. According to officials, the AH-64Ds in the worst condition were the first aircraft to be scheduled for upgrade to the AH-64E fleet. Therefore, the officials stated that this upgrade increased the efficiency of the overall fleet and decreased overall maintenance costs for the aircraft. Depot-level reparables was the most significant category of maintenance costs, averaging $218.07 million per year, or 49 percent of total maintenance costs, from fiscal years 2011 through 2017. Depot maintenance costs was the smallest share, averaging $0.38 million per year, or less than 0.1 percent of total maintenance costs, during the same time period.

AH-64 Total Operating and Support Costs

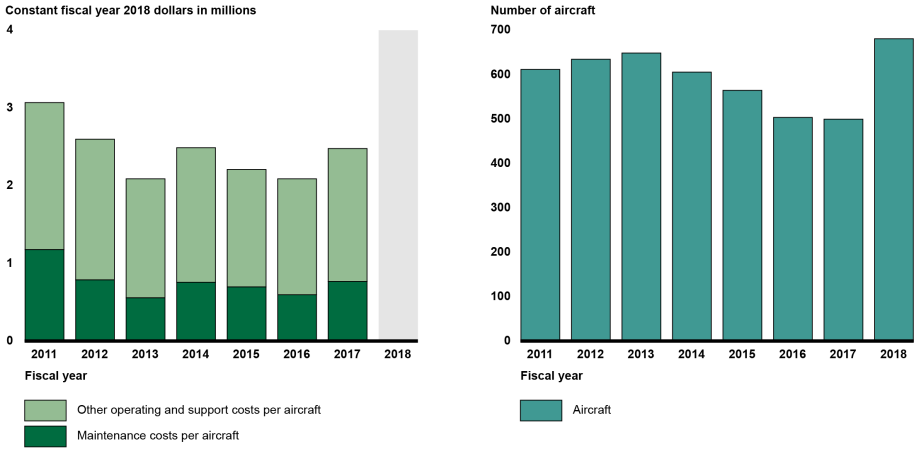


Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data was inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

From fiscal years 2011 through 2017, the AH-64's O&S costs per aircraft decreased from about $1.89 million to $1.71 million and the mission capable rate decreased. Also, maintenance costs per aircraft, on average, accounted for almost half of the total cost per aircraft over the same time period, averaging about $770,000 million per year. Additionally, the number of aircraft in the fleet increased from 612 in fiscal year 2011 to 681 in fiscal year 2018.

AH-64 Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data was inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Sustainment Challenges and Mitigation Actions

Maintenance: According to program officials, delayed administrative timelines for executing repair contracts negatively affected maintenance times for the AH-64. The Army's ongoing actions include putting additional tools in place to provide proper notification of expiring contracts so that Army officials can extend and quickly award contracts before the expiration date.

Supply Support: Army officials have stated that the Army has experienced issues with parts quality that have caused delays in repair times, delayed production timelines when procuring spare parts for the AH-64, and parts shortages. According to officials, the program office has faced challenges related to manufacturer parts quality issues, which led to additional maintenance actions and increased the NMCM and NMCS rates in 2017 and 2018. To address these issues, the program office worked with manufacturers to perform required replacement and maintenance actions reducing both the unit burden and the time required to complete corrective maintenance actions, as well as to form a strategic plan to prevent future parts reliability issues. Additionally, officials stated they have also faced production and repair delays of parts, which the Army has worked to mitigate by leading monthly engagements with parts suppliers to reduce production lead times. Finally, to combat parts shortages, Army officials stated that they continually work with Boeing and the Defense Logistics Agency to expedite deliveries to address parts shortages affecting Corpus Christi Army Depot and commercial repair output of parts.

Program Office Comments

In commentating on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Army/Scott T. Sturkol. | GAO-21-101SP

Program Essentials

Manufacturer: Boeing

Sustainment: Depot maintenance conducted at Army depots and contractor sites. Field maintenance conducted by Army personnel at the unit level.

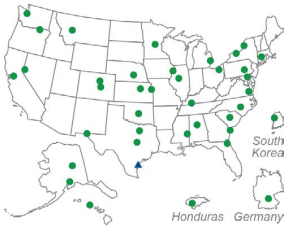
Program Office: Project Manager Cargo Helicopters, Redstone Arsenal, Alabama.

Fiscal Year 2019 Data

Average age: 6.53 years (CH-47F)

Average lifetime flying hours: 1,285.28 hours per aircraft (CH-47F)

Depot maintenance activity and combat aviation brigade locations:



Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The Army finished transitioning its CH-47Ds to CH-47Fs to improve capability and reduce unscheduled maintenance. However, the program office is working to address remaining supply support issues with corrective action plans and process improvements.

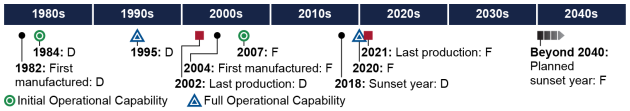
CH-47 Chinook Sustainment Quick Look

Common Name: CH-47
Lead Service: Army

Background

The CH-47 Chinook is a heavy-lift cargo rotary wing aircraft that was first manufactured in 1982. It transports forces and heavy equipment to provide routine aerial sustainment of maneuver forces. Between fiscal year 2011 and fiscal year 2018 there were two models of the CH-47, D and F, with program office officials confirming that the D model was retired in 2018. According to program office officials, modernization from the CH-47D to the CH-47F began in 2004, with planned completion of a full fleet upgrade by 2022, and as of 2019 there have been no D models flying.

Life Cycle of the CH-47

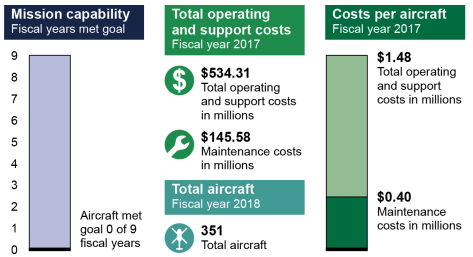


Source: GAO analysis of Army data. | GAO-21-101SP

Overview

In fiscal year 2019, the CH-47 fleet did not meet its mission capable rate goal due to maintenance and supply issues, and did not meet its goal for any year from fiscal year 2011 to fiscal year 2019. Unavailability due to maintenance and supply issues decreased from fiscal year 2011 to fiscal year 2019 because, according to officials, the newer CH-47Fs replaced the older CH-47Ds. Additionally, operating and support (O&S) costs per aircraft decreased from about $2.07 million in fiscal year 2011 to about $1.48 million in fiscal year 2017. According to officials, maintenance costs decreased because the CH-47Fs required less unscheduled maintenance than the CH-47Ds.

CH-47 Sustainment Status



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Sustainment Strategy

- The CH-47F Chinook with Block II Life-Cycle Sustainment Plan (2016) documents the modernization program for the CH-47 and provides a product support strategy to minimize the costs and logistics footprint within the existing supply chain while meeting warfighter requirements. This upgrade strategy allows the CH-47 program office to incrementally insert technology upgrades into the CH-47F model while maintaining affordability and meeting requirements.

- There was no depot maintenance program for the CH-47 between fiscal year 2011 and fiscal year 2019 because the aircraft was being modernized, according to program office officials. The Army initially sustained the CH-47 with interim contractor support and then transitioned to either organic or limited performance-based logistics support. Field maintenance is performed by combat aviation brigade personnel.

- According to officials, the Defense Logistics Agency and Army Aviation and Missile Command provide supply support for the CH-47.

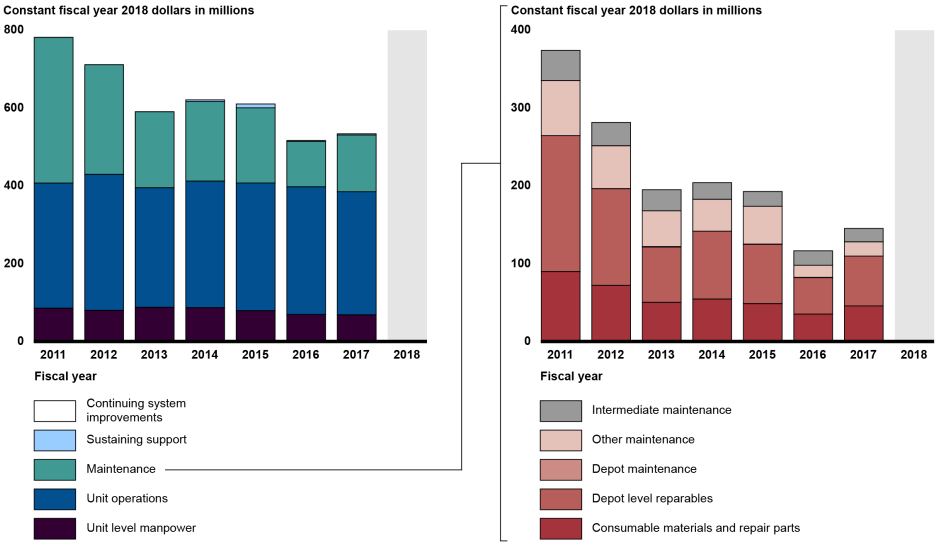
Availability and Condition

From fiscal year 2011 through fiscal year 2019, the CH-47 missed its mission capable goals. However, the percent of mission capable aircraft increased from fiscal year 2011 to fiscal year 2019 as more CH-47F aircraft were operated and maintained. According to officials, the CH-47 missed its goals because the CH-47D—which required more unscheduled maintenance than the CH-47F—was still in the fleet at that time. The CH-47D was no longer flying as of 2019, and officials expect to complete the fleet upgrade to the CH-47F by 2022. From fiscal year 2011 through fiscal year 2019, the not mission capable maintenance (NMCM) rate decreased, while the not mission capable supply (NMCS) rate remained relatively steady. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2017, the CH-47's total O&S costs decreased from $781.82 million to $534.31 million, as the mission capable rate increased. Unit operations costs accounted for the largest share of O&S costs over the period, averaging about $324.96 million per year during the same time period. Maintenance costs decreased significantly, from $374.22 million in fiscal year 2011 to $145.48 million in fiscal year 2017. According to officials, the older CH-47Ds required more unscheduled maintenance than did the newer CH-47Fs, so as the fleet was upgraded, maintenance costs—and as a result overall O&S costs—decreased.

CH-47 Total Operating and Support Costs

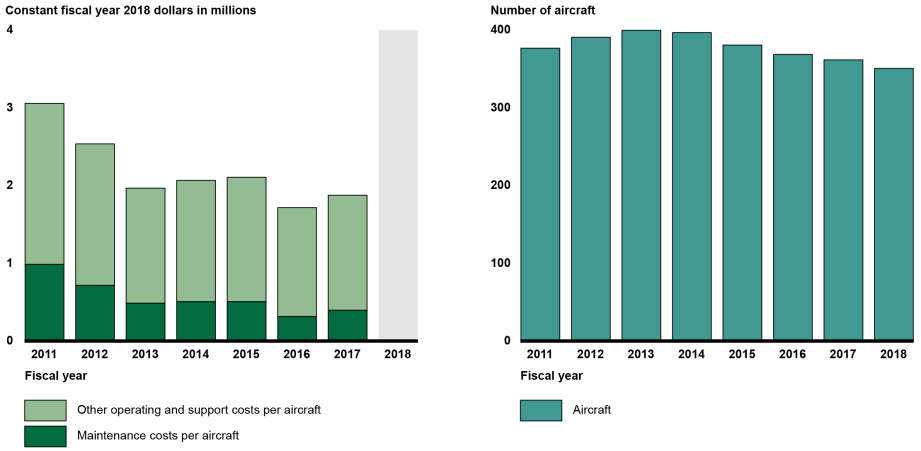


Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

From fiscal year 2011 through fiscal year 2017, the CH-47's O&S costs per aircraft decreased from $2.07 million to $1.48 million, while mission capable rates increased. Also, maintenance costs per aircraft decreased from $0.99 million in fiscal year 2011 to $0.4 million in fiscal year 2017. According to officials, the Army was transitioning the older CH-47Ds, which required more unscheduled maintenance, to the newer CH-47Fs during the time period. Additionally, the number of aircraft decreased from 377 aircraft in fiscal year 2011 to 362 aircraft in fiscal year 2017; however, according to officials, the Army plans to have 465 CH-47F aircraft—246 new builds and 219 upgraded CH-47D models—once the upgrade process is complete in 2022.

CH-47 Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Sustainment Challenges and Mitigation Actions

Maintenance: According to program office officials, the CH-47D required more unscheduled maintenance than did the CH-47F, which is typical for older aircraft. However, as the fleet is fully upgraded to CH-47F models, this unscheduled maintenance is expected to decrease, resulting in greater availability of the aircraft for Combat Aviation Brigades. In addition, according to officials, the program office began implementation of a new scheduled maintenance plan for the CH-47F fleet in June 2019, which is based on best commercial practice and methodology. Under this plan, officials stated that task inspection intervals have been significantly extended; for example, heavy maintenance inspections scheduled at 200 and 400 flying hours will now be performed at 320 and 640 flying hours, which officials expect will lead to a 2.5 percent reduction in scheduled maintenance downtime across the fleet. According to program office officials, the goal is to have the entire CH-47F fleet under this new maintenance plan by July 2021.

Supply Support: According to program office officials, one of the biggest sustainment challenges for the CH-47 has been having access to low-demand, but critical, parts, such as airframe components and outer surface skins. To mitigate this issue, officials told us that they utilize the open CH-47F production line to get parts that are causing availability issues, and that they have had specific parts fabricated at Army Logistics Readiness Centers. Further, supply chain management issues continue to be a problem, due to a low volume of parts in the system, long production lead times, and delinquent deliveries, according to officials. According to officials, the program office continues to work with Boeing and other contractors to identify high risk parts and suppliers and to implement corrective actions for the root causes, improve processes, and develop risk mitigation strategies for each part and its supplier. According to officials, they also have ongoing engagements with the Defense Logistics Agency, Army Aviation and Mission Command, and Army Contracting Command, as well as with original equipment manufacturers and suppliers, to mitigate excessive lead times and delinquent deliveries. Lastly, officials stated that managing avionics and software systems to address obsolescence issues has been a significant challenge that is expected to continue at an increasing rate. According to officials, the program office conducts proactive obsolescence monitoring for components and seeks out industry support to mitigate this issue, but these re-design efforts—even if funded by the original equipment manufacturers—are costly.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Army/Scott T. Sturkol. | GAO-21-101SP

Program Essentials

Manufacturer: Sikorsky Aircraft Corporation

Sustainment: Depot maintenance conducted at the Corpus Christi Army Depot. Field maintenance conducted by Army personnel at the unit level.

