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Since its inception in the 1920's, the three characteristics that have defined the strategic relevance of Carrier Air Wings are range, mass and payload capacity. The end of the Cold War, coupled with the United States' involvement in a series of permissive conflicts, has led to a conscious reduction in overall carrier striking distance and the overall size of Carrier Air Wings. As more advanced threats loom on the horizon, alternative methods need to be considered to bridge the production delays associated with more capable replacement aircraft. Returning the S-3B Viking to the fleet would increase the number of Strike/Fighter assets available and would increase the lethal radius associated with those assets. Additionally, as Sea Control returns to the forefront of national policy, the S-3B would enhance the range associated with the Anti-Surface and Anti-Submarine Warfare missions, thus improving the survivability and lethality of the entire Carrier Strike Group.

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Return of the Viking: Restoring a Proven Asset to Combat an Advanced Threat

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Abstract

Since its inception in the 1920's, the three characteristics that have defined the strategic relevance of Carrier Air Wings are range, mass and payload capacity. The end of the Cold War, coupled with the United States' involvement in a series of permissive conflicts, has led to a conscious reduction in overall carrier striking distance and the overall size of Carrier Air Wings. As more advanced threats loom on the horizon, alternative methods need to be considered to bridge the production delays associated with more capable replacement aircraft. Returning the S-3B Viking to the fleet would increase the number of Strike/Fighter assets available and would increase the lethal radius associated with those assets. Additionally, as Sea Control returns to the forefront of national policy, the S-3B would enhance the range associated with the Anti-Surface and Anti-Submarine Warfare missions, thus improving the survivability and lethality of the entire Carrier Strike Group.

INTRODUCTION

Since 1922, when the United States converted the *USS Jupiter* into its first flattop aircraft carrier, Naval Aviation, specifically carrier aviation, has evolved into the nation's primary tool to establish sea control and project power from the sea. Three core elements: mass, range and firepower serve as the benchmarks for measuring the effectiveness of the Carrier Air Wing (CVW) and the validity of the aircraft carrier itself.[1] Following the end of the Cold War, the fiscal environment became constrained and national priorities caused Naval Aviation to shift emphasis from mass and range to aircraft reliability and sortie generation capabilities.[2] Three platforms were rapidly retired, (the A-6 Intruder, F-14 Tomcