

NOT FOR PUBLICATION UNTIL RELEASED BY THE
SENATE ARMED SERVICES COMMITTEE
SEAPOWER SUBCOMMITTEE

STATEMENT OF

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DIRECTOR AIR WARFARE

BEFORE THE

SEAPOWER SUBCOMMITTEE

OF THE

SENATE ARMED SERVICES COMMITTEE

ON

DEPARTMENT OF THE NAVY AVIATION PROGRAMS

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INTRODUCTION

Mr. Chairman, Ranking Member Hirono and distinguished members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Department of the Navy's (DoN) Fiscal Year (FY) 2020 aviation programs. Our budget request aligns to the current National Defense Strategy where great power competition remains the central challenge to U.S. prosperity and security. A resurgent Russia and a rapidly growing China continue their aims to displace American influence from critical regions around the globe, undermine our alliances, and coerce our regional allies and partner nations. Both nations, and their proxies, are attempting to challenge us in all warfighting domains, none greater than on the seas and in the air.

Our FY 2020 budget request recognizes that we are still emerging from a period of strategic and resource atrophy instilled under the Budget Control Act (BCA). Sequestration budget caps resulted in a significant erosion of readiness and the loss of some of our competitive military advantage. To address the challenges of great power competition, and overcome the results of the BCA, we require predictable and on-time budgets commensurate with the challenges we face together as a nation. Receipt of an on-time budget in FY 2019 was extremely helpful and most appreciated by the Department. Budgets commensurate with sequestration caps would only undermine the progress we have made and inflict significant damage to Naval Aviation; the return to Continuing Resolutions would only add instability and induce higher programmatic and warfighting risks.

Our FY 2020 investments are focused, balanced and prioritized to deliver a ready, capable, global sea-based and expeditionary force. We request your support for the continued transition of the major components of the Carrier Air Wing (CVW), Expeditionary Strike Group, Amphibious Ready Group, and land-based Expeditionary Wings. We appreciate the support of Congress to help us improve our readiness posture and ask for your continued support as we expand on the assimilation and teaming of manned and unmanned systems and further mature the integration of advanced platforms, sensors, networks, electromagnetic spectrum, and strike weapons that provide the necessary military advantage over those challenging the global posture.

China is innovating faster than we are and fielding significant warfighting capabilities. To address the pace at which they are progressing we cannot continue to develop weapon systems under a procurement acquisition system with its foundations from the Cold War (or

earlier). We appreciate your continued support for the use of accelerated acquisition authorities Congress provided under the FY 2017 National Defense Authorization Act. While we are still maturing the use of these authorities, we have seen positive results of accelerated acquisition processes. We developed and fielded an Early Operational Capability of the Long-Range Anti-Ship Missile in approximately four and one-half years as compared to eight years (or longer) under traditional processes. Furthering that success, we are developing MQ-25A as a maritime accelerated acquisition program and the Next Generation Jammer Low Band is being considered for a Middle Tier (Section 804) program.

Mr. Chairman, we are planning for a strategic environment that continues to be complex, uncertain, and technologically advanced. Our National Defense Strategy directs the development and operations of a more lethal and ready force, prepared to defeat adversaries in high-end combat. With the proliferation of modern conventional and cyber weapons, from both state and non-state actors, we anticipate continued challenges to our global influence across a large operational continuum. But with the sustained support of Congress, we can continue progressing along the path that addresses these needs, restores our competitive naval advantage, enhances global deterrence, and ensures Naval Aviation remains uncontested in an increasingly complex global security environment.

TACTICAL AVIATION

Strike Fighter Inventory Management Overview

The Naval Aviation Enterprise continues to actively manage strike fighter inventory challenges. However, the key enabler will be stable, on-time funding over multiple years to achieve the desired results.

The FY 2020 request continues the Department's momentum in reducing strike fighter inventory shortfall with procurement of 10 F-35Bs, 20 F-35Cs, 24 FA-18E/F Block III Super Hornets and additional aircraft across the Future Years Defense Program. In tandem with these procurements, Service Life Modernization initiatives and capability upgrades enhance our inventory by maintaining the tactical relevance of the F/A-18 E/F and legacy F/A-18 A-D aircraft.

The Navy continues its accelerated divestiture of legacy Hornets with the last fleet and training squadron completing transition to F/A-18E/F in 2019, followed by the Reserve component in 2025. To maximize the overall readiness capacity of the Department, F/A-18 A-D aircraft will be transferred to the Marine Corps, the Naval Aviation Warfighting Development Center and Naval Reserves. Based on operational and flight test requirements, the Department will maintain a portion F/A-18 A-D aircraft for the Marine Corps and Navy test squadrons through 2030.

F-35 Joint Strike Fighter

The F-35 Lightning II will form the backbone of U.S. air combat superiority for decades to come. Whether the mission requires the execution of strike, close air support, counter air, escort, or suppression of enemy air defenses, both the F-35B and F-35C are vital to our future as they become the lethal cornerstone of our naval air forces. The Navy and Marine Corps will transition 25 squadrons over the next 10 years as we replace our aging legacy fleet.

The Marine Corps has already established one Fleet Replacement Training Squadron, one operational test squadron, and three operational line squadrons, with USMC F-35Bs already operating in support of two different Marine Expeditionary Units/ Amphibious Readiness Groups from Amphibious Assault Ships (LHDs). The Navy declared F-35C Initial Operating Capability (IOC) in February 2019. Continuing to deliver this transformational capability to Navy and Marine Corps front-line forces as soon as possible remains a top priority.

The DoN is committed to reducing F-35 costs. The Department's goal is to reduce the flyaway cost of the Marine Corps F-35B to be no greater than \$104 million dollars and the Navy F-35C cost to be no greater than \$98 million dollars no later than Low Rate Initial Production (LRIP) Lot 14. We are also working to decrease operation and sustainment costs by 27 percent over current projections.

The baseline program has delivered over 250 aircraft to test, operational, and training sites (all variants). The F-35 program continues to mature with base stand-up, sustainment of fielded aircraft and maturation of the global sustainment enterprise.

The FY 2020 President's budget requests \$4.7 billion in Aircraft Procurement funds (APN) for 10 F-35B and 20 F-35C aircraft, modifications and spares.

F-35 Continuous Capabilities Development and Delivery (C2D2)

With the F-35 program soon closing Block 3F System Development and Demonstration, we must continue to modernize the aircraft with advanced capabilities to maintain the advantage over advancing adversary fighters and ground-based radar threats.

Towards that end, the Department restructured the original Block 4 Follow-on Modernization acquisition strategy into a more agile Continuous Capabilities Development and Delivery (C2D2) model. The C2D2 approach leverages commercial practices, develops capability in smaller, more easily managed increments, and accelerates delivery of warfighting capability. The approach also advances departmental goals of reducing C2D2 risk and lowering cost. In support of FY 2020 C2D2 ramp-up the DoN requests \$806.6 million in Research, Development, Test, and Evaluation funds (RDT&E).

F/A-18 A/B/C/D Hornet

Service Life Extension Program (SLEP) efforts extended the F/A-18 A-D beyond its original service life of 6,000 hours to 8,000 hours, and in select aircraft, up to 10,000 flight hours. Along with flight hour extensions, these aircraft require capability upgrades to maintain tactical relevance as the Marine Corps plans to fly a portion of the legacy F/A-18 A-D fleet through the FY 2030 timeframe to bridge the transition gap to an F-35B/F-35C fleet.

The FY 2020 budget requests \$228.8 million in APN to implement aircraft commonality programs, enhance capability, improve reliability, and ensure structural safety of the F/A-18 A-D inventory, and \$101.0 million for the continuation of the Hornet SLEP.

F/A-18E/F Super Hornet

The F/A-18E/F Super Hornet will be the numerically predominant aircraft in CVWs into the 2030s. Continued investment in new aircraft, capability enhancements and flight hour extensions significantly improves CVW lethality.

In the second year of what will be a 72 aircraft Multi-Year Procurement (MYP), the FY 2020 President's Budget requests \$1.80 billion in APN for procurement of 24 F/A-18E/F Block III Super Hornet aircraft and \$201.5 million of RDT&E for improvements, RADAR upgrades and Block III development.

AV-8B Harrier

The FY 2020 budget requests \$27.4 million in RDT&E funds to continue design, development, integration and test of platform improvements. These improvements include continuation of an Engine Life Management Program, Escape System upgrades, Joint Mission Planning System updates, Link-16 Digital Interoperability (DI) integration, Operational Flight Program block upgrades (mission and communication systems), navigation improvements, weapons carriage updates, countermeasure improvements, and updates to an Obsolescence Replacement/Readiness Management Plan.

The FY 2020 budget also includes \$39.5 million in APN to continue the incorporation of Obsolescence Replacement/Readiness Management Plan systems, electrical and structural enhancements, LITENING Pod upgrades, F402-RR-408 engine safety and operational changes, DI upgrades that include Link 16, and inventory sustainment and upgrade efforts to offset obsolescence and attrition.

Next Generation Air Dominance (NGAD) Family of Systems

The Department is continuing a Next Generation Air Dominance (NGAD) Analysis of Alternatives (AoA) to address the anticipated retirement of the F/A-18E/F and EA-18G aircraft in the 2030s.

The Joint Chiefs of Staff approved the Initial Capabilities Document that frames NGAD study requirements to support the full range of military operations from carrier-based platforms. The AoA is considering the widest possible range of materiel concepts while balancing capability, cost/affordability, schedule, and supportability. It will assess manned and unmanned approaches to fulfill predicted 2030+ mission requirements. Analyses will consider baseline programs of record (current platforms), evolutionary or incremental upgrades to baseline programs (including derivative platforms), and new development systems or aircraft to meet identified gaps in required capability. We anticipate the NGAD AoA to report out during FY 2019.

AIRBORNE ELECTRONIC ATTACK (AEA)

EA-18G Growler

The EA-18G Growler is a critical enabler for the Joint force as it brings fully netted electronic warfare capabilities to the fight, providing essential capabilities in the Electromagnetic Maneuver Warfare environment.

The EA-18G program will complete deliveries in July 2019 bringing the total procurement quantity to 160 aircraft. This fulfills current Navy requirements for AEA for nine CVWs and five expeditionary squadrons plus one reserve squadron. The FY 2020 President's Budget requests \$143.6 million of RDT&E for additional modernization to ensure the EA-18G maintains its edge in the electromagnetic spectrum by providing robust sensing and engagement capabilities.

Next Generation Jammer (NGJ)

The NGJ is the follow-on to the legacy AN/ALQ-99 initially fielded in 1971 and is critical to the Navy's maritime fight. As adversaries continue to make significant investments to improve their Electronic Warfare capabilities, the Navy must be able to counter these threats to maintain its operational advantage. The ALQ-99 has reached capability limits both technologically and materially and is challenged against modern radar threats and communication systems. NGJ is a critical capability designed to address dynamically evolving threats and provides Navy Carrier Strike groups and the Joint force with the capabilities to achieve Electromagnetic Spectrum superiority. NGJ will maximize the survivability and lethality of the Navy's 4th and 5th generation aviation platforms and strike weapons and support all Services and joint/coalition air, land, and sea tactical strike missions.

NGJ will be implemented via three separate programs: Mid-Band (formerly known as Increment 1); Low-Band (formerly known as Increment 2); and High-Band (formerly known as Increment 3). NGJ Mid-Band is currently in the Engineering and Manufacturing Development phase. Despite a delay due to a required pod structure redesign effort to meet air worthiness requirements, a collaborative government/industry effort completed the structure redesign in June 2018, and the program is scheduled to IOC in FY 2022.

Our FY 2020 budget requests \$524.3 million in RDT&E for delivery of Engineering Development Models, developmental flight testing, and procurement of System Demonstration Test Articles. We also request \$111.1 million in RDT&E to complete the NGJ Low-Band ‘Demonstration of Existing Technologies’ effort and commence a follow-on development contract.

AIRBORNE EARLY WARNING AIRCRAFT

Airborne Early Warning Aircraft

The E-2D Advanced Hawkeye (AHE) is the Navy’s carrier-based Airborne Early Warning and Battle Management Command and Control aircraft. The E-2D AHE provides Theater Air and Missile Defense capabilities and is a cornerstone of the Naval Integrated Fire Control system of systems enhancements.

The FY 2020 President’s Budget requests \$232.8 million in RDT&E to continue the Navy’s modernization priorities, to include, Naval Integrated Fire Control development and test, Theater Combat ID and National Technical Means integration, ALQ-217 Electronic Support Measures and Survivability updates, Cyber Protection, Counter Electronic Attack, Secret Internet Protocol Router chat, Crypto Modernization/ Frequency Remapping, Multifunctional Information Distribution System/Joint Tactical Radio System Tactical Targeting Network Technology, Sensor Netting, and Data Fusion.

In the second year of what will be a 24 aircraft MYP contract covering FYs 2019-2023, the FY 2020 budget also requests \$934.7 million in APN for four Full Rate Production (FRP) Lot 8 aircraft and Advance Procurement for FY 2021 FRP Lot 9 aircraft.

ASSAULT SUPPORT AND LOGISTICS SUPPORT AIRCRAFT

Tilt-Rotor Aircraft (USMC MV-22 Osprey and Navy CMV-22B)

The FY 2020 President’s budget for the DoN V-22 program (MV-22 and CMV-22) requests \$185.1 million in RDT&E, \$993.8 million in APN for procurement of aircraft, and \$325.4 million in APN for modification of aircraft.

Marine Corps MV-22 Ospreys currently have a permanent presence in INDOPACOM, CENTCOM, and EUCOM supporting crisis response missions for AFRICOM. At any point, there are no less than five MV-22 squadrons deployed. Marine Corps is planning to procure an additional 16 aircraft through a five-year multi-year procurement package (FY2018-FY2022). The MV-22 readiness program, comprised of Common Configuration-Readiness and Modernization (CC-RAM) and nacelle improvements, is the MV-22 community's optimized plan to increase mission capable rates by 15 percent. The FY 2020 budget requests \$115.6 million in RDT&E for continued MV-22B development and product improvements, \$8.5 million to support advance procurement requirements and \$315.3 million for modifications, of which \$140.2 million is reserved for CC-RAM and \$33M for nacelle improvements.

The Navy is continuing development of Carrier On-board Delivery (COD) mission aircraft. The COD replacement program is leveraging prior Department MV-22 investment to recapitalize the legacy C-2 Greyhound fleet with CMV-22B tilt-rotor aircraft. Navy's CMV-22B aircraft require modifications to the baseline MV-22 design to better suit this platform for carrier operations. Those modifications include, greater fuel capacity in the fuselage and wings to allow the aircraft to carry up to 6,000 pounds for a distance of at least 1,150 nautical miles, beyond line-of-sight high frequency radio, public address system, improved fuel jettison system, improved cargo lighting system and integration of Operations and Safety Improvement Program (OSIP) capabilities. The FY20 President's Budget requests \$69.5 million in RDT&E for continued CMV-22B development, testing and product improvements; \$985.3 million in APN for procurement of 10 Lot 24 CMV-22Bs and long-lead materials for FY 2021 (Lot 25) aircraft; and \$10.1 million for readiness and interoperability OSIPs.

C-2A Greyhound

As the DoN recapitalizes the long-range aerial logistics support and COD capabilities with CMV-22B, the C-2A fleet will continue to provide critical COD support for operations worldwide until the FY 2024 timeframe. The FY 2020 budget request provides for \$15.8 million in APN and \$1.5 million in RDT&E to manage remaining C-2A aircraft mission systems obsolescence, including critical Center Wing Section repair kits to maintain sufficient capacity and readiness to safely complete the transition to CMV-22B.

CH-53K Heavy Lift Replacement Program

The FY 2020 President's Budget requests \$516.7 million in RDT&E to continue the CH-53K Engineering Manufacturing Development phase and \$1.0 billion in APN for procurement of six Lot 4 LRIP aircraft, including Advance Procurement and initial spares.

The need for a heavy lift replacement aircraft remains vital to supporting the Marine Corps in present and future warfighting concepts. In spite of the recent setbacks associated with the program's development – rate of closure in technical deficiencies – all of the technical deficiencies are solvable issues. To date, the CH-53K has flown more than 1,370 flight hours towards the completion of the program. It has also demonstrated the lifting of 36,000 lbs and operational gear like the Joint Light Tactical Vehicle. During FY 2020, the program will continue to execute developmental test flights including propulsion qualification, initial shipboard qualification, aerial refueling, hot/high altitude testing, structural loads demonstration, window/ramp guns testing and fire extinguishing system development.

CH/MH-53E

To keep the CH-53E and MH-53E viable through their remaining services lives, the FY 2020 President's Budget requests \$68.4 million (\$11.4 million MH-53E and \$57.0 million CH-53E) in APN and \$16.5 million (\$0.8 million MH-53E and \$15.6 million CH-53E) in RDT&E. The funding will provide for Condition Based Maintenance software upgrades, cockpit upgrades, Embedded Global Positioning System/Inertial Navigation System, T-64 engine reliability improvements, survivability upgrades, and Phase I of CH-53E's Degraded Visual Environment capability. These critical safety and avionics upgrades are essential to address obsolescence issues within the cockpit, increase overall situational awareness, and maintain mission effectiveness.

Maintenance on both variants of the H-53E becomes more challenging as they approach 30 years of service. Unprecedented operational demand of the CH-53E significantly impacted the material condition of DoD's only heavy lift assault support aircraft. This challenge has been significantly mitigated with the introduction and continued execution of the H-53 reset initiative. The purpose of reset is to return fully mission capable aircraft with zero discrepancies to the fleet and recover readiness. To date, 24 aircraft have completed reset and accumulated over 9,200 flight hours. Reset has also reduced both the cost per flight hour and maintenance man hours per

flight hour. Continued reset and sustainment initiatives are critical to the success of the CH-53E until its replacement, the CH-53K, is delivered to the fleet. The MH-53E will continue to perform its primary mission of airborne Mine Countermeasures as well as transport of cargo and personnel until it is replaced by the family of modular systems that comprise the Littoral Combat Ship (LCS) Mine Countermeasures Mission Package.

ATTACK AND UTILITY AIRCRAFT

AH-1Z/UH-1Y

The FY 2020 President's Budget requests \$114.1 million in APN and \$65.4 million in RDT&E for aircraft modernization efforts that will significantly increase relevance, safety, and lethality on the modern battlefield. The H-1 Upgrade Program completed procurement in FY 2019. Over a decade has passed since the initial fielding of the Venom and Viper. The fleet has significant obsolescence issues in software architecture, Aircraft Survivability Equipment (ASE), navigation equipment, Health and Usage Monitoring Systems, and weapons systems.

Previously funded hardware retrofits are currently underway for mission computers, ASE, and DI. Drivetrain and air vehicle improvements have improved reliability. The H-1 fleet is leveraging concurrent DI and weapons upgrade efforts across the Aviation Enterprise to provide initial LINK-16 and Joint Air-to-Ground Missile capabilities in FY 2020 and 2021 respectively. Additional efforts include EGI upgrade, Aircraft Network Switch, and Advanced Data Transfer System. Integrating and enabling the full capabilities of these systems requires an investment in software modernization and Ethernet backbone. The Marine Corps will seek future funding in support of these initiatives to secure battlefield relevance, lethality, survivability, and operational safety.

MH-60R/S

The FY 2020 President's Budget requests \$149.8 million in APN and \$19.2 million in RDT&E. APN funds support safety related systems improvements, corrections of deficiencies, warfighter upgrades, and obsolescence issues such as mission-computer modernization and procurement of kits for the Helmet Display Targeting System, Advanced Data Transfer System, Data Link, and VOR/ILS. RDT&E funding is requested to support developmental efforts that include MH-60S Service Life Assessment Program, Multifunctional Information Distribution

System Block Upgrade 2 and implementation of Link-16 J11 and J12.6 series messages that will enable the helicopter to provide in-flight target updates to Net Enabled Weapons.

EXECUTIVE SUPPORT AIRCRAFT

VH-3D/VH-60N Executive Helicopter Series

The FY 2020 President's Budget requests \$8.9 million of APN to continue programs that ensure the in-service Presidential fleet remains safe, reliable and current. Ongoing efforts include a Communications Suite Upgrade (Wide Band Line of Sight) that provides persistent access to the strategic communications network, the continuing Structural Enhancement Program necessary to extend platform service life, and Obsolescence Management needed to sustain and improve system readiness for both VH-60N and VH-3D platforms. The Cabin Interior and Environmental Control System upgrade is a critical obsolescence management effort for the VH-3D, reducing aircraft operational weight and improving maintainability. Where appropriate, technology updates for legacy platforms will be directly leveraged for the benefit of the VH-92A program.

VH-92A Presidential Helicopter Replacement Aircraft

The FY 2020 President's Budget requests \$187.4 million in RDT&E to continue Engineering, Manufacturing and Development activities, to include, contractor tests for airworthiness certification and modifications of Engineering Development Model and System Demonstration Test Article aircraft to support Initial Operational Test and Evaluation. Additionally, \$658.1 million of APN is requested to procure six LRIP Lot 2 aircraft and associated support.

FIXED-WING AIRCRAFT

KC-130J (USMC)

The FY 2020 President's Budget requests \$307.0 million to procure three KC-130Js and spares as part of the FY 2019 MYP (MYP III) and \$96.9 million in APN for targeted improvements. Key improvements include increased survivability through advanced electronic countermeasure modernization, upgrade to the Block 8.1 software that incorporates vital Link-16 digital interoperability, and obsolescence upgrades to the Harvest HAWK Intelligence,

Surveillance and Reconnaissance/Weapon Mission Kit. The obsolescence upgrade includes compatibility with additional Hellfire variants and an improved full motion video data-link. Today, the KC-130J remains in high demand, providing tactical air-to-air refueling, assault support, Close Air Support, and Multi-sensor Imagery Reconnaissance capabilities in support of Special Purpose Marine Air-Ground Task Forces (MAGTF) and deployed Marine Expeditionary Units.

MARITIME PATROL AIRCRAFT

Maritime Patrol Aircraft

The P-8A Poseidon combines the proven reliability of commercial 737 airframes with modern avionics, robust military communications, and advanced sensors and weapons to provide a range of advanced warfighting capabilities. P-8A warfighting capabilities include full-spectrum, wide area, cue-to-kill Anti-Submarine Warfare; armed Anti-Surface Warfare (ASuW); and networked Intelligence, Surveillance, and Reconnaissance (ISR). Continued congressional support of the P-8A program enables the planned divestiture of the aging P-3C Orion aircraft fleet.

The FY 2020 request includes \$1.2 billion in APN for six new aircraft. It also includes \$198.7 million in RDT&E for development of aircraft updates to include the addition of Networked Enabled Weapons capabilities, satellite communication updates, track management enhancements, and sensor fusion capabilities.

P-3C Orion

The active duty fleet will finish its transition to the P-8A airframe in FY 2020. Only the Reserve Force (VP-62 and VP-69) will fly the P-3C in the Littoral Surveillance and RADAR System configuration, augmenting the Active Duty Forces in this Maritime ISR mission set through 2022. The Navy plans to recapitalize the reserve Maritime Patrol Force into the P-8A airframe as resources permit.

EP-3 Aries

The EP-3E Aries is the Navy's only manned Maritime ISR and Signals Intelligence (SIGINT) platform. The Joint Airborne SIGINT Common Configuration includes Multi-INT

sensors, robust communication, and data links employed by the EP-3E air vehicle to ensure effective fleet support across the full spectrum of military operations.

The FY 2011 National Defense Authorization Act directed the Navy to sustain the EP-3E airframe and associated mission systems to minimize SIGINT capability gaps until the systems are fully recapitalized within a system or family of systems that in aggregate provide equal or better capability and capacity. The Navy's family of systems approach to ISR shifts the focus from platforms to payloads to deliver increased capacity and persistence by the end of this decade. To support these efforts, we request \$8.7 million for the EP-3 program as we transition Navy's maritime ISR platforms.

UNMANNED AIRCRAFT SYSTEMS (UAS)

The DoN has placed a priority on the development of unmanned systems leading to a fully integrated manned and unmanned fleet. Unmanned technology will not replace our Sailors and Marines; instead it will unlock their full potential as the Navy integrates this technology within our total force.

MQ-4C Triton

The MQ-4C is a critical capability and capacity enabler in the Navy's Maritime ISR&T transition plan. Under this initiative, Triton fills a vital role for the Joint Forces Maritime Component Commander by delivering persistent and netted maritime ISR and furthers our plan to retire legacy EP-3E aircraft as MQ-4Cs are delivered to the Fleet. FY 2020 investments are aligned to deliver air vehicles and control station capacity to achieve IOC in FY 2021, continue our efforts to deliver five full Triton orbits to meet increasing warfighter ISR demands, and enhance MQ-4C capabilities.

The FY 2020 President's Budget requests \$11.8 million in RDT&E to continue Triton baseline development activities; \$202.3 million in RDT&E for Multi-INT modernization; and \$493.3 million in APN for procurement of Lot 5 LRIP aircraft/spares, retrofit of the LRIP Lot 1 and Lot 2 aircraft to the Multi-INT configuration, and procurement of long-lead materials for Lot 6 LRIP aircraft.

MQ-25 Stingray

The Navy is fully committed to unmanned carrier aviation. Reflecting this commitment, MQ-25 has been designated a Maritime Accelerated Acquisition Program with a requirement to deliver the Navy's first carrier-based UAS no later than 2024. MQ-25's primary mission is a carrier-based tanker to extend the range, reach, and lethality of the CVW; its secondary mission is as an ISR platform. MQ-25 tanker aircraft will reduce the use of F/A-18E/Fs for recovery and mission tanking, freeing these tactical aircraft to execute their primary strike fighter mission role and increasing strike fighter capacity within the CVW. A key MQ-25 enabler for CVW operations is the Unmanned Carrier Aviation Mission Control Station (UMCS) and its associated infrastructure.

The FY 2020 President's Budget requests \$671.3 million in RDT&E to procure 42 engineering development aircraft under a fixed cost contract and to continue development of the MQ-25 air system and \$32.7 million in OPN for installation of UMCS aboard CVNs.

MQ-8 Fire Scout

The MQ-8 Fire Scout is a rotary-wing system that includes two airframe types, the MQ-8B and MQ-8C. The MQ-8C is an endurance upgrade to the MQ-8B. It is a larger, more capable and more cost-effective airframe that uses the same mission-control system, avionics, and payloads as the MQ-8B. Both systems are employed from suitably equipped air-capable ships, carry modular mission payloads, and operate using the Tactical Control System (TCS) and Line-Of-Sight Tactical Common Data Link.

The FY 2020 President's Budget requests \$29.6 million of RDT&E to continue hardware and software modifications, payload integration, cyber vulnerability closure, and safety improvements. The budget also requests \$79.6 million in APN to procure Active Electronically Scanned Array radar kits, ancillary shipboard equipment, aircraft support equipment, trainers and logistics elements to outfit suitable-equipped air-capable ships and train MQ-8 aviation detachments.

Tactical Control System (TCS)

The FY 2020 President's Budget requests \$9.5 million in RDT&E for the MQ-8 System's TCS. TCS is a government-owned, standards-compliant software suite that provides scalable

command and control capabilities for the MQ-8 Fire Scout system. In FY 2020, we will continue to enhance and sustain TCS software integration enabling MQ-8 operations on air capable ships to include LCS, Frigate (FFG(X)), and the Expeditionary Sea Base (ESB). We will also continue integration and test focused on the MQ-8C radar and Minotaur mission management system and migration to the Common Control System (CCS).

RQ-21A Blackjack

To meet the demand for persistent, multi-role ISR capability, the Department is building a balanced portfolio of manned and unmanned aircraft focused on expeditionary maritime environment missions. RQ-21 Blackjack, a Group 3 unmanned air system with the capability for runway independent operations aboard amphibious ships and on the shore, provides persistent ship and land based ISR support for Marine Expeditionary and Naval Special Warfare tactical-level maneuver decisions, unit-level force defense, and force protection missions. The RQ-21 UAS has completed several successful combat deployments and has proven itself to be significant contributor to the warfighter.

The FY 2020 President's Budget requests \$22.4 million in RDT&E (\$11.5 million USN, \$10.9 million USMC) and \$118.0 million in APN for support of Marine Corps and Naval Special Warfare forces to address ISR capability requirements (\$98.2 million USN, \$19.8 million USMC).

MAGTF Expeditionary UAS (MUX)

The MAGTF Expeditionary UAS (MUX) will provide a competitive advantage to naval expeditionary forces operating in contested maritime spaces. MUX is currently envisioned to be a weaponized, payload-flexible, shipboard capable and expeditionary system that is runway-independent for all weather conditions. The system will also provide a multi-mission, long-range (690+ NM), long-endurance (24+ hours), platform that will complement MV-22 operations and operate from the sea in an uncontested environment. MUX will facilitate sea denial operations and maritime maneuver globally in support of our fleet commanders. The FY 2020 President's Budget requests \$21.2 million for research and development requirements.

Common Control System (CCS)

The FY 2020 President's Budget requests \$43.1 million in RDT&E and Other Procurement Navy (OPN) for continuation of CCS activities. The primary mission of CCS is to provide common control across the Navy's unmanned systems (UxS) portfolio to add scalable and adaptable warfighting capability, implement robust cybersecurity attributes, leverage existing government owned products, eliminate redundant software development efforts, consolidate product support, encourage innovation, improve cost control, and enable rapid integration of UxS capabilities across all domains (air, surface, sub-surface, and ground). CCS leverages existing government owned software to provide UxS Vehicle Management (VM), Mission Management (MM) and Mission Planning (MP) capabilities. CCS delivered initial UxS VM functionality for MQ-25 Stingray in FY 2018. CCS VM functionality was delivered to MQ-8 Fire Scout in early FY 2019 with another delivery scheduled for the third quarter of FY 2019. In FY 2020, CCS will continue development of common mission management/mission planning capabilities, common software service development, and support, including the continued refinement of incremental common service releases for MQ-25 Stingray and MQ-8 Fire Scout which will support other future UxS platforms transitioning to CCS.

STRIKE WEAPONS PROGRAMS

Offensive Missile Strategy (former 'Cruise Missile Strategy')

The Department previously developed and submitted a 'Cruise Missile Strategy' to Congress. This strategy delineated our plans for supporting all cruise missile weapon systems such as Tomahawk, the Long-Range Anti-Ship Missile (LRASM), Harpoon, etc. and the development of future next generation weapons. Navy offensive strike systems, however, consist of a broader family of current and future weapons. These weapons capitalize on key system attributes (e.g. speed, range, lethality, survivability, commonality) with a strong focus on delivering 'multi-domain' capabilities. Under this construct, 'Cruise Missiles' are a subset within the offensive strike weapons family. As a result, the DoN has broadened the scope of the 'Cruise Missile Strategy' to include all non-nuclear offensive strike missiles with ranges greater than 50 nautical miles (i.e. the 'Offensive Missile Strategy' (OMS)).

The OMS construct supports a wider, more systematic approach towards delivering a capabilities balance to increase overall force effectiveness to address emerging threats. The DoN will evaluate the OMS via an iterative process. We will review existing and developing capabilities, leverage analytical processes/study updates, and assess threat/intelligence report updates to inform annual RDT&E and procurement funding priorities to achieve an optimal mix of offensive strike missile system capabilities.

Our OMS construct has three pillars. First, the Navy will sustain relevant weapon systems. Our objective is to preserve the readiness and capacity of our key strike weapons inventories. Second, we will pursue strike weapon capability enhancements. Under this initiative, we will develop near-term capability upgrades to enhance existing weapons that provide critical improvements to our current long-range strike weapons capabilities (e.g. Maritime Strike Tomahawk, new Tomahawk warhead (Joint Multiple Effects Warhead System), LRASM V1.1, SM-6/Block 1B, and the Naval Strike Missile). Third, we will develop next generation strike missile capabilities to address emerging threats.

To fully inform Congress of next generation weapons development plans, we have completed classified briefings to all four Defense Committees.

Tomahawk Cruise Missile

The FY 2020 President's Budget requests \$320.1 million in RDT&E, \$386.7 million in Weapons Procurement Navy (WPN) and \$78.6 million in OPN.

RDT&E will be used for development and test of: navigation and communications upgrades to improve performance in Anti-Access/Area Denial environments; a Maritime Strike Tomahawk (MST) variant; a Global Positioning System M-Code capability; the Joint Multiple Effects Warhead System and Fuse; and the associated Tactical Tomahawk Weapon Control System (TTWCS) and Tomahawk Mission Planning Center (TMPC) updates that support all upgrades and address usability, interoperability and information assurance mandates.

WPN is required for the restart of the Tomahawk missile production line and procurement of 90 all-up-round missiles, procurement of 156 Navigation/ Communications kits, procurement of 20 MST kits and completion of 112 missile recertifications.

OPN is required for procurement and installation of TMPC and TTWCS hardware/software modifications to address evolving security requirements, critical program

information protection, obsolescence updates, and modern computing architecture improvements.

Next Generation Land Attack Weapon (NGLAW)

NGLAW will provide the next generation of long-range, kinetic strike capability to destroy high-priority fixed, stationary and moving targets – as well as those targets hardened, defended or positioned at ranges such that engagement by aviation assets would incur unacceptable risk. NGLAW will be capable of kinetic land and maritime attack from both surface and sub-surface platforms. The NGLAW AoA has completed and the classified results have been shared with all four congressional defense committees.

Offensive Anti-Surface Warfare (OASuW) Increment 1 (Long Range Anti-Ship Missile (LRASM))

OASuW Increment 1 (LRASM) will provide Combatant Commander's the ability to conduct ASuW operations against near/mid-term high-value surface combatants protected by Integrated Air Defense Systems with long-range Surface-to-Air-Missiles and deny adversaries sanctuary of maneuver. The program achieved Early Operational Capability (EOC) on the Air Force B-1B in early FY 2019 and is on-track to achieve EOC on the Navy's F/A-18E/F aircraft prior to the schedule objective of the fourth quarter of FY 2019.

The FY 2020 President's Budget request \$65.4 million in RDT&E for LRASM V1.1 development and testing and \$143.2 million in WPN to purchase LRASM All-Up-Round weapons.

Offensive Anti-Surface Warfare (OASuW) Increment 2

OASuW Increment 2 is required to deliver the long-term, air-launched ASuW capabilities to counter 2028 threats (and beyond). The Department continues to plan for OASuW Increment 2 to be developed via full and open competition. To inform the long-term path forward, the DoN will leverage NGLAW AoA results to inform the required ASuW capabilities. The AoA study to determine the Increment 2 path-forward will complete in 2019. In the interim, Navy is pursuing incremental upgrades to LRASM to bridge the gap until an OASuW Increment 2 program of record can be established. Increment 2 IOC is now planned for the FY 2028-2030 timeframe.

Sidewinder Air-Intercept Missile (AIM-9X)

The FY 2020 President's Budget requests \$19.5 million in RDT&E and \$119.5 million in WPN for AIM-9X. RDT&E will be applied toward the Engineering Manufacturing Development of critical hardware redesign driven by obsolescence; developmental test of System Improvement Program missile software (Version 9.4); and design and development of Insensitive Munitions improvements. WPN funding is requested to procure a combined 292 All-Up-Rounds and Captive Air Training Missiles and associated missile/trainer related hardware.

Advanced Medium-Range Air-to-Air Missile (AMRAAM/AIM-120D)

The FY 2020 President's Budget requests \$39 million in RDT&E for continued software capability enhancements and \$224.5 million in WPN for 169 All-Up-Rounds and associated missile-related hardware. RDT&E resources support the development and test of an Electronic Protection Improvement Program and a System Improvement Program to counter emerging electronic attack threats.

Small Diameter Bomb II (SDB II)

The FY 2020 President's Budget requests \$50.1 million in RDT&E for continued development/test of the SDB II weapon, F/A-18E/F Operational Testing, and F-35 Developmental Testing. The DoN also requests \$118.5M in WPN to procure 750 All-Up-Round weapons.

Advanced Anti-Radiation Guided Missile (AARGM) & AARGM Extended-Range

The FY 2020 President's Budget requests \$7.1 million of RDT&E for Anti-Radiation Missile Foreign Material Assessment; \$11.7 million for AARGM Advanced Development, FOT&E Correction of Deficiencies, and System Capability Upgrades; and \$119.6 million for AARGM Extended Range (AARGM-ER) development. The Department also requests \$183.7 million in WPN for production of 245 baseline AARGM Block 1 modification kits for integration into All-Up-Rounds.

Harpoon II+

The FY 2020 President's Budget requests \$25.4 million in WPN to procure 70 modification kits and 9 Captive Training Missiles. Harpoon II+ will integrate an upgrade package to the existing USN Block 1C missiles and System Configuration Set for the F/A-18 E/F and P-8 aircraft.

Joint Air-to-Ground Missile (JAGM)

The FY 2020 President's Budget requests \$18.4 million in RDT&E for software development, AH-1Z platform integration, modeling and simulation, and completion of Developmental Testing, and Integration Testing. Additional efforts include Operational Testing in support of the FRP Decision and FY 2020 IOC on the AH-1Z. The budget request also includes \$91.0 million in WPN to procure 382 tactical missiles and four captive air training missiles.

Advanced Precision Kill Weapon System II (APKWS II)

APKWS II has become a weapon of choice in current operations due to its high stowed “kills” capacity, exceptional accuracy and reliability, and low-yield warhead that reduces the risk of collateral damage while achieving the desired effect on the target. The FY 2020 President’s Budget requests \$31.5 million in PANMC for procurement of 1,123 APKWS II guidance section kits for use on both rotary-wing and fixed-wing platforms.

Direct Attack Weapons and General Purpose Bombs

Fully funding the General Purpose Bombs and Joint Direct Attack Munition (JDAM) line items are critical to building and maintaining the DoN’s direct attack weapons inventory. The FY 2020 President's Budget requests \$63.0 million for Direct Attack Weapons and General Purpose Bombs and an additional \$82.7 million to procure 3,388 JDAM kits to enhance readiness and prepare for future contingencies.

CONCLUSION

Naval Aviation operates forward - near our potential adversary’s home shores. With an increasingly complex national security environment and overt challenges to the current

international order, we need Congressional support to deliver the ready, capable, and global sea-based and expeditionary force to meet these challenges. Our vision is to provide the right capability in the hands of the warfighter, on schedule, and in the most affordable manner possible. With the support of Congress, we will build and sustain a lethal, resilient force through balanced investments across readiness and capability and rebuild the capacity we lost over the past decade.

Addendum A

SAFETY (Part 1 of 2)

All Navy senior leadership views the occurrence of Physiological Episodes (PE) in our tactical aircraft and trainers with the highest concern and it remains our number one aviation safety priority. To date, we have identified multiple interrelated causal factors. The mitigation efforts currently in place, include software modifications, personnel education, and equipment changes are positively affecting the PE rate for all Type/Model/Series aircraft but most notably in T-45s. With these mitigations, Naval Aviation is currently meeting operational requirements and personnel are working in an operationally safe environment.

For our T-45 aircraft we have reduced the overall PE rate substantially with more than 100,000 flight hours flown and only 14 events since return to flight (where in prior years' rates had been as high as 80 events/100,000 flight hours). Two of the 14 are still under investigation for final determination as to whether or not they meet the criteria necessary to be deemed a PE. Seven of the 14 cases post return-to-flight were attributed to human factors; in all T-45 cases, negligible contaminants were found in the monitoring devices, all well below Occupational Safety and Health Administration standards, and contamination has been ruled out as a causal factor in T-45 PE. Beyond mitigating the identified flow problem from the engine, we are integrating an Automatic Backup Oxygen System (ABOS) to improve oxygen generating system performance overall.

In our F/A-18 aircraft, we continue to implement changes that are improving the Environmental Control System, increasing system reliability and improving the cockpit environment for our aviators. In Legacy aircraft (F/A-18 A-D) we have seen an almost fifty percent reduction in PE rates, largely due to implementation of AFB (Air Frame Bulletin) 821 in 2017. AFB-821 which places life limits on seven ECS high-time components with the purpose of inspecting and replacing components as necessary to improve and baseline system operation. Furthermore, the F/A-18 Root Cause Corrective Action team has identified premature component failure as a contributory factor in almost 300 PEs. All of those components are under re-design, and two will be begin to be implemented in the Fleet in 4Q FY2019. More work remains to be done, but mitigation and redesign efforts are producing positive results in all FA-18 variants but not to the levels we seek. We are collaborating across the DoD to leverage

research efforts to help characterize the cockpit environment to ensure we reach long-range, holistic solutions. We are investigating every line of inquiry recommended by NASA to include measuring breathing gas quality at the mask. We are working with our industry partners to develop a new On Board Oxygen Generating System concentrator designed to replace the existing concentrator currently in the F/A-18 and EA-18 aircraft. This effort will provide digital data logging of performance, increased reliability and oxygen scheduling in compliance with the recently published MIL-STD 3050.

We continue to provide Flag-level leadership and oversight to this critical effort. RDML Luchtman heads the Physiological Episode Action Team and unifies all PE actions supporting multiple aircraft across Naval Aviation. Our engineers, industry partners, physiologists and outside support will continue to work diligently to drive PE to the lowest possible level.

**SAFETY
(Part 2 of 2)**

Class A, B, and C Aviation-Related Safety Issues Summary

A summary of all Naval Aviation Class A, B and C aviation-related safety issues, including recent mishaps, trends, and analysis from October 2016 through March 2019 follows. The rates presented in the table are based on total mishaps per 100,000 flight hours and include Flight, Flight-Related and Ground mishaps.

Year	Flight Hours	Class A	Class A Rate	Class B	Class B Rate	Class C	Class C Rate
FY17	1,072,156	25	2.33	35	3.26	239	22.29
FY18	1,072,229	19	1.77	40	3.73	249	23.22

The most recent (FY 2017-13 Mar 2019) DoN flight Class A mishaps include:

- 28 Feb 2019: (MCAS Miramar, CA) Two F/A-18C's collided in mid-air while conducting CAS. Both aircraft landed safely. No injuries.

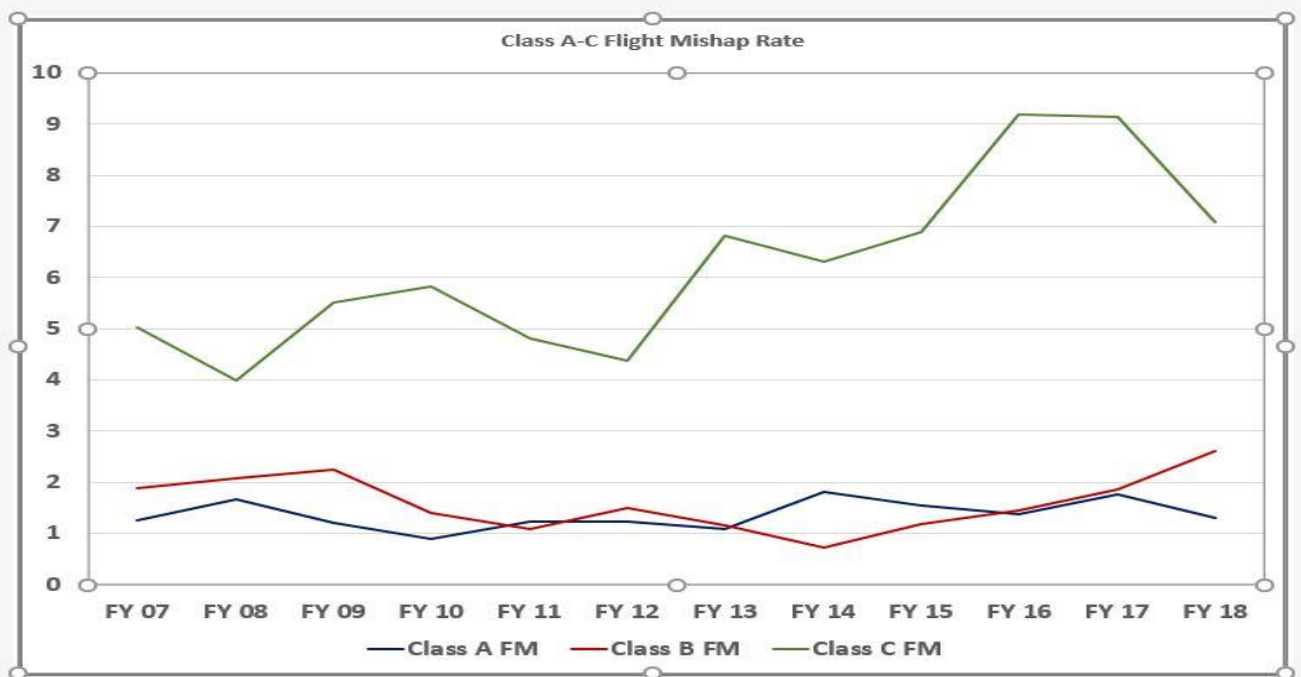
- 05 Dec 2018: (Philippine Sea) F/A-18D and KC-130J collided while performing fixed wing aerial refueling mission. F/A-18 aircrew ejected with one fatality. 5 aircrew fatalities in the KC-130.
- 12 Nov 2018: (Philippine Sea) F/A-18F aircraft malfunction resulting in loss of aircraft; aircrew recovered and in stable condition.
- 18 Oct 2018: (Pacific Ocean) MH-60R crashed on takeoff onboard CVN.
- 04 Oct 2018: (NAS Lemoore, CA) A right engine fire occurred on a F/A-18F during a training flight. Emergency landing with no injuries.
- 28 Sep 2018: (Beaufort MCAS, SC) F-35B crashed. Pilot ejected safely.
- 21 Aug 2018: (VACAPES) F-35C ingested FOD while conducting aerial refueling operations with an F/A-18F. Both aircraft were damaged.
- 16 Aug 2018: (Near Mountain Home AF Base, Idaho) Aircraft suffered hard landing in FARP prior to refueling operations. No Injuries or casualties.
- 02 Aug 2018: (Lavic Lake, CA) UH-1Y skid and main rotor blades damaged during Low Light Level RVL landing.
- 07 June 2018: (Western Pacific near Guam) FA-18E experienced fire indications and engine failure immediately after catapult launch. Aircraft recovered safely on single engine.
- 13 Apr 2018: (Iwakuni, JP) FA-18E experienced Class A mishap in flight. Aircraft recovered safety.
- 03 Apr 2018: (El Centro, CA) CH-53E impacted ground while on approach into a landing zone. 4 fatalities.
- 02 Apr 2018: (Djibouti Ambouli International) AV-8B shortly after lift-off impacted ground, pilot ejected safely. 14 Mar 2018: (Key West, FL) F/A-18F while flying single engine, crashed on short final. 2 fatalities.
- 14 Mar 2018: (Key West, FL) F/A-18F while flying single engine, crashed on short final. 2 fatalities.
- 11 Dec 2017: (Tinker AFB, OK) E-6B struck birds during descent, leading to number 4 engine flameout.
- 04 Dec 2017: (NAS Fallon) F/A-18A right leading edge flap departed aircraft in flight and hit the vertical stabilizer.
- 22 Nov 2017: (Philippine Sea) C-2A ditched while inbound to CVN with 11 onboard. 3 fatalities.
- 11 Oct 2017: (Futenma MCAS, Japan) CH-53E engine fire in flight, emergency landing. No injuries.
- 01 Oct 2017:(Monroe County, TN) T-45C crashed on low-level training route. 2 fatalities.
- 28 Sep 2017: (Syria) MV-22B crashed on landing during support mission.
- 12 Aug 2017: (Bahrain) F/A-18E departed runway during landing after a ship to shore divert due to an engine malfunction. Pilot ejected. No injuries.
- 09 Aug 2017: (25 Miles South of Key West, FL) F-5N went down over water. Pilot ejected safely.
- 05 Aug 2017: (15 nm off NE Australia IVO Shoal Water Bay) MV-22B struck LPD flight deck on final approach and then crashed into water. Three personnel are missing and presumed deceased. 23 recovered.