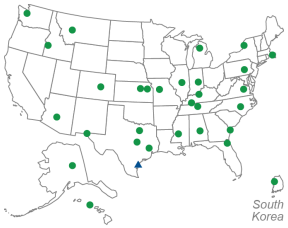
Program Office: Program Manager Utility Helicopters, Redstone Arsenal, Alabama

Fiscal Year 2019 Data

Average age: 15.86 years

Average number of lifetime flying hours: 184.2 hours per aircraft

Depot maintenance activity and combat aviation brigade locations:



▲ Depot maintenance activity location
● Combat aviation brigade location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The UH/HH-60 fleet faces parts supply challenges. Officials are implementing actions to improve the acquisition and quality of spare parts.

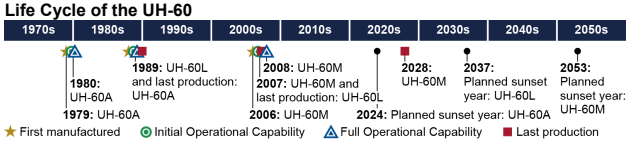
UH/HH-60 Black Hawk Sustainment Quick Look

Common Name: Black Hawk Utility Helicopter
Lead Service: Army

Background

The UH/HH-60 Black Hawk is a utility tactical transport helicopter. The UH-60 provides air assault, general support, command and control, and special operations support to combat, stability, and support operations, and the HH-60 is a variant that also provides aeromedical evacuation services. The HH-60 and UH-60 are managed in an integrated manner due to their similarities, according to Army officials.

Life Cycle of the UH-60



Source: GAO analysis of Air Force data. | GAO-21-101SP

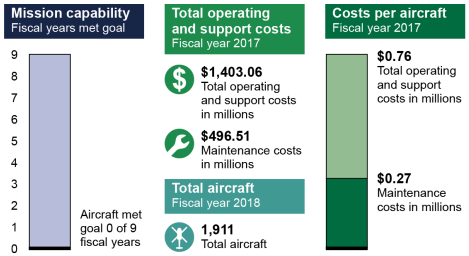
Life Cycle of the HH-60

Source: GAO analysis of Air Force data. | GAO-21-101SP

Overview

The UH/HH-60 fleet did not meet its mission capable goal in any year from fiscal year 2011 through 2019. However, the percent of mission capable aircraft increased from fiscal year 2011 to year 2019. Operating and support (O&S) costs per aircraft decreased, from about $1.06 million in fiscal year 2011 to $0.76 million in fiscal year 2017.

UH/HH-60 Sustainment



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Sustainment Strategy

- The H-60L and H-60M Life Cycle Sustainment Plans provide a roadmap for the sustainment of the aircraft, with the UH-60A being covered under the H-60L plan, according to Army officials. The Army manages the UH-60A, UH/HH-60L, and UH/HH-60M in an integrated manner, according to program officials.
- The Army is focused on executing a 100-percent organic core capability for all UH/HH-60 airframes and depot-level reparables. The Army performs depot maintenance on the aircraft at Corpus Christi Army Depot, Texas.
- The Army uses Sikorsky Aircraft Corporation, the Army Supply System, and the Defense Logistics Agency to obtain parts for the aircraft. Specifically, the Army uses long-term strategic contracts that are managed by the Defense Logistics Agency to procure spare parts for the UH/HH-60.

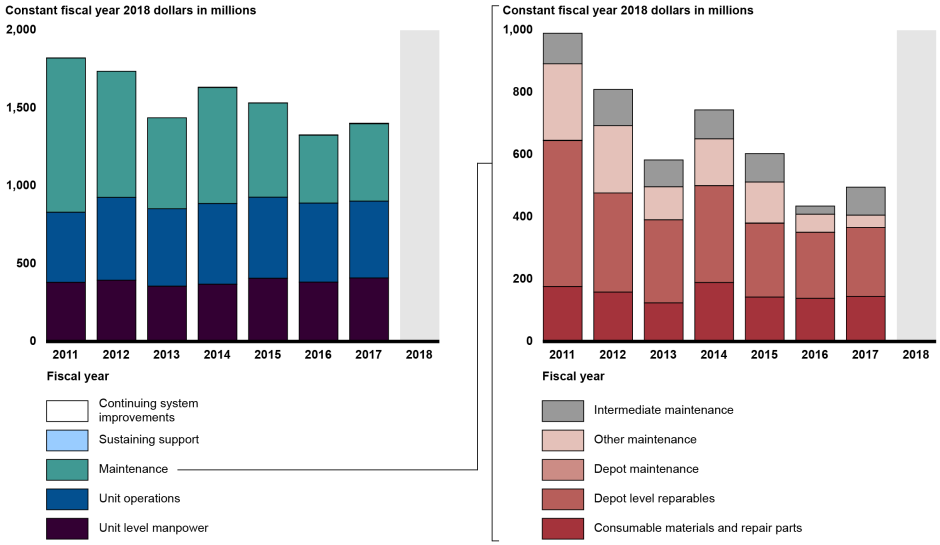
Availability and Condition

From fiscal year 2011 through fiscal year 2019, the UH/HH-60 missed its mission capable goals. However, the percent of mission capable aircraft increased from fiscal year 2011 to fiscal year 2019. According to officials, the UH/HH-60 missed its goals because of spare parts quality issues as well as a reduction of repair programs and late deliveries of supply items by the vendor. From fiscal year 2011 through fiscal year 2019, the not mission capable maintenance (NMCM) rate decreased, while the not mission capable supply (NMCS) rate increased. Officials explained that the increase in the NMCS rate was due, in part, to spare parts quality and availability issues, which required replacements due to recalls for safety purposes. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2017, the UH/HH-60's overall O&S costs decreased, from about $1.82 billion in fiscal year 2011 to about $1.4 billion in fiscal year 2017. Maintenance accounted for 43 percent of O&S costs over the period, but overall O&S costs decreased by $494.06 million between fiscal years 2011 and 2017. According to officials, upgrading the UH-60A aircraft to UH-60M aircraft decreased the overall maintenance costs for the fleet. Depot-level reparables was the most significant category of maintenance costs, averaging $290.66 million per year, or 44 percent of total maintenance costs from fiscal years 2011 through 2017. Depot maintenance was the smallest maintenance cost category, averaging $0.53 million per year, or less than 1 percent of total maintenance costs for the same time period.

UH/HH-60 Total Operating and Support Costs

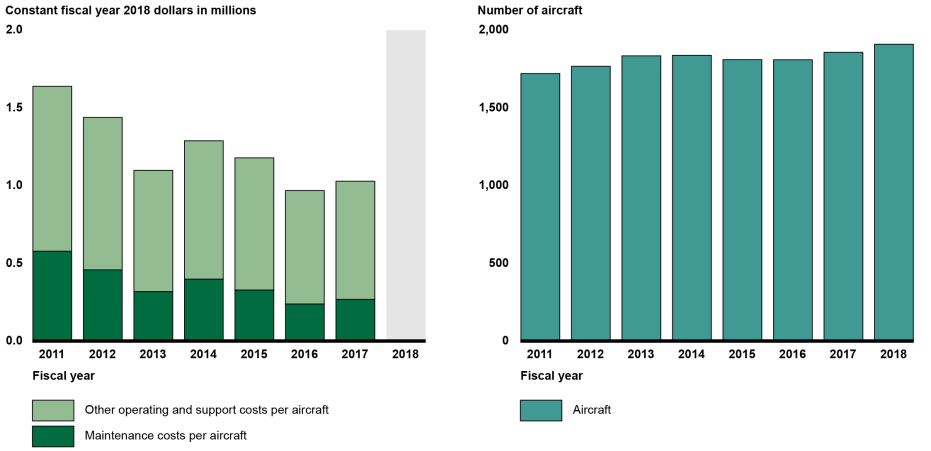


Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

From fiscal year 2011 through fiscal year 2017, the UH/HH-60's O&S costs per aircraft decreased, from about $1.06 million to $0.76 million, while the mission capable rate increased, from 69 percent to 74 percent. Maintenance costs per aircraft, on average, accounted for about 43 percent of the total O&S costs per aircraft, averaging $0.37 million per year between fiscal years 2011 and 2017. Additionally, the number of aircraft in the fleet increased, from 1,722 in fiscal year 2011 to 1,911 in fiscal year 2018.

UH/HH-60 Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Army data. | GAO-21-101SP

Note: We obtained fiscal year 2018 operating and support (O&S) cost data from the Army, but we learned from the Army that the data were inaccurate. Thus, the costs presented here for the Army aircraft are based on fiscal year 2017 O&S data.

Sustainment Challenges and Mitigation Actions

Supply Support: The Army has experienced parts quality challenges that have caused delays in repair and parts production lead times for the UH/HH-60. To address these challenges, the program office is adjusting lead time requirements and using more long-term contracts with manufacturers. Additionally, officials stated that they have worked to mitigate parts issues by leading monthly engagements with parts suppliers to reduce production lead times. Army officials also stated that they continually work with Sikorsky Aircraft Corporation and the Defense Logistics Agency to expedite deliveries for parts shortages impacting Corpus Christi Army Depot and commercial repair output.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Navy/Mass Communication Specialist 2nd Class Mark Andrew Hays. | GAO-21-101SP

Program Essentials

Manufacturer: Sikorsky

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers and field maintenance conducted by Navy maintainers

Program Office: Program Manager – Air 299, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 6.76 years

Average lifetime flying hours: 2,547 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The MH-60R faces maintenance challenges, as its fleet size grew rapidly between fiscal years 2011 and 2019. Officials are working to address these issues.

MH-60R Seahawk Sustainment Quick Look

Common Name: MH-60 Romeo
Lead Service: Navy

Background

The MH-60R Seahawk is a twin engine helicopter first manufactured in 2005. Its primary missions are anti-submarine warfare, anti-surface warfare, and electromagnetic warfare. The MH-60R is designed to operate aboard cruisers, destroyers, littoral combat ships, and aircraft carriers. The aircraft is equipped with a 250-foot cable rescue hoist with a 600-pound lift capability, and a cargo hook with a 6,000-pound capacity.

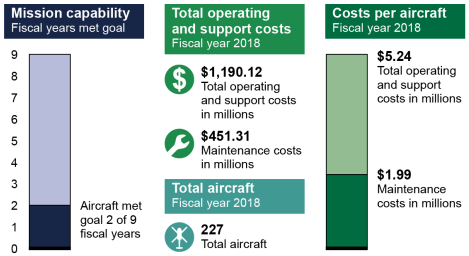
Life Cycle of the MH-60R

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

In fiscal year 2019, the MH-60R fleet did not meet its mission capable goal because some of the fleet was not mission capable due to depot, maintenance, and supply issues. In addition, the MH-60R exceeded its mission capable goals in only two years from fiscal year 2011 through 2019. Total not mission capable rates increased from fiscal year 2011 to fiscal year 2019 because of low maintenance personnel-to-aircraft ratios, according to Navy officials. Additionally, operating and support (O&S) costs per aircraft increased, from about $4.33 million in fiscal year 2011 to about $5.24 million in fiscal year 2018. According to officials, O&S costs grew during this time period because the total number of aircraft increased, which required additional personnel to maintain and support additional fielded aircraft, squadrons, and sites.

MH-60R Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The MH-60R Multi-Mission Helicopter Acquisition Logistics Support Plan (2005) describes the strategy to coordinate and manage the logistics elements supporting the sustainment of the program. The plan provides the planning data to accomplish life-cycle support for the program and contains logistics information and a production planning management tool. Further, the plan is designed to utilize the benefits derived from support planning and program accomplishments on other H-60 aircraft in an attempt to eliminate the need for redevelopment, re-validation, and re-verification of Navy resources.

- The Naval Supply Systems Command awarded a performance-based logistics contract in 2015 to primarily repair MH-60 depot-level reparables and manage the inventory of those spare parts, with the option for the contractor to buy parts if replacements were needed.

- Depot maintenance occurs at Navy Fleet Readiness Centers, and Navy maintainers sustain and conduct field maintenance for the MH-60R. Generally, depot maintenance occurs every 3 years, according to officials.

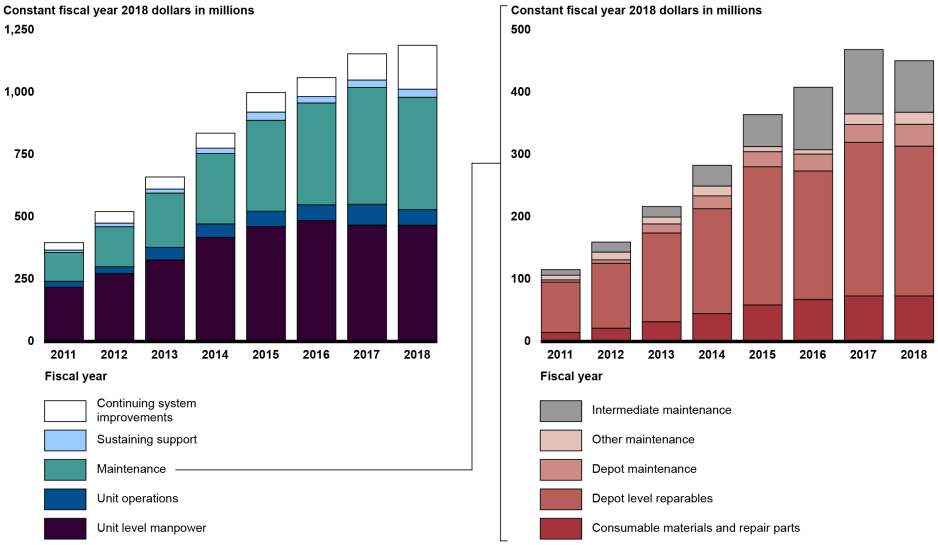
Availability and Condition

The MH-60R exceeded its mission capable goals in only two years from fiscal year 2011 through 2019. Also, the percent of mission capable aircraft decreased each year from fiscal year 2011 to fiscal year 2019. According to Navy officials, the MH-60R missed its mission capable goals due to low maintenance personnel-to-aircraft ratios, insufficient skills of and training for maintenance personnel, and a lack of updated technical publications. From fiscal year 2011 through fiscal year 2019, the not mission capable rates maintenance (NMCM) and supply (NMCS) rates generally increased. According to Navy officials, the NMCM rate increase was due to a shortage of maintenance personnel as the number of aircraft increased. Furthermore, in fiscal years 2018 and 2019, the NMCS rate was increasingly an issue for the aircraft, and officials explained that parts inventories were unable to keep pace with aircraft deliveries. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2018, the MH-60R's total O&S costs tripled, which officials said was largely due to an increase in the fleet size—from 92 aircraft in fiscal year 2011 to 227 in fiscal year 2018. According to officials, this increase in the fleet size led to additional personnel requirements to maintain the aircraft and sites. Maintenance costs accounted for a large share of O&S costs over the period, increasing from about $115.94 million in fiscal year 2011 to $451.31 million in fiscal year 2018, which officials explained was caused by the increase in the number of aircraft and flight hours. The largest category of maintenance costs was depot-level reparables, which increased from about $80.73 million in fiscal year 2011 to $240.3 million in fiscal year 2018. According to officials, the increase in costs for depot-level reparables was due to an increase in depot inductions as new aircraft entered their first depot maintenance induction cycles and warranties expired on new production parts.

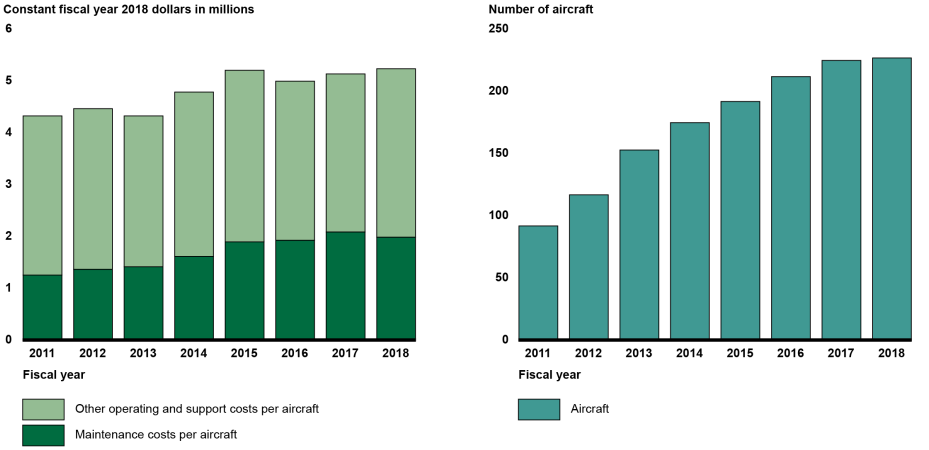
MH-60R Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

From fiscal year 2011 through fiscal year 2018, the MH-60R's O&S costs per aircraft increased from about $4.33 million in fiscal year 2011 to $5.24 million in fiscal year 2018. Unit level manpower, maintenance, and continuing system improvement costs increased as the number of aircraft more than doubled, from 92 aircraft in fiscal year 2011 to 262 aircraft in fiscal year 2019. According to officials, this increase in fleet size increased the number of flying hours, which also led to an increase in fuel costs captured under unit operations costs over this time period.

MH-60R Operating and Support Costs per Aircraft Compared and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: According to officials, maintenance of the MH-60R has been challenging due to a lack of adequately trained maintenance personnel, technical publications, and funding. The officials explained that the number of aircraft requiring support increased above the primary authorized allowance, and the funding provided for support equipment and logistics was not increased to support the assigned aircraft. To combat these issues, officials stated that they are working to adjust priorities to better support the fleet, better communicate requirements for sustainment, and develop performance plans.

Supply: Officials acknowledged that there was an increased shortage of parts to repair the aircraft in fiscal year 2018. Officials also told us that they are working to be proactive and better position the program to react to any unforeseen issues with parts wearing out. Specifically, program officials reported that they are planning to better align the number of aircraft requiring support—which currently exceeds the primary authorized allowance—with the available resources for sustaining the fleet, to ensure that the fleet is not larger than they have the supply support to handle.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Navy/Mass Communication Specialist 3rd Class Steven Edgar. | GAO-21-101SP

Program Essentials

Manufacturer: Sikorsky

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers and field maintenance conducted by Navy maintainers

Program Office: Program Manager – Air 299, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 10.93 years

Average lifetime flying hours: 3,889 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The MH-60S faces challenges due to maintenance and supply issues. Program office officials are working to adjust priorities to better support the fleet.

MH-60S Seahawk Sustainment Quick Look

Common Name: MH-60 Sierra
Lead Service: Navy

Background

The MH-60S Seahawk is a twin engine helicopter first manufactured in 2000. Its primary missions are anti-surface warfare, combat search and rescue, organic airborne mine countermeasure, and combat support missions. The MH-60S is designed to operate aboard cruisers, destroyers, littoral combat ships, and aircraft carriers. This aircraft, which shares an airframe with the MH-60R, is equipped with a 250-foot cable with a 600-pound lift capability, and a cargo hook with a 6,000-pound capacity.

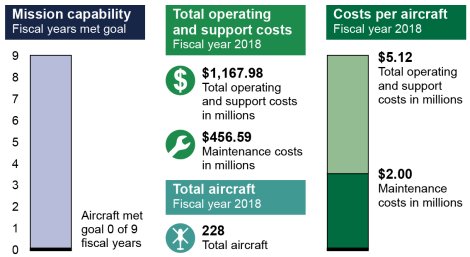
Life Cycle of the MH-60S

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

In fiscal year 2019, the MH60S fleet did not meet its mission capable rate goal, nor in any other year since fiscal year 2011. The MH-60S did not meet its goal because of depot, maintenance, and supply issues. Not mission capable rates increased from fiscal year 2011 to fiscal year 2019 because of low maintenance personnel-to-aircraft ratios, according to Navy officials. Additionally, operating and support (O&S) costs per aircraft increased, from about $4.1 million in fiscal year 2011 to about $5.12 million in fiscal year 2018. According to officials, O&S costs increased largely because of an increase in the number of total aircraft, which required additional personnel to maintain and support the additional fielded aircraft, squadrons, and sites.

MH-60S Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The MH-60S Life Cycle Sustainment Plan (2002) describes the strategy to monitor and accomplish MH-60S program objectives, program schedules, and assigned program responsibilities. The plan provides the logistics considerations, a management tool for program resources, and other planning data to accomplish life-cycle support for the program.
- In 2015, the Naval Supply Systems Command awarded a performance-based logistics contract to repair MH-60 depot-level reparables and manage the inventory of those spare parts, with the option for the contractor to buy parts if replacements were needed.
- Depot maintenance occurs at Navy Fleet Readiness Centers and Navy maintainers sustain and conduct field maintenance for the MH-60S. Generally, depot maintenance occurs every 3 years, according to officials.

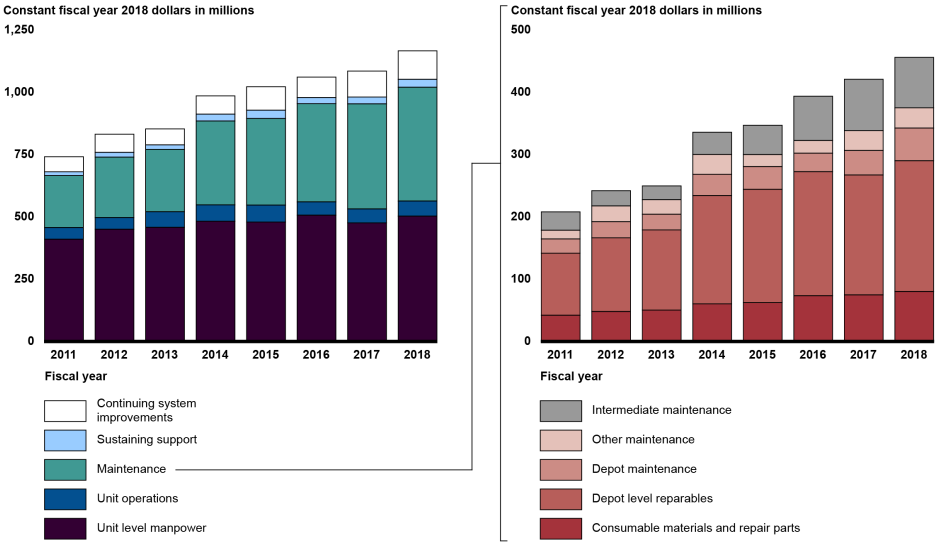
Availability and Condition

The MH-60S missed its mission capable goals from fiscal year 2011 through fiscal year 2019. Also, the percent of mission capable aircraft decreased. According to Navy officials, the MH-60S missed its mission capable goals due to low maintenance personnel-to-aircraft ratios, insufficient skills of and training for maintenance personnel, and a lack of supporting products, to include technical publications. From fiscal year 2011 through fiscal year 2019, the rates generally increased for not mission capable maintenance (NMCM) and not mission capable supply (NMCS). According to Navy officials, the NMCM rate increased due to a lack of maintenance personnel as the number of aircraft increased. Furthermore, in fiscal years 2018 and 2019 NMCS was increasingly an issue for the aircraft, as the spares posture was unable to support fielding aircraft, according to officials. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2018, the MH-60S's total O&S costs rose by about 57 percent, which officials told us was largely due to an increase in fleet size—from 181 aircraft in fiscal year 2011 to 228 in fiscal year 2018. According to officials, this increase in fleet size led to additional personnel requirements to maintain the aircraft and sites. Maintenance costs accounted for a large share of O&S costs over the period, increasing from about $208.7 million in fiscal year 2011 to $456.59 million in fiscal year 2018, which officials attributed to the increase in the number of aircraft and flight hours. The most significant category of maintenance costs was depot-level reparables, which increased from about $99.57 million in fiscal year 2011 to $209.68 million in fiscal year 2018. According to officials, the increase in costs for depot-level reparables was due to an increase in depot inductions as new aircraft entered their first depot maintenance induction cycles.

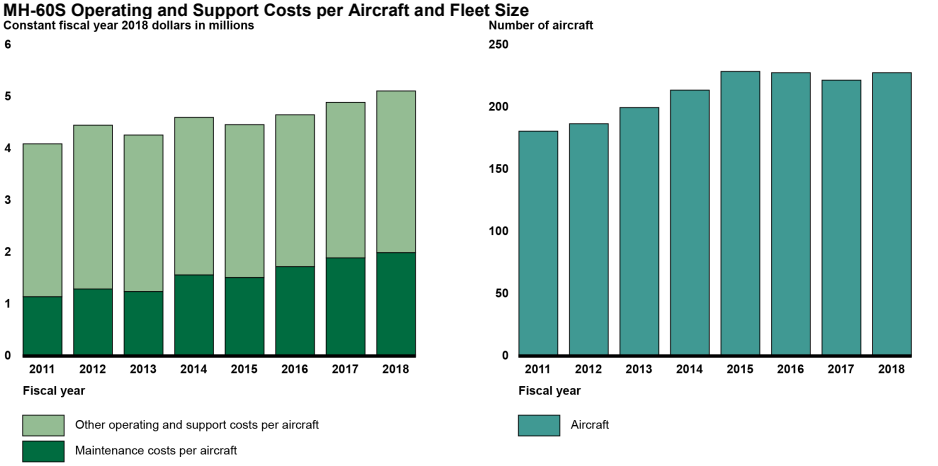
MH-60S Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

From fiscal year 2011 through fiscal year 2018, the MH-60S's O&S costs per aircraft increased from about $4.1 million in fiscal year 2011 to $5.12 million in fiscal year 2018. This occurred due to increases in costs as the number of aircraft increased by about 26 percent, from 181 aircraft in fiscal year 2011 to 228 aircraft in fiscal year 2018. According to officials, this increase in fleet size increased the number of flying hours, which also led to an increase in fuel costs captured under unit operations costs over this time.

MH-60S Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: Maintenance of the MH-60S has been challenging due to a lack of adequately trained maintenance personnel, technical publications, and funding. According to officials, while the number of aircraft requiring support increased above the primary authorized allowance at squadrons, the funding provided for support equipment and logistics was not increased to support the assigned aircraft. To combat these issues, officials are working to adjust priorities to better support the fleet, better communicate requirements for sustainment, and develop performance plans.

Supply: Officials acknowledged that there was an increased shortage of parts to repair the aircraft in fiscal year 2018. Officials also told us that they are working to better position the program to react to any unforeseen issues with parts wearing out. Specifically, program officials reported that they are planning to better align the number of aircraft requiring support—which is currently over the primary authorized allowance—with the available resources for sustaining the fleet, to ensure that the fleet is not larger than they have the supply support to handle.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Marine Corps/Sgt. Jesus Sepulveda Torres. | GAO-21-101SP

Program Essentials

Manufacturer: Bell Helicopter Textron Inc.

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers, Bell, and Tobyhanna Army Depot; and field maintenance conducted by Marine Corps maintainers

Program Office: Program Manager – Air 276, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 4.4 years

Average lifetime flying hours: 946 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The AH-1Z is experiencing maintenance and supply challenges. The Marine Corps' mitigation actions include reducing unscheduled maintenance, reducing the number of aircraft, and improving supply chains.

AH-1Z Viper Sustainment Quick Look

Common Name: AH-1Z
Lead Service: Marine Corps

Background

The AH-1Z Viper is a close air support, armed escort reconnaissance, anti-armor operations, and anti-air warfare aircraft first manufactured in 2006. It is designed with a four-bladed composite rotor system, four-bladed tail rotor, and a fully integrated glass cockpit. The aircraft is equipped with an integrated advanced fire control system and the capacity to support multiple weapon configurations.

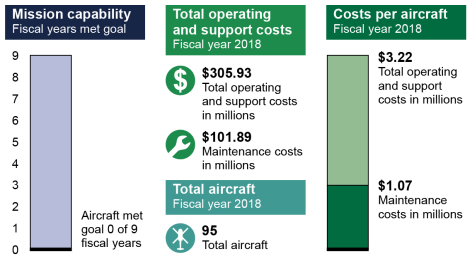
Life Cycle of the AH-1Z

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

From fiscal year 2011 through fiscal year 2019, the AH-1Z fleet did not meet its mission capable rate goal. Specifically, in fiscal year 2019, the AH-1Z did not meet its goal because of depot, maintenance, and supply issues. Not mission capable rates due to depot, maintenance, and supply issues increased from fiscal year 2011 to fiscal year 2019 because squadrons did not have enough maintainers or spare parts to support more aircraft than what was authorized to perform their mission, according to officials. Additionally, total operating and support (O&S) costs per aircraft increased, from about $2.68 million in fiscal year 2011 to about $3.36 million in fiscal year 2018. According to officials, O&S costs per aircraft increased as a result of the upgrade from the older AH-1W aircraft to the newer AH-1Z aircraft.

AH-1Z Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The Life-Cycle Sustainment Plan (2016) provides the overall framework for the sustainment of the AH-1Z throughout its life cycle. This plan documents the program's integrated product support plan and total life-cycle support management strategy.
- The Marine Light Helicopter Independent Readiness Review (2017) provides an in-depth look into AH-1Z sustainment issues and identifies actionable recommendations to mitigate challenges.
- Marine Corps field maintainers maintain the AH-1Z at the squadron level. The Navy Fleet Readiness Centers conduct depot maintenance under a planned interval of 54 months. Naval Supply Systems Command and the Defense Logistics Agency provide supply chain management.
- The Naval Supply Systems Command entered into a performance-based logistics contract with Bell Helicopter Textron beginning in fiscal year 2020 to provide timely, cost-effective repairs as well as supply support.