- 05 Aug 2017: (North Island NAS, CA) F/A-18F struck round down with right horizontal stabilizer upon landing. Diverted successfully.
- 16 Jul 2017: (Bay of Bengal) F/A-18F engine borescope plug backed out in flight causing hot air to burn to engine bay and aircraft skin.
- 10 Jul 2017: (Indianola, MS) KC-130T crashed on logistics flight from Cherry Point to El Centro. 16 fatalities.
- 26 Apr 2017: (Off the Coast of Guam) MH-60R collided with water on initial takeoff from ship. No injuries.
- 21 Apr 2017: (Philippine Sea) F/A-18E lost on approach to landing on carrier. Pilot ejected without injury prior to water impact.
- 05 Apr 2017: (Yuma, AZ) CH-53E landed hard and rolled on day training flight. Crew of five uninjured.
- 28 Mar 2017: (El Centro NAF) HH-60H main rotor blades contacted tail rotor driveshaft on landing.
- 17 Jan 2017: (NAS Meridian, MS) T-45 crashed following a BASH incident on takeoff. Both crewmembers ejected. No fatalities.
- 13 Dec 2016: (Off the Coast of Okinawa, Japan) MV-22B attempted a precautionary emergency landing (PEL) to dry land but crash landed in shallow water. Crew of five evacuated with injuries.
- 07 Dec 2016: (Off the Coast of Iwakuni MCAS, Japan) F/A-18C crashed into the water while conducting a night mission. One fatality.
- 21 Nov 2016: (Upper Mojave Desert Region) F/A-18F struck a tree while instructor pilot was conducting a currency flight event. Returned to base safely. No injuries.
- 09 Nov 2016: (Off the Coast of San Diego) Two F/A-18As were conducting basic flight maneuvers and had a mid-air collision. One aircraft crashed in the water. Pilot ejected successfully. One aircraft landed with significant damage.
- 27 Oct 2016: (MCAS Beaufort, SC) F-35B had an inflight weapons bay fire followed by an uneventful landing. No injuries.
- 25 Oct 2016: (Twenty-nine Palms, CA) F/A-18C crashed on final approach. Pilot ejected successfully. No injuries.
- 20 Oct 2016: (Yuma, AZ) CH-53E main rotor contacted building causing damage to the aircraft.

DoN Class A aviation ground and Flight Related mishaps (AGM and FRM):

- 07 Feb 2019: (Tinker AFB, OK) E-6B being towed out of a hangar when vertical stabilizer struck the hangar. (AGM)
- 09 Dec 2018: (MCAS New River, NC) CH-53E landing gear inadvertently retracted during ground taxi. (AGM)
- 09 Oct 2018: (Kadena AFB, Japan) Two HH-60H helicopters taxied into each other on the taxi ramp. No injuries. (AGM)
- 30 Jul 2018: (NAS North Island, CA) During hotseat, HH-60H auxiliary fuel tank detached from aircraft and landed on two service members. E-6 died in the hospital, E-5 was treated and released. (AGM)
- 18 Jul 2018: (SOCAL) Sonar Transducer Assembly (TA) departed MH-60R during anti-submarine warfare (ASW) training. (FRM)

- 16 May 2018: (Andros Island, Bahamas) MH-60R lost a dipping sonar while conducting sonar operations. (FRM)
- 17 Sep 2018: (Atlantic Ocean) E-3 killed when struck by E-2C propeller on deck of CVN. (AGM)
- 21 Feb 2018: (MCAS Camp Pendleton, CA) O-3 died on 24 Feb from injuries sustained when he was struck by a UH-1Y tail rotor. (AGM)
- 17 Aug 2017: (NW of San Clemente Island) MH-60R lost SONAR transducer at sea. (FRM)
- 11 Jul 2017: (New River MCAS, NC) Maintenance personnel struck by lightning on the flight line while working on MV-22B. One fatality. Two others were treated and released.
- 25 Jun 2017: (MCAS Miramar, CA) Two Marines injured and F/A-18A damaged after flammable material in drip pan caught fire. (AGM)
- 19 Jan 2017: (NAS Norfolk, VA) Three E-2C aircraft damaged in an engine oil related event. (AGM)
- 18 Dec 2016: (Kadena AFB, Japan) Tow bar separation resulted in aircraft/tow collision with damage to nose gear and lower fuselage of P-8A. (AGM)
- 16 Dec 2016: (NAS Whidbey Island, WA) Canopy on EA-18G exploded/jettisoned resulting in severe injuries to two personnel. (AGM)



DoN Historical Mishap Rate Trend per 100K Flight Hours per Mishap Class