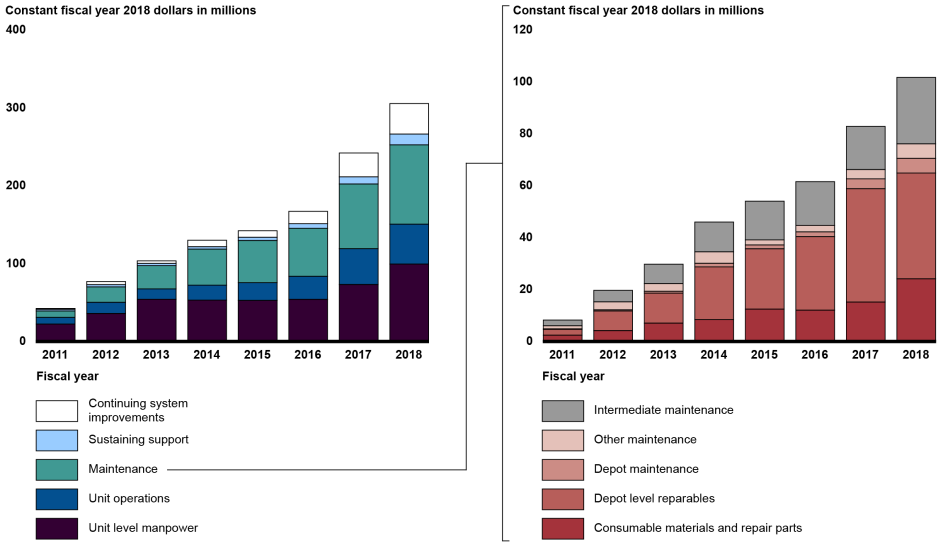
Availability and Condition

From fiscal year 2011 through fiscal year 2019, the AH-1Z missed its mission capable goals. Also, the percent of mission capable aircraft decreased during this time period. From fiscal year 2011 through fiscal year 2018, the not mission capable maintenance (NMCM) rate increased and the not mission capable supply (NMCS) rate decreased. Officials stated that the increase in the NMCM rate between fiscal years 2011 and 2018 was due to a high rate of unscheduled maintenance, inadequate maintainer training and not enough maintainers, and other poor maintenance practices—such as insufficient preventive maintenance and corrosion control—that sacrifice long-term sustainment in order to meet flight schedules. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2018, the AH-1Z's total O&S costs increased. According to officials, O&S costs increased because the AH-1Z inventory went up from 16 aircraft in fiscal year 2011 to 95 aircraft in fiscal year 2018 as squadrons transitioned from the older predecessor aircraft to the newer AH-1Z and maintainers were trained on the new system. Unit level manpower and maintenance costs accounted for the largest shares of O&S costs over the period. Unit level manpower costs increased from about $22.82 million in fiscal year 2011 to about $99.87 million in fiscal year 2018, whereas maintenance costs increased from about $8.37 million to about $101.88 million. In fiscal year 2018, depot-level reparables was the largest category of maintenance costs at about $40.79 million, while depot maintenance was the smallest category of maintenance costs at $5.61 million. Officials stated that depot-maintenance costs were low because the AH-1Z fleet was in the early stages of being fielded and the aircraft has only recently begun to enter depot maintenance.

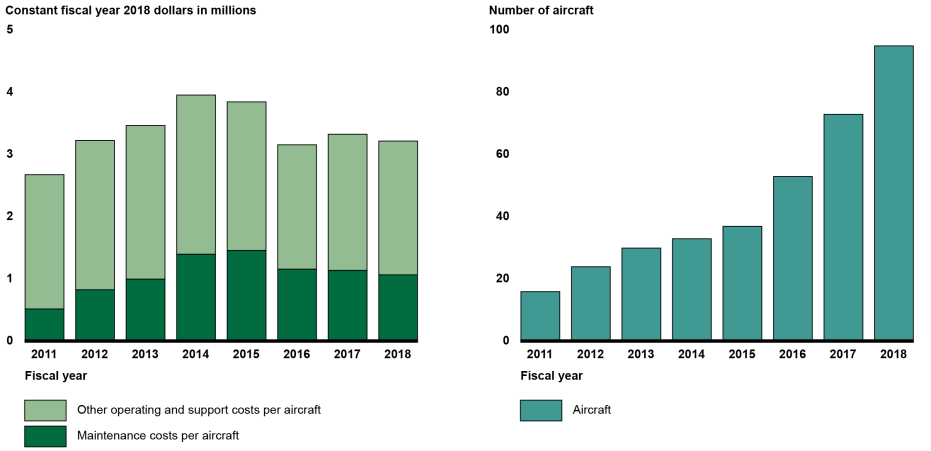
AH-1Z Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

From fiscal year 2011 through fiscal year 2018, the AH-1Z's O&S costs per aircraft generally increased from fiscal year 2011 through fiscal year 2014 and generally decreased from fiscal year 2015 through fiscal year 2018, while the mission capable rate decreased. Also, maintenance costs per aircraft, on average, accounted for one-third of total cost per aircraft, averaging about $1.07 million per year. According to officials, that is a result of an increase in the number of depot reparable demands and an increase in component costs. Additionally, as noted previously, the AH-1Z fleet increased by 79 aircraft, from 16 aircraft in fiscal year 2011 to 95 aircraft in fiscal year 2018.

AH-1Z Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: The AH-1Z faces maintenance challenges related to a high rate of unscheduled maintenance and an inability to fully support current aircraft numbers at the squadron level. As a result, officials stated that unscheduled maintenance is driving the maintenance planning, instead of the maintenance plans driving the maintenance workload. This reactive maintenance disrupts the scheduled maintenance plan and leaves only work hours available to complete the bare minimum maintenance to keep the aircraft flyable while deferring more in-depth maintenance work to later, according to officials. To mitigate this situation, officials told us that they are updating long-term maintenance processes, which include—but are not limited to—technical publication updates, an analysis of maintenance levels, improving maintainer technical knowledge, and the establishment of a corrosion prevention program. Further, the program office has established fleet support team site offices at each major H-1 location to assist the fleet with maintenance and troubleshooting discrepancies.

Supply Support: The AH-1Z has experienced supply challenges, which officials are working to mitigate in several ways. For example, program office officials told us that the number of aircraft at the standard squadron is approximately 25 percent above the normal authorized allowance for which squadrons are staffed and equipped. As a result, squadrons are unable to support the AH-1Z. To mitigate this issue, officials told us they are working to adjust the fleet size to ensure that the squadrons do not have any overages they cannot support, and have implemented the Light Attack Aircraft Management Plan to perform short- and long-term preservation to excess inventory, thereby reducing workload to the fleet and burdens to the supply system. Further, the officials stated that, to alleviate supply chain delays, the Navy Supply Systems Command entered into a performance-based logistics contract with Bell in December 2019 for rotors and drives components and the Defense Logistics Agency is planning to enter into a performance-based contract with Bell in late fiscal year 2020 for about 3,600 consumable items.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Navy/Mass Communication Specialist 2nd Class Kyle Carlstrom. | GAO-21-101SP

Program Essentials

Manufacturer: Sikorsky

Sustainment: Field maintenance conducted by USMC maintainers and depot maintenance conducted at Navy Fleet Readiness Centers and Korean Air Co., Ltd

Program Office: Program Manager – Air 261, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 31.8 years

Average lifetime flying hours: 6,363.48 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The CH-53E is an aging aircraft with maintenance and supply challenges. Actions to mitigate these challenges include resetting the fleet, revising the integrated maintenance program, and improving the supply chain.

CH-53E Sustainment Quick Look

Common Name: Super Stallion
Lead Service: Marine Corps

Background

The CH-53E Super Stallion helicopter, which transports heavy equipment and supplies for amphibious assault, was first manufactured in 1978. The aircraft incorporates secure communications capability, a global positioning system, aviator night vision imaging systems heads up display sensors, and it carries three 50-caliber guns to support combat and rescue missions.

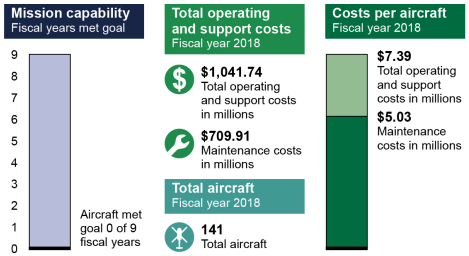
Life Cycle of the CH-53E

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

In year 2019, the CH-53E fleet did not meet its mission capable goal. The CH-53E did not meet its goal due to maintenance and supply issues. In addition, from fiscal year 2011 to fiscal year 2019, the CH-53E did not meet its mission capable goal and not mission capable rates increased from fiscal year 2011 to fiscal year 2019. According to officials, this decrease in mission capability was due to aging issues, including ineffective depot maintenance, aircraft not properly reset to full mission capability following combat, poor supply support and obsolescence, and decreased maintenance efficiency. Additionally, operating and support (O&S) costs per aircraft increased from $6.74 million in fiscal year 2011 to $7.39 million in fiscal year 2018. Maintenance costs were the largest contributor to O&S costs, at 58 percent per year on average. Depot-level reparables was the largest category of maintenance costs for the CH-53E, which made up 50 percent of total maintenance costs, on average.

CH-53E Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The Life-Cycle Sustainment Plan (2016) documents the program's integrated product support plan and total life-cycle support management strategy and provides a roadmap toward achieving performance requirements and minimizing the life-cycle cost associated with acquisition and sustainment through transition to the CH-53K.
- Supply support is provided by the Naval Supply Systems Command and the Defense Logistics Agency. According to program office officials, the Naval Supply Systems Command entered into a performance-based logistics contract with Sikorsky Aircraft Corporation in 2005 for repair support of 10 components and was expanded later for an additional 54 components.
- According to officials, the CH-53E is maintained organically by Marine Corps maintainers and at Navy Fleet Readiness Centers and Korean Air Co., Ltd., under a depot planned maintenance interval (PMI) cycle. The PMI event takes 7 months to complete and occurs every 900 to 1,600 flight hours.

Availability and Condition

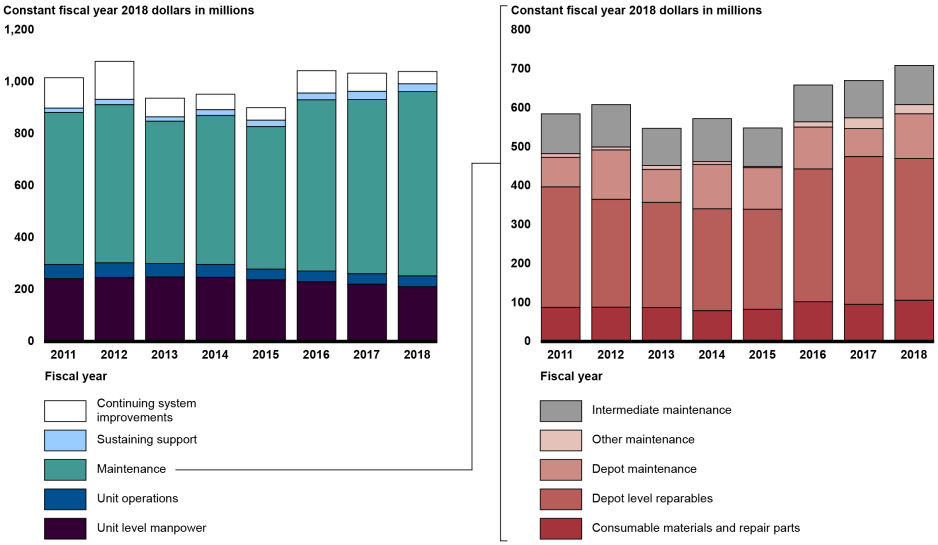
From fiscal year 2011 through fiscal year 2019, the CH-53E program missed its mission capable goal and the mission capable rate decreased from fiscal year 2011 to fiscal year 2019. The percent of mission capable aircraft decreased largely due to maintenance issues and reporting metrics changes, according to officials.

From fiscal year 2011 through fiscal year 2019, the not mission capable maintenance (NMCM), depot (NMCD), and supply (NMCS) rates increased. According to officials, the increases in the NMCM and NMCS rates were due to insufficient numbers of squadron maintenance personnel, whose effectiveness was hindered by a lack of required support equipment, inadequate technical support, and an overall lack of formal and on-the-job, follow-on training. Further, persistent critical parts shortages added to maintenance and supply delays. Officials stated that these parts shortages were a result of obsolescence issues and of relying on historical demand patterns instead of utilizing predictive demand to improve readiness. According to officials, a 2017 change in metrics calculations caused the increase in the NMCD rate and therefore shifted the mission capable rate downward, and a change to data business rules in 2018 caused a decrease in the NMCM rate and an increase in the NMCS rate. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

The CH-53E's total O&S costs remained fairly steady from fiscal year 2011 through fiscal year 2018, averaging around $1 billion per year. Maintenance costs accounted for the largest share of O&S costs over the period, averaging about $613.29 million per year, or 61 percent of the total. Depot-level reparables was the most significant maintenance cost category, averaging $307.49 million per year.

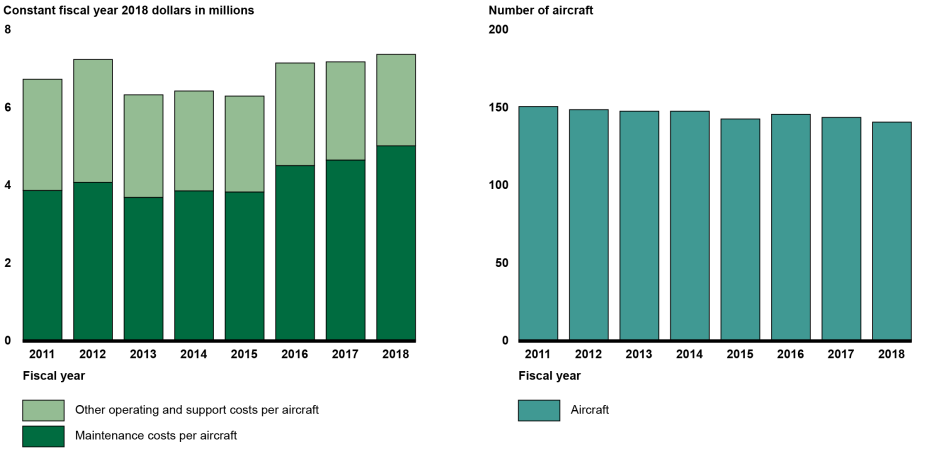
CH-53E Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

From fiscal year 2011 through fiscal year 2018, the CH-53E's O&S costs per aircraft increased from $6.74 million to $7.39 million, while the mission capable rate decreased. Also, maintenance costs per aircraft, on average, accounted for more than half of total O&S costs per aircraft, averaging about $4.2 million per year. Additionally, the number of aircraft decreased, from 151 in fiscal year 2011 to 141 in fiscal year 2018, due to a lack of available aircraft, as the back-up aircraft inventory was previously exhausted.

CH-53E Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Aging: The CH-53E has been in operation for close to 40 years, with the mission capable rate declining from fiscal year 2011 through fiscal year 2019 due to challenges associated with an aging platform, according to officials. Sikorsky conducted a service-life extension study in the mid-1990s and determined that replacing the bulkhead—a dividing wall or barrier between compartments—would extend the service life of the CH-53E from 6,000 to 10,000 hours. As a result, Marine Corps aviation funded all bulkhead replacements. Despite the higher-than-average utilization rates for aircraft deployed in support of the wars in Iraq and Afghanistan, a plan rotating aircraft to reduce the number of flying hours has ensured that only three aircraft should reach the end of their service lives prior to 2024, which is the first year that CH-53Es will be retired.

Maintenance: According to a 2015 Marine Corps readiness review, many of the CH-53E's readiness issues are due to very heavy and hard usage in 11 years of wartime, along with a lack of needed depot maintenance to restore the aircraft upon their return. Additionally, there is a shortage of squadron maintenance personnel, and their effectiveness is hindered by a lack of required support equipment, inadequate technical support, an insufficient quantity of specially trained and qualified squadron personnel, and an overall lack of formal and on-the-job, follow-on training. Lastly, there is a high number of aircraft in maintenance outside of squadrons, which is one of the leading causes of the reduced number of aircraft available to operational commanders. The Marine Corps' ongoing and planned actions include resetting the CH-53E fleet to full mission capability beginning in 2016, directing renewed focus on training to increase technical expertise of aircraft maintainers, changing the CH-53E depot planned maintenance interval (PMI) from a calendar to a flight hour requirement in 2017, and implementing a depot readiness initiative in 2018 to quickly return post-PMI aircraft to a mission capable status.

Supply Support: The CH-53E is experiencing shortages of parts due to diminishing manufacturing sources, obsolescence issues, and over-reliance on demand history to drive supply support decisions instead of using more forward-looking, predictive criteria that make a difference in readiness. As a result, the program office has ongoing and planned actions to improve supply chain performance by expanding the use of product support arrangements and performance-based logistics contracts with industry partners and by implementing demand planning and predictive forecasting tools to determine parts inventory requirements.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Marine Corps/Sgt. Aaron Henson. | GAO-21-101SP

Program Essentials

Manufacturer: Bell-Boeing Joint Program Office

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers, Marine Corps Air Station – Hawaii, and Army Center – Huntsville, Alabama; and field maintenance conducted by Marine Corps, Navy, and contractor maintainers

Program Office: V-22 Joint Program Office – Air 275, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 8 years

Average lifetime flying hours: 1,400 per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The MV-22B is experiencing aging, maintenance, and supply challenges. The Marine Corps' mitigation actions include corrosion repair, preventing aircraft deterioration, and improving supply chains.

MV-22B Osprey Joint Advanced Vertical Lift Aircraft Sustainment Quick Look

Common Name: MV-22B Osprey
Lead Service: Marine Corps

Background

The MV-22B Osprey Joint Advanced Vertical Lift was the first tilt rotor aircraft, having been first manufactured in 1996. The aircraft operates as a helicopter when taking off and landing vertically, and it has the long-range cruise capabilities of a twin turboprop aircraft. The aircraft transports troops, equipment, and supplies, and it operates from ships or expeditionary airfields ashore.

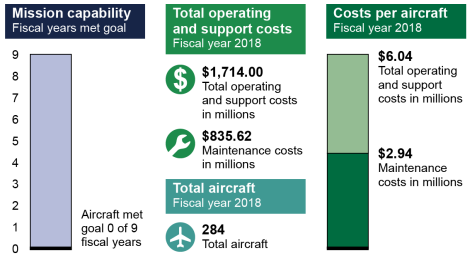
Life Cycle of the MV-22

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

In fiscal year 2019, the MV-22B fleet did not meet its mission capable goal due to depot, maintenance, and supply issues. Further, the MV-22B fleet did not meet its mission capable goal in any year from fiscal year 2011 to fiscal year 2019. According to officials, unavailability due to depot, maintenance, and supply issues increased from in fiscal year 2011 to fiscal year 2019 because of issues with corrosion, engineering delays, and supply shortages. Additionally, operating and support (O&S) costs per aircraft decreased slightly, from about $6.58 million in fiscal year 2011 to about $6.04 million in fiscal year 2018. According to officials, costs per aircraft decreased as more aircraft were introduced into the fleet.

MV-22B Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The Life-Cycle Sustainment Plan (2014) provides the overall framework for the sustainment of the MV-22B system throughout its life cycle. This plan documents the program's integrated product support plan and total life-cycle support management strategy.
- The Joint Program Office manages the MV-22B for the Marine Corps, the CV-22 Osprey for the Air Force and United States Special Operations Command, and the CMV-22 for the Navy, as they are similar systems. Bell-Boeing provides a portion of product support, such as on-site fleet support, in-service engineering support, and access to parts, among other things, through a performance-based logistics contract managed by the Joint Program Office.
- Marine Corps field maintainers maintain the MV-22B at the squadron level. The Navy Fleet Readiness Centers conduct depot maintenance under a planned interval of every 24 months. Naval Supply Systems Command and Defense Logistics Agency provide supply support.

Availability and Condition

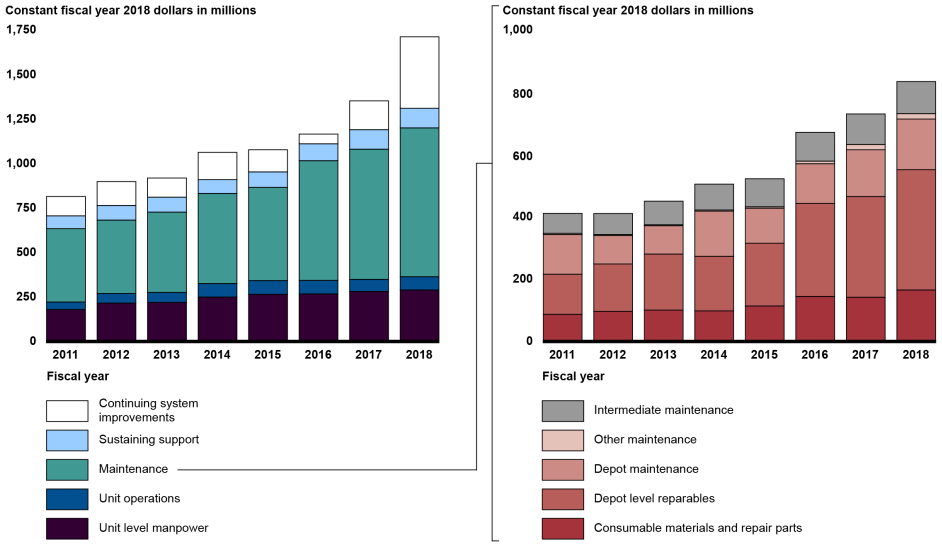
From fiscal year 2011 through fiscal year 2019, the MV-22B missed its mission capable goals and the percent of mission capable aircraft decreased from fiscal year 2011 to fiscal year 2019. According to officials, the MV-22B is missing its annual goals because of corrosion issues, materiel unavailability, and issues caused by technical data gaps and engineering delays.

From fiscal year 2011 through fiscal year 2019, the rates generally increased for not mission capable depot (NMCD), not mission capable maintenance (NMCM), and not mission capable supply (NMCS). According to officials, a November 2018 update to the approach to calculating the mission capability data for this aircraft resulted in this decrease in the NMCM rate and increase in the NMCS rate. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2018, the MV-22B's total O&S costs more than doubled, as the number of aircraft increased from 124 to 284. Additionally, in 2017 the Navy implemented a new aircraft retrofitting program that modifies the aircraft's configuration to address reliability or safety concerns. This program resulted in increased costs in the continuing system improvements category, specifically in fiscal year 2018. Joint Program Office officials noted that this reconfiguration does not result in immediate improvements to reliability, but is expected to help in the future. Maintenance costs increased each year and accounted for 50 percent of the total O&S costs from fiscal years 2011 through 2018, averaging about $568 million per year. Depot-level reparables was the most significant category of maintenance costs, averaging $231 million per year during the same time period.

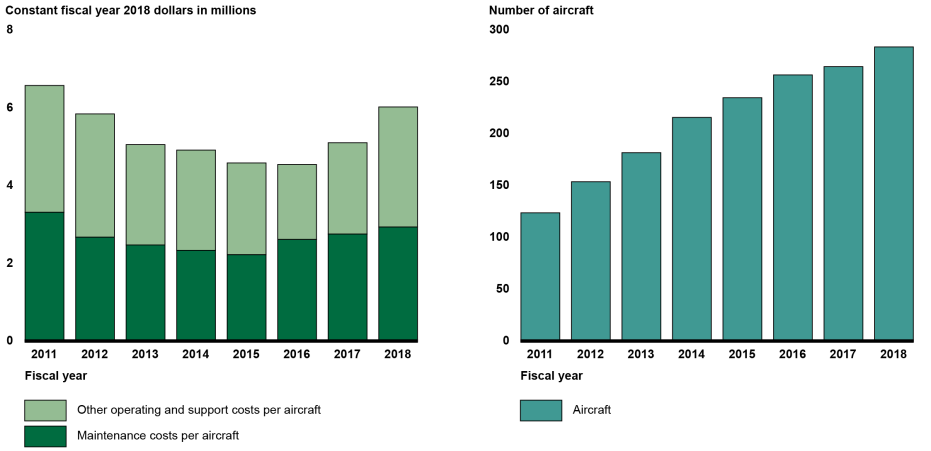
MV-22B Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

The MV-22B's total O&S costs per aircraft decreased steadily from fiscal year 2011 through fiscal year 2016 before increasing in fiscal years 2017 and 2018. Specifically, O&S costs per aircraft increased from $4.54 million in fiscal year 2016 to $6.04 million in fiscal year 2018, while the mission capable rate decreased. According to officials, this increase is a result of additional demand for aircraft propeller blades in fiscal years 2017 and 2018, which had increased in price by 209 percent. Maintenance costs per aircraft, on average, accounted for about half of the total costs per aircraft, averaging about $2.7 million per year from fiscal years 2011 through 2018. Additionally, the number of aircraft more than doubled, from 124 aircraft in fiscal year 2011 to 284 aircraft in fiscal year 2018, with a planned fleet size of 360 MV-22Bs by fiscal year 2024.

MV-22B Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Aging: As the MV-22B ages and more aircraft undergo depot-level maintenance, officials are finding more evidence of corrosion. Officials told us that they have developed a corrosion roadmap that allows them to discover where corrosion is present, and that they have involved original equipment manufacturing partners in finding and repairing corroded parts. As a result, the Joint Program Office released about 12 technical directives to repair and prevent corrosion. According to Joint Program Office officials, the benefits of these improvements are starting to reduce the rate of corrosion-related failures and removals. Further, according to officials, they are currently working on developing additional repairs so that the entire fleet is not affected by these corrosion issues.

Maintenance: An independent review of the Osprey program found that the MV-22B currently has too many configurations—over 70 in total—for the Joint Program Office to maintain adequately and consistently. To mitigate this issue, the Joint Program Office plans to reduce the number of configurations and ultimately achieve a common configuration, which officials hope will result in less time spent on unplanned maintenance and inspections. The first aircraft to undergo reconfiguration will be completed in fiscal year 2020. The MV-22B also faces maintenance issues related to technical data gaps. For example, according to officials, non-standard, complex repairs require temporary engineering instructions. To mitigate this situation, officials told us that they had developed an engineering hotline and held daily engineering phone calls to reduce the amount of time it takes them to address maintenance issues, review outstanding engineering requests, and discuss next steps. According to Joint Program Office officials, this has resulted in a reduction of average turnaround time by approximately 50 percent for temporary engineering instructions, thereby reducing data gaps. The Joint Program Office officials also stated that they are addressing the technical data gaps by delivering 170 Structural Repair Manuals over the next 5 years to reduce fleet demand and improve repair turnaround time. The joint program office has also begun an aircraft preservation program to help reduce the number of aircraft deemed not mission capable due to maintenance. For example, according to officials, when MV-22B aircraft are not in use, they will be preserved in a mission capable state until needed, thereby reducing the amount of damage caused by environmental factors such as humidity and reducing the amount of time to fix any issues. Lastly, the Joint Program Office stated that it has awarded a Performance Based Logistics and Engineering (PBL&E) contract that directly incentivizes industry to align with fleet goals of reducing the number of "long-term down" aircraft and reduce NMCM rates. According to the Joint Program Office, the PBL&E contract also incentivizes rapid engineering responses, which should improve mission capable rates by reducing time spent awaiting maintenance, eliminating technical data gaps, and informing root cause and corrective actions. According to the Joint Program Office, these efforts resulted in the number of MV-22B "long-term down" aircraft being reduced from 66 to 33 in 2019.

Supply Support: The MV-22B has experienced spare parts availability issues, which officials are working to mitigate in several ways. For example, Joint Program Office officials told us that they designed a semi-annual program with Navy Supply Systems Command to discuss problem components and try to resolve the major issues. The Joint Program Office also reported pursuing initiatives such as working with Navy Supply Systems Command and the Defense Logistics Agency to award contracts incentivizing materiel availability. For example, according to Joint Program officials, they plan to implement a performance-based contract with Bell-Boeing in 2019 to incentivize meeting-expedited delivery times. In addition, officials reported that the Defense Logistics Agency has initiatives underway to rectify incorrect part identification numbers so that the correct parts are ordered at the correct rate.

Program Office Comments

In commenting on a draft of this assessment, the Joint Program Office stated that its efforts initiated in fiscal years 2018 and 2019 to accelerate readiness recovery produced results in fiscal year 2019 and will continue to improve readiness. Specifically, the Joint Program Office stated that the MV-22B in fiscal year 2019 was able to increase its flight hours over fiscal year 2018 and meet the fiscal year 2019 flight hour goal. The Joint Program Office noted that the improvements it has made should continue to result in improved MV-22B readiness rates in the years to come.

Source: U.S. Marine Corps/Staff Sgt. Donald Holbert. | GAO-21-101SP

Program Essentials

Manufacturer: Bell Helicopter Textron Inc.

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers, Bell, and Tobyhanna Army Depot; and field maintenance conducted by Marine Corps maintainers

Program Office: Program Manager – Air 276, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 6.9 years

Average lifetime flying hours: 1,389 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The UH-1Y is experiencing maintenance and supply challenges. The Marine Corps' mitigation actions include reducing unscheduled maintenance, reducing the fleet size, and improving supply chains.

UH-1Y Venom Sustainment Quick Look

Common Name: UH-1Y
Lead Service: Marine Corps

Background

The UH-1Y Venom is a combat assault support, airborne command and control, search and rescue, and special operations support rotary aircraft first manufactured in 2006. It is designed with a four-bladed composite rotor system and integrated digital cockpit, and it provides heavy load carrying ability.

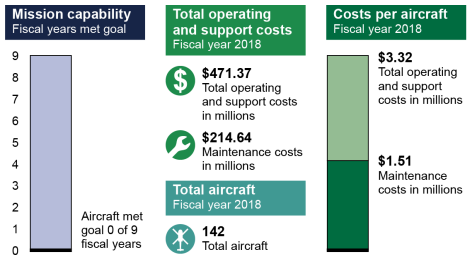
Life Cycle of the UH-1Y

Source: GAO analysis of Navy data. | GAO-21-101SP

Overview

The UH-1Y did not meet its mission capable goal in any year from fiscal year 2011 to fiscal year 2019. Specifically, in fiscal year 2019, the UH-1Y fleet did not meet its mission capable goal due to depot, maintenance, and supply issues. Unavailability due to depot, maintenance, and supply issues increased from fiscal year 2011 fiscal year 2019 because, according to officials, squadrons are not manned or equipped with spare parts to support the inventory of aircraft. Additionally, operating and support (O&S) costs per aircraft generally remained steady, with an increase from about $3.18 million in fiscal year 2011 to $3.32 million in fiscal year 2018. According to officials, the increase was due to the costs associated with the upgrade from the older UH-1N aircraft to the newer UH-1Y aircraft, which was completed in 2018.

UH-1Y Sustainment Status



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Strategy

- The H-1 – Acquisition Category 1C Life-Cycle Sustainment Plan (2016) provides the overall framework for the sustainment of the UH-1Y throughout its life cycle. This plan documents the program's integrated product support plan and total life-cycle support management strategy.
- The Marine Light Helicopter Independent Readiness Review (2017) describes UH-1Y readiness and sustainment issues and identifies recommendations to mitigate challenges.
- Marine Corps field maintainers maintain the UH-1Y at the squadron level. The Navy Fleet Readiness Center - East conducts depot maintenance under a planned interval of 54 months. Naval Supply Systems Command and Defense Logistics Agency provide supply chain management.
- The Naval Supply Systems Command entered into a performance-based logistics contract with Bell Helicopter Textron beginning in fiscal year 2020 to provide timely, cost-effective repairs as well as supply support.

Availability and Condition

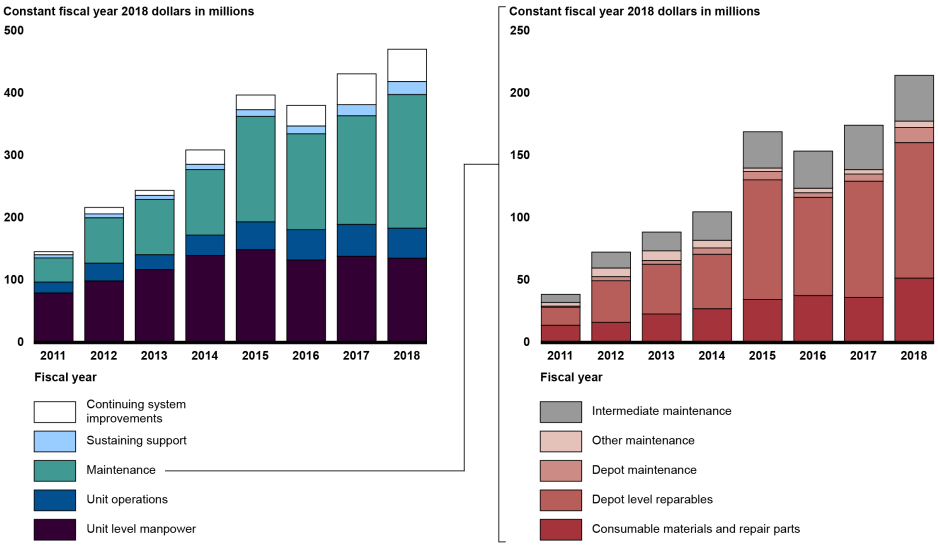
From fiscal years 2011 through 2019, the UH-1Y generally experienced a decreasing mission capable rate and did not meet its mission capable goal in any year during this time period. According to officials, the UH-1Y is missing its goals because there are too many aircraft—approximately 25 percent more than the normally authorized allowance—that need to be maintained when compared to the amount of maintainers and supply support, which leads to fewer mission capable aircraft.

From fiscal year 2011 through fiscal year 2018, the not mission capable maintenance (NMCM) rate increased and the not mission capable supply (NMCS) rate decreased. Officials stated that the increase in the NMCM rate between fiscal years 2011 and 2018 was due to a high rate of unscheduled maintenance, inadequate maintainer training and not enough maintainers, and other poor maintenance practices—such as insufficient preventive maintenance and corrosion control—that sacrifice long-term sustainment for meeting flight schedules. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

For fiscal years 2011 through 2018, the UH-1Y's total O&S costs increased as the mission capable rate decreased. According to officials, O&S costs increased because the UH-1Y inventory went up from 46 aircraft in fiscal year 2011 to 142 aircraft in fiscal year 2018 as squadrons transitioned from the older UH-1N aircraft to the newer UH-1Y aircraft—which began in 2007 and concluded in 2017— and maintainers were trained on the new system. Maintenance costs, which increased from about $38.94 million in fiscal year 2011 to about $214.64 million in fiscal year 2018, accounted for the largest share of O&S costs over the period. Depot-level reparables was the most significant category of maintenance costs, at about $108.77 million in fiscal year 2018. Depot-level reparable costs were higher at the end of the time period due to an increasing number of repair demands and an increase in the cost of parts, according to program officials.

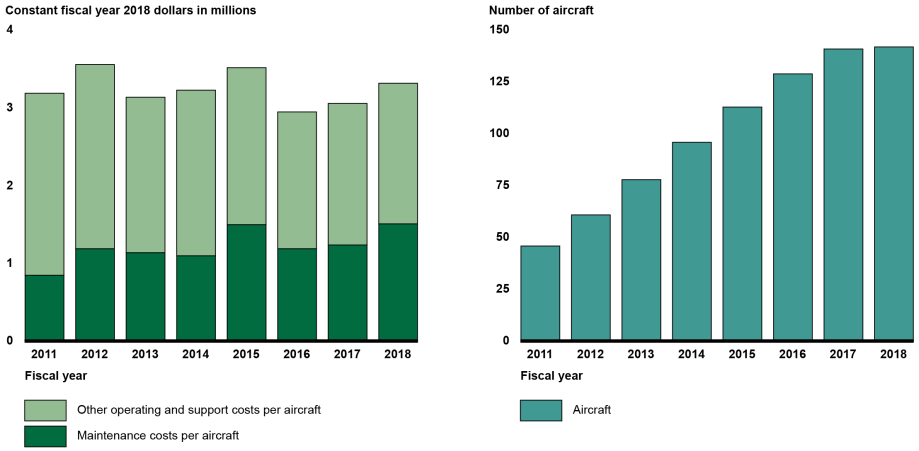
UH-1Y Total Operating and Support Costs



Source: GAO analysis of Navy data. | GAO-21-101SP

From fiscal year 2011 through fiscal year 2018, the UH-1Y'sO&S costs per aircraft remained steady, averaging about $3.25 million per year, while the mission capable rate decreased. Also, maintenance costs per aircraft, on average, accounted for more than one-third of total O&S costs per aircraft, averaging about $1.21 million per year. According to officials, this was a result of increase in the number of depot reparable demands and an increase in the cost of parts. Additionally, as noted previously, the UH-1Y fleet increased by 96 aircraft, from 46 aircraft in fiscal year 2011 to 142 aircraft in fiscal year 2018.

UH-1Y Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Navy data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: The UH-1Y faces maintenance challenges related to a high rate of unscheduled maintenance and an inability to fully support current aircraft numbers at the squadron level. As a result, officials stated that unscheduled maintenance is driving the maintenance planning instead of the maintenance plans driving the maintenance workload. This reactive maintenance disrupts the scheduled maintenance plan and only leaves work hours available to complete the bare minimum maintenance to keep the aircraft flyable while deferring more in-depth maintenance work to later, according to officials. To mitigate this situation, officials told us that they are updating long-term maintenance processes, which include—but are not limited to—technical publication updates, an analysis of maintenance levels, improving maintainer technical knowledge, and the establishment of a corrosion prevention program. Further, the program office has established fleet support team site offices at each major H-1 location to assist the fleet with maintenance and troubleshooting discrepancies.

Supply Support: While NMCS rates decreased between fiscal year 2011 and 2018, the UH-1Y has experienced supply issues, which officials are working to mitigate in several ways. For example, program office officials told us that the number of aircraft at the standard squadron is approximately 25 percent above the normal authorized allowance—which is the number for which supplies are purchased; therefore, squadrons are unable to provide support for the excess aircraft. To mitigate this issue, officials told us they are working to adjust the fleet size by rotating the aircraft in and out of the fleet on a periodic basis to ensure that the squadrons do not have any overages they cannot support, and they have implemented the Light Attack Aircraft Management Plan to perform short- and long-term preservation to excess inventory, reducing workload to the fleet and burdens to the supply system. Further, to alleviate supply chain delays, the officials stated that the Navy Supply Systems Command entered into a performance-based logistics contract with Bell in December 2019 for rotors and drives components and the Defense Logistics Agency is planning to enter into a performance-based contract with Bell in late fiscal year 2020 for about 3,600 consumable items.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Air Force/Airman 1st Class Jennifer Zima. | GAO-21-101SP

Program Essentials

Manufacturer: Bell-Boeing Joint Program Office

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Centers – East and Southwest and field maintenance conducted by service maintainers

Program Office: V-22 Joint Program Office – Air 275, Naval Air Systems Command, Patuxent River, Maryland

Fiscal Year 2019 Data

Average age: 7.9 years

Average lifetime flying hours: 1,860 hours per aircraft

Depot maintenance activity and squadron locations:

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The CV-22 is experiencing maintenance and supply challenges. The Air Force's mitigation actions include purchasing retiring parts, establishing a common configuration for all CV-22 models, and improving supply chains.

CV-22 Osprey Joint Advanced Vertical Lift Aircraft Sustainment Quick Look

Common Name: CV-22
Lead Service: Air Force

Background

The CV-22 Osprey is a tiltrotor aircraft that was first manufactured as the Special Operation Forces variant of Marine Corps' MV-22B Osprey in 2005. The aircraft takes off vertically and, once airborne, the engine and prop rotors can rotate into a forward position. The CV-22 enables Air Force Special Operations Command aircrews to conduct long-range infiltration, exfiltration, and resupply missions at low altitudes.

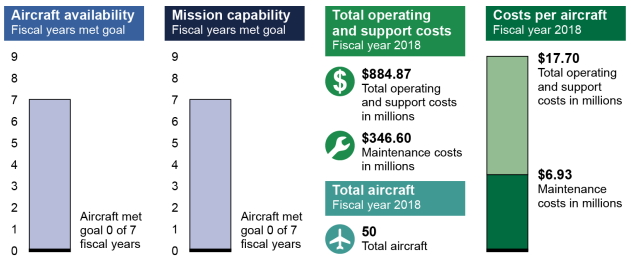
Life Cycle of the CV-22

Source: GAO analysis of Air Force data. | GAO-21-101SP

Overview

From fiscal years 2013 to 2019, the CV-22 fleet did not meet its aircraft availability or mission capable rate goals. In fiscal year 2019, the CV-22 fleet did not meet its goals due to maintenance and supply issues. Maintenance and supply issues were related to scheduled and unscheduled depot work, component unreliability, and increased inspection times, according to officials. Additionally, operating and support (O&S) costs per aircraft decreased from about $25.6 million in fiscal year 2011 to about $17.7 million in fiscal year 2018. According to officials, these costs decreased due to an increase in the size of the fleet from 18 to 50 aircraft.

CV-22 Sustainment Status



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Strategy

- The V-22 Joint Program Life-Cycle Sustainment Plan (2014) provides the overall framework for the sustainment of the CV-22 system throughout its life cycle. This plan documents the program's integrated product support plan and total life cycle support management strategy.

- The Joint Program Office manages the MV-22B for the Marine Corps, the CV-22 Osprey for the Air Force and United States Special Operations Command, and the CMV-22 for the Navy as they are similar systems. Bell-Boeing provides a portion of product support, such as on-site fleet support, in-service engineering support, and access to parts, among other things, through a performance-based logistics contract managed by the Joint Program Office.

- Air Force field maintainers maintain the CV-22 at the organizational and intermediate levels of maintenance. The Navy Fleet Readiness Centers conduct depot maintenance under a utilization-based maintenance induction schedule; aircraft are inducted for planned depot maintenance at approximately 1,680 flight hours. Naval Supply Systems Command and the Defense Logistics Agency provide supply support.

Availability and Condition

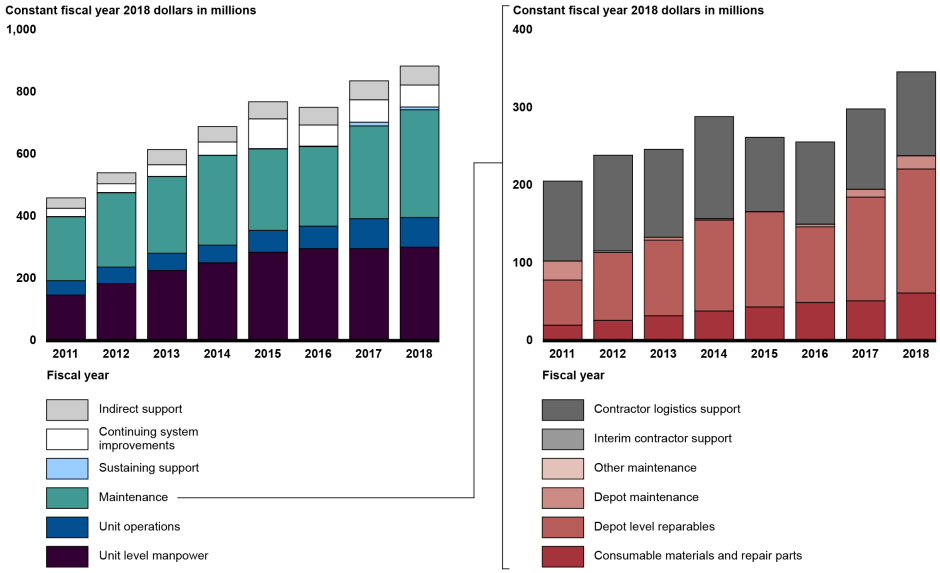
From fiscal year 2013 through fiscal year 2019, the CV-22 failed to meet its aircraft availability and mission capable rate goals. According to officials, the CV-22 missed its goals because of scheduled and unscheduled depot work, unreliability of wiring and components, and the length of time to conduct phase inspections. Additionally, over time the aircraft availability and mission capable goals slightly decreased due to a decrease in requirements, according to officials.

From fiscal year 2011 through fiscal year 2019, the rates increased for not mission capable maintenance (NMCM) and not mission capable both (NMCB) maintenance and supply, while the not mission capable supply (NMCS) rate generally stayed constant. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2018, the CV-22's total O&S costs nearly doubled. According to officials, this increase can largely be attributed to the overall increase in the number of aircraft. Maintenance costs also increased by $140.8 million between fiscal year 2011 and 2018, accounting for about 40 percent of O&S costs over the period. Further, depot-level reparables, the most significant category of maintenance costs, increased from $58.14 million in fiscal year 2011 to $159.59 million in fiscal year 2018.

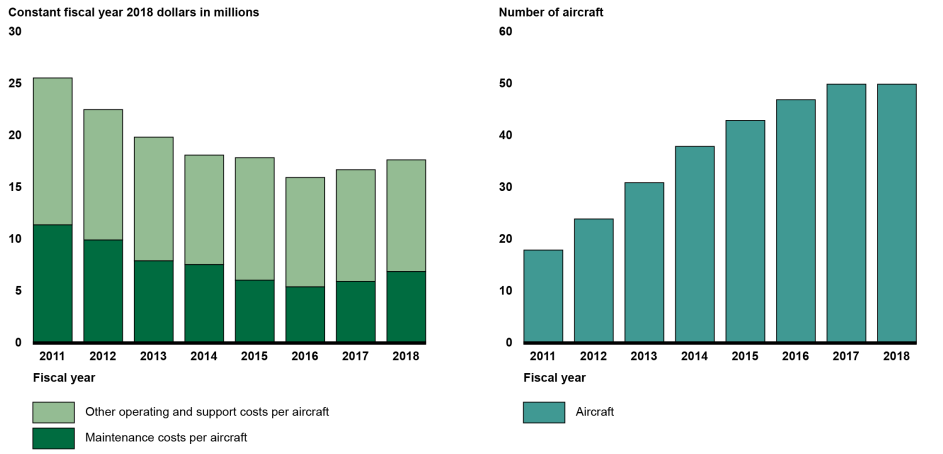
CV-22 Total Operating and Support Costs



Source: GAO analysis of Air Force data. | GAO-21-101SP

The CV-22's total O&S costs per aircraft decreased steadily from fiscal year 2011 through fiscal year 2016 before increasing slightly in fiscal years 2017 and 2018. Specifically, O&S costs per aircraft decreased from $25.60 million in fiscal year 2011 to $16 million in fiscal year 2016 and increased to $17.7 million in fiscal year 2018, while the mission capable rate varied. Maintenance costs per aircraft, on average, accounted for about 40 percent of the total O&S costs per aircraft from fiscal years 2011 through 2018, averaging about $7.68 million per year. Additionally, the number of aircraft more than doubled, from 18 aircraft in fiscal year 2011 to 50 aircraft in fiscal year 2019, with a total expected fleet of 52 aircraft.

CV-22 Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: According to Joint Program Office officials, the CV-22 currently has too many configurations—22 in total—for the Joint Program Office to maintain adequately and consistently. To mitigate this issue, the Joint Program Office plans to reduce the number of configurations and ultimately achieve either a common configuration or a minimal number of configurations, which officials hope will result in less time spent on unplanned maintenance and aircraft inspections. The full completion of the initiative is planned for fiscal year 2027. Further, officials told us that the configuration challenge affects depot maintenance times, which decreases availability. The Joint Program Office plans to mitigate this challenge through an aggressive modification program to achieve the common configuration. Joint Program Office officials also told us aircraft availability and mission capability have both been negatively affected by low reliability of wiring and other components. To address these issues, the Joint Program Office is working to fully fund the current and future corrective action plans and engineering proposals to improve the reliability of these components. Lastly, the Joint Program Office stated that it has awarded a Performance Based Logistics and Engineering (PBL&E) contract that directly incentivizes industry to align with fleet goals of reducing the number of “long-term down” aircraft and reduce the NMCM rate. According to the Joint Program Office, the PBL&E contract also incentivizes rapid engineering responses, which should improve mission capable rates by reducing awaiting maintenance time, eliminating technical data gaps, and informing root cause and corrective actions.

Supply Support: The CV-22 has experienced spare part availability issues due to the number of configurations for the aircraft, which officials are working to mitigate in several ways. For example, Joint Program Office officials told us that they are working to implement a common configuration, as stated above, which will reduce the demand on the supply system. The CV-22 has also experienced supply issues when the necessary parts were not readily available to install due to there being no previous demand for the specific part and issues with suppliers. The Joint Program Office plans to improve consumable and reparable material support for the fleet by having the Air Force and the Defense Logistics Agency partner to more accurately measure the need for specific parts to ensure the most needed parts are available for purchase. The Joint Program Office also reports pursuing a number of initiatives, such as working with Navy Supply Systems Command and the Defense Logistics Agency to award contracts incentivizing material availability. The CV-22 has experienced supply shortages after some manufacturers stopped making certain CV-22 parts. According to officials, the program office has purchased additional parts and developed incentives for manufacturers to help ensure there are sufficient parts to effectively maintain the fleet throughout its lifetime, among other things.

Program Office Comments

In commenting on a draft of this assessment, the Joint Program Office stated that its efforts initiated in fiscal years 2018 and 2019 to accelerate readiness recovery produced results in fiscal year 2019 and will continue to improve readiness. Specifically, the Joint Program Office stated that the CV-22 in fiscal year 2019 was able to meet the fiscal year 2019 flight hour goal. The Joint Program Office noted that the improvements it has made should continue to result in improved CV-22 readiness rates in the future.

Source: U.S. Air Force/Senior Airman Greg Nash. | GAO-21-101SP

Program Essentials

Manufacturer: United Technologies/Sikorsky Aircraft Company

Sustainment: Programmed depot maintenance is conducted by government and contractor personnel at various locations and field-level maintenance is performed by Air Force personnel

Program Office: Robins Air Force Base, Georgia

Fiscal Year 2019 Data

Average age: 27.5 years

Average lifetime flying hours: 7070.5 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The HH-60G faces several maintenance and supply challenges, such as prolonged depot maintenance timelines and malfunctioning parts. Mitigation actions include improving the planning of depot maintenance and coordinating across the military on supply support issues.

HH-60G Pave Hawk Sustainment Quick Look

Common Name: HH-60G
Lead Service: Air Force

Background

The HH-60G Pave Hawk is a twin engine helicopter first manufactured in 1982. Its primary mission is to conduct day or night personnel recovery operations into hostile environments to recover isolated personnel during war. The HH-60G is also tasked to perform military operations other than war, including civil search and rescue, medical evacuation, disaster response, and humanitarian assistance.

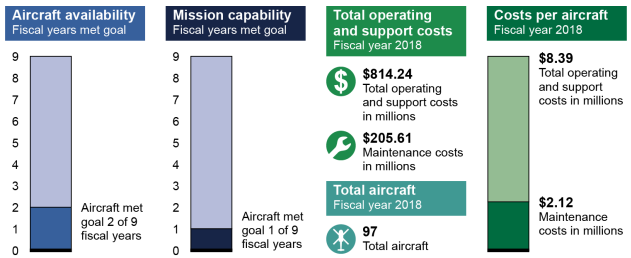
Life Cycle of the HH-60G

Source: GAO analysis of Air Force data. | GAO-21-101SP

Overview

The HH-60G fleet met the Air Force's aircraft availability goals in two years from fiscal years 2011 through 2019 and met the mission capable goal in one of those years. However, in fiscal year 2019, the HH-60G did not meet its aircraft availability goal or mission capable goal. From fiscal year 2011 through fiscal year 2018, total operating and support (O&S) costs for the HH-60G fleet decreased by $169.60 million, from $983.84 million to $814.24 million. Over the same 8-year period, the HH-60G fleet size decreased from 99 to 97 aircraft, including two test aircraft in fiscal year 2018, according to Air Force officials. The total O&S costs per aircraft decreased from $9.94 million in fiscal year 2011 to $8.39 million in fiscal year 2018, while the maintenance costs per aircraft increased slightly from $2.08 million to $2.12 million during the same timeframe.

HH-60G Sustainment Status



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Strategy

- The March 2017 HH-60G Weapon System Life-Cycle Sustainment Plan Version 1.0 Supporting Operations and Support Phase outlines the sustainment strategy for the legacy HH-60G weapon system. According to the plan, the basic H-60 helicopter is operated by the Air Force, Army, Navy, and Coast Guard, and those services, in addition to contractors, all play a role in HH-60G sustainment. According to Air Force officials, the HH-60G fleet is sustained through scheduled inspections, field and depot technical assistance requests, and programmed depot maintenance (performed every 6.5 years). Additionally, these officials stated that structural, maintenance, reliability, and diminishing manufacturing sources and material shortages modifications are made to the aircraft.

- Programmed depot maintenance is conducted by government and contractor personnel at Corpus Christi Army Depot, Navy Fleet Readiness Center Southeast, and Korean Air Lines, among other locations. Field-level maintenance is performed by Air Force, Air Force Reserve Command, and Air National Guard personnel. Supply support is managed by the Air Force Sustainment Center, Army Materiel Command, Naval Air Systems Command, and the Defense Logistics Agency. Officials explained that the Air Force plans to end HH-60G programmed depot maintenance inductions in fiscal year 2020 due to planned aircraft retirements and deliveries of the replacement aircraft (the HH-60W).

Availability and Condition

The HH-60G fleet met the Air Force's aircraft availability goals in two years during fiscal years 2011 through 2019 and met the mission capable goal in one year. According to Air Force officials, the low HH-60G availability rate was largely a result of a smaller fleet size than originally planned due to operational losses from aircraft mishaps. Specifically, the HH-60G program of record was 112 aircraft, but the aircraft inventory was between 99 and 97 in fiscal years 2011 and 2018, including two test aircraft in fiscal year 2018, which reduced the program's ability to achieve the availability rate goal. Air Force officials said that the two test aircraft were a part of their operational loss replacement program. The officials told us that the decline in availability was also a result of increased downtime stemming from the aircraft's heavy modification schedule and depot performance issues, among other reasons.[1]

The not mission capable for maintenance (NMCM) rate for the HH-60G fleet varied from fiscal years 2011 through 2019. The not mission capable for supply (NMCS) rate also varied. The not mission capable for both (NMCB) rate trended upwards from fiscal year 2011 to fiscal year 2019. According to Air Force officials, functional check flight delays—the flight required to assess the airborne function of certain repaired or replaced components—was the leading NMCM driver for the fleet. The officials said that functional check flights increased since fiscal year 2013 because the aging HH-60G is often used at its maximum gross weight, which causes airframe structural issues and cracking and additional maintenance to remove and reinstall components. Air Force officials also told us that the NMCS rate was higher in fiscal years 2016 through 2018 largely due to a problem with the aircraft's refueling probes. Unusual numbers of refueling probe oscillations began to occur in fiscal year 2011, with the most occurring in fiscal year 2015. The research and investigation of the problem took several years until the cause was identified in November 2015. According to program officials, fixing the problem required removing all affected refueling probes from the inventory and replacing them, with the last aircraft being repaired in December 2018. Officials noted that the HH-60G's main rotor blade was the largest NMCS driver in fiscal year 2019. Finally, the NMCB rate was higher in fiscal years 2016 through 2019 because of parts shortages that led to cannibalization (i.e., removing serviceable parts from one aircraft and installing them in another aircraft), according to Air Force officials. Data provided by these officials showed that the refueling probe and the main rotor blade were two examples of parts that were cannibalized due to shortages and that impacted the HH-60G's NMCB rate during those years. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

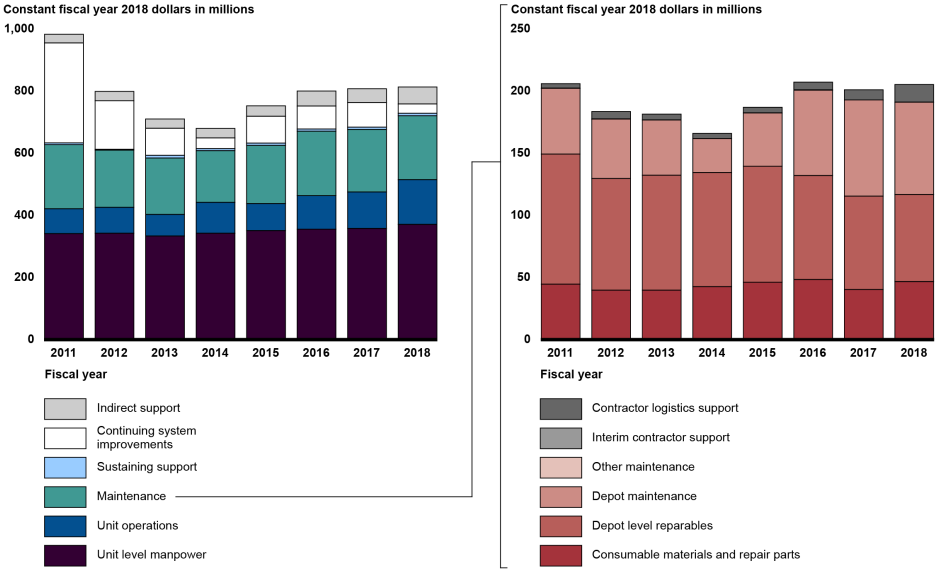
Operating and Support Costs

From fiscal year 2011 through 2018, the total O&S costs for the HH-60G fleet decreased by about $169.60 million, from $983.84 million to $814.24 million. When comparing the two fiscal years, most of the decrease was due to a reduction in costs for continuing systems improvements. Continuing system improvements were $292.13 million less

[1]GAO, *Military Readiness: Air Force Plans to Replace Aging Personnel Recovery Helicopter Fleet*, GAO-18-605 (Washington, D.C.: Aug. 16, 2018). We reported that HH-60G helicopters spent an average of 332 days undergoing depot level maintenance in fiscal year 2017 compared with 233 days in fiscal year 2007, more than a 40-percent increase. Air Force officials attributed these challenges to the helicopters exceeding their initially planned service life.

in fiscal year 2011 than in fiscal year 2018, but these costs were significantly higher in fiscal year 2011 than the other years in the time period. According to HH-60 program officials, seven major modifications were ongoing during fiscal year 2011, including a service life extension, a gun replacement, and the operational loss replacement program to restore the fleet's aircraft inventory. The $218.45 million spent on the operational loss replacement program in fiscal year 2011 was likely the primary reason why continuing system improvement costs were higher in fiscal year 2011, according to these officials. Maintenance costs were almost the same in fiscal years 2011 and 2018, $206.27 million and $205.61 million respectively. The remaining cost categories all increased during the 8-year period, with unit operations and unit-level manpower increasing the most, by $63.56 million and $29.85 million, respectively. Program officials noted that higher fuel costs and additional training requirements following significant Air Force-wide personnel cuts were two of the reasons for the higher unit operations costs.

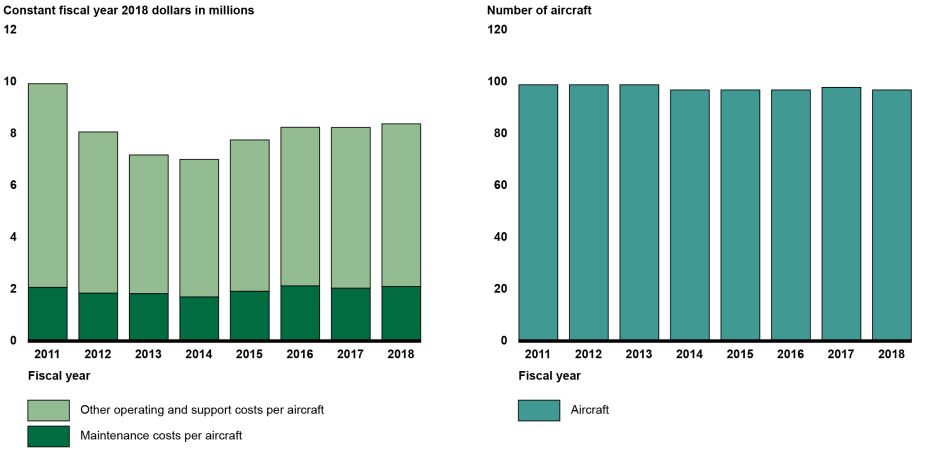
HH-60G Total Operating and Support Costs



Source: GAO analysis of Air Force data. | GAO-21-101SP

The total O&S costs per aircraft decreased from $9.94 million in fiscal year 2011 to $8.39 million in fiscal year 2018. Over the 8-year period, the HH-60G fleet size decreased—from 99 to 97 aircraft—and total O&S costs decreased by about $169.60 million, reducing the total O&S costs per aircraft. However, maintenance costs were almost the same in fiscal years 2011 and 2018, $206.27 million and $205.61 million, respectively. Therefore, maintenance costs per aircraft went up slightly, from $2.08 million to $2.12 million, when comparing those two fiscal years.

HH-60G Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Maintenance: For many years, the HH-60G program has had a higher rate of operational losses than Air Force officials said were planned, an average of one aircraft every 24 months. The ongoing operational loss replacement program will replace these aircraft by modifying UH-60L aircraft to the HH-60G configuration and will increase the fleet's aircraft availability rate. Air Force officials explained that two test aircraft were delivered in fiscal year 2018, 10 aircraft were delivered between July 2019 and March 2020, and nine aircraft are to be delivered by December 2020 under the operational loss replacement program. Also, functional check flights—the flights required to assess the airborne function of certain repaired or replaced components—have increased, and the delay in obtaining these functional flight checks has become leading NMCM driver for the aging HH-60G fleet, according to Air Force officials. To mitigate this issue, the officials said that they plan to perform an engineering analysis in fiscal year 2020 to determine what can be accomplished on the ground instead of during a flight. Air Force officials also told us that the HH-60G program faces challenges with downtime for modifications and programmed depot maintenance. To reduce the number of aircraft that are down for depot maintenance at one time, the officials said that they started to combine the installation of multiple modifications into blocks and manage the timing of scheduled depot inductions more effectively in fiscal year 2019. However, they found that depot induction schedule changes have increased field maintenance requirements with additional inspections and limited the ability of units to accurately plan flying hour and inspection schedules.

Supply Support: Air Force officials said that the aging fleet, the lack of vendors, and the lack of primary inventory control authority to manage HH-60G parts are several supply support challenges for the HH-60 fleet. The HH-60G program office is an active member of the Team Hawk working group, which works to help solve ongoing sustainment issues and to benefit from the other services' lessons learned, according to Air Force officials. They explained that the Team Hawk working group is a collaboration between the Air Force, Army, Coast Guard, Navy, and the H-60 original equipment manufacturer, to identify and solve sustainment challenges, discuss technical issues, classify risk areas, discuss and investigate collaboration opportunities, and identify parts obsolescence among key stakeholders. Further, HH-60 program officials said that they manage engineering services and reliability and maintainability contracts that give reach-back capabilities to manufacturers and small businesses to identify, study, and solve sustainment and engineering issues. Finally, they stated that an obsolescence/diminishing manufacturing sources and material shortages lead is assigned to the HH-60G program office to identify items with immediate or near-term obsolescence issues, assess the population of problem items, and prioritize the items that are most at risk for current and future readiness.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.

Source: U.S. Air Force/Senior Airman Jonathan McElderry. | GAO-21-101SP

Program Essentials

Manufacturer: Bell Helicopter/Textron, Inc.

Sustainment: Depot maintenance conducted at Navy Fleet Readiness Center – East and field maintenance conducted by contractors

Program Office: Air Force Life Cycle Management Center, Robins Air Force Base, Georgia

Fiscal Year 2019 Data

Average age: 47 years

Average lifetime flying hours: 14,900 hours per aircraft

Depot maintenance activity and squadron locations:

▲ Depot maintenance activity location
● Squadron location

Source: GAO. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

The UH-1N is experiencing many challenges related to its age. Officials told us plans to retire the aircraft beginning in 2022 will mitigate aging issues, with full retirement expected by 2032.

UH-1N Iroquois Aircraft Sustainment Quick Look

Common Name: UH-1N
Lead Service: Air Force

Background

The UH-1N Iroquois is a light-lift utility aircraft that was first manufactured in 1956 and last produced in 1974. The aircraft has a crew of three and is capable of flight in inclement weather and nighttime conditions. The UH-1N supports combatant command missions and enables Air Force aircrews to conduct airlifts of emergency security forces and distinguished visitors, and to conduct security and surveillance of off-base nuclear weapons convoys.

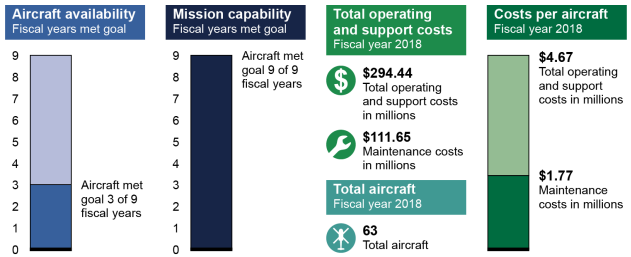
Life Cycle of the UH-1N

Source: GAO analysis of Air Force data. | GAO-21-101SP

Overview

The UH-1N fleet exceeded its mission capable goal in each year from fiscal year 2011 to fiscal year 2019, and exceeded its aircraft availability goal in three years during that same time period. In fiscal year 2019, the UH-1N fleet did not meet its aircraft availability goal, but exceeded its mission capable rate goal. Operating and support (O&S) costs per aircraft increased from about $3.89 million in fiscal year 2011 to about $4.67 million in fiscal year 2018 as a result of an increase in UH-1N maintenance costs.

UH-1N Sustainment Status



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Strategy

- The UH-1N Replacement Life-Cycle Sustainment Plan (2018) provides the overall framework for the sustainment of the UH-1N system and its replacement, the MH-139A. This plan documents the UN-1N program's product support and total life cycle support management strategies, and provides plans to sustain the UH-1N while it is being replaced— from 2022 through 2032.

- The program office extended its engineering services support contract with Bell Helicopter Textron, Inc. in December 2018 for the UH-1N fleet to provide engineering assistance with repair questions and modifications.

- The Navy Fleet Readiness Center – East conducts depot maintenance, and the Army is responsible for conducting depot-level maintenance on reparable components. Contractor field maintainers provide organizational and intermediate maintenance for the UH-1N at the squadron level. Army, Navy, Air Force, and Defense Logistics Agency item managers provide supply support.

Availability and Condition

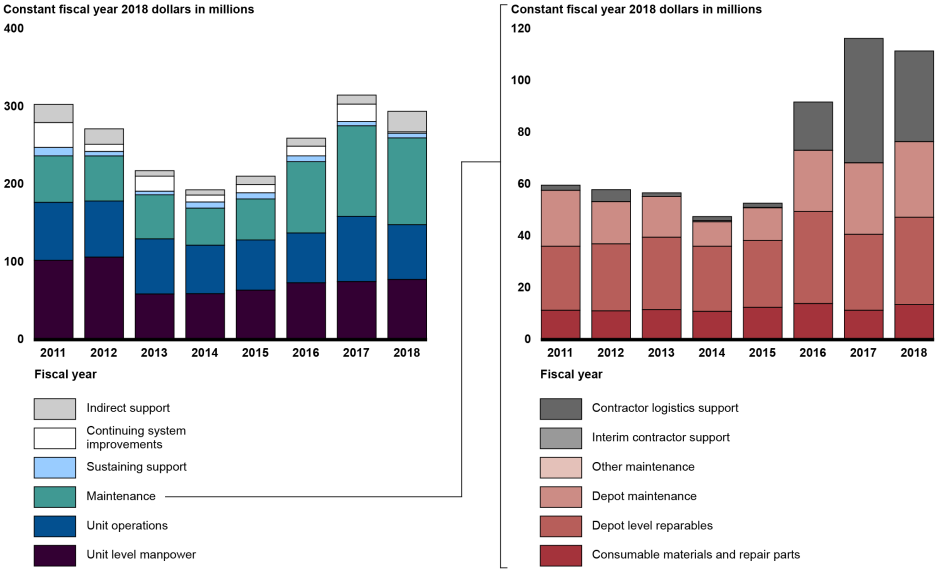
The UH-1N fleet exceeded its mission capable goal in each year from fiscal year 2011 to fiscal year 2019, and exceeded its aircraft availability goal in three years during that same time period.

From fiscal year 2011 through fiscal year 2019, the rates for not mission capable supply (NMCS) and both maintenance and supply (NMCB) stayed fairly constant, while the not mission capable maintenance (NMCM) rate slightly increased. According to officials, the NMCM rate increased due to increased times to remove and re-install components on aircraft due to the age of the aircraft. Specific details on mission capable and not mission capable rates were omitted because the information was deemed by DOD to be sensitive.

Operating and Support Costs

From fiscal year 2011 through fiscal year 2014, the UH-1N's total O&S costs decreased and then increased from fiscal year 2015 through fiscal year 2017, before slightly dropping again in fiscal year 2018. The increase in costs from fiscal year 2014 to fiscal year 2018 was primarily due to an increase in maintenance costs, from $47.65 million in fiscal year 2014 to $111.65 million in fiscal year 2018. According to officials, increases in costs also occurred due to errors in the Air Force Total Ownership Cost database that included TH-1H—an Iroquois training aircraft—engine repair contract costs, and other support costs with the UH-1N.

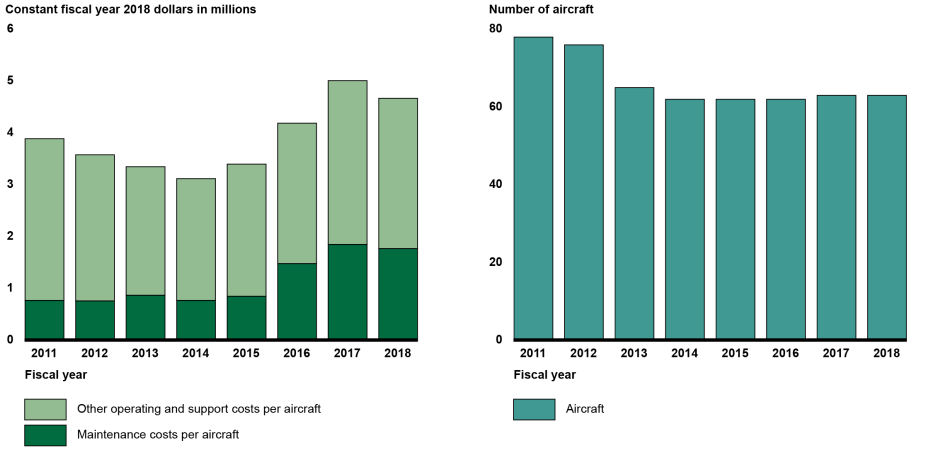
UH-1N Total Operating and Support Costs



Source: GAO analysis of Air Force data. | GAO-21-101SP

The UH-1N's total O&S costs per aircraft increased from $3.89 million in fiscal year 2011 to $4.67 million in fiscal year 2018. Specifically, O&S costs per aircraft decreased from $3.89 million in fiscal year 2011 to $3.12 million in fiscal year 2014. Since fiscal year 2014, O&S costs per aircraft increased to a high of $5.01 million in fiscal year 2017 before decreasing slightly to $4.67 million in fiscal year 2018. This increase was largely attributable to an increase in maintenance costs, specifically contractor logistics support, depot-level reparables, and depot maintenance. Maintenance costs per aircraft were generally stable from fiscal year 2011 through fiscal year 2015, averaging about $0.81 million per year before increasing to an average of $1.7 million from fiscal year 2016 through fiscal year 2018. As previously discussed, according to officials, increases in costs occurred because of errors in the Air Force Total Ownership Cost database that included TH-1H—an Iroquois training aircraft—engine repair contract costs and other support costs with the UH-1N. Additionally, the number of aircraft decreased from 78 aircraft in fiscal year 2011 to 63 aircraft in fiscal year 2018, as the aircraft approaches its phased retirement beginning in 2022 and concluding in 2032. However, according to officials, TH-1H aircraft may have been captured in the number of aircraft, erroneously inflating the number of aircraft between fiscal years 2011 and 2013.

UH-1N Operating and Support Costs per Aircraft and Fleet Size



Source: GAO analysis of Air Force data. | GAO-21-101SP

Sustainment Challenges and Mitigation Actions

Aging: According to officials, the age of aircraft components and high number of usage hours has created additional maintenance to remove or reinstall components, which has led to an increase to NMCM time. Further, the Air Force is currently buying over 150 new main rotor blades due to the aging-related high failure rate on the repair line, which negatively impacts the mission capable and aircraft availability rates, according to officials.

Maintenance: According to officials, the aging fleet and lack of repair of UH-1N components has led to maintenance sustainment challenges and unpredictable aircraft schedules. This has prevented units from being able to accurately plan flying hour and inspection schedules, which has resulted in last-minute changes and an increase in unit maintenance. Additionally, officials stated that the main rotor blade replacements have increased NMCM time due to the requirement for a functional check flight prior to returning aircraft to mission capable status.

Supply Support: According to officials, Defense Logistics Agency parts shortages and tester issues have not allowed the Air Force to keep up with transmission parts demands for the UH-1N. Further, there have also been transmission supply shortage issues—which are repaired by the Army—for the Air Force.

To address sustainment challenges, the UH-1N program office continues to proactively work with the other services to improve the sustainment program across the common H-1 platform. According to officials, they monitor both internal and external sustainment providers to ensure issues are resolved as quickly as possible for minimal impact to overall aircraft availability. For example, one of the supply partners was unable to deliver enough rotor blades. As a result, the services authorized pulling blades from the aircraft in storage to prevent a gap in support until the new blades were delivered. Officials also said that the program office is executing an obsolescence program to minimize costs and offset detrimental sustainment impact, which includes meetings to discuss sustainment issues as they arise.

Program Office Comments

In commenting on a draft of this assessment, the program office provided technical comments, which we incorporated where appropriate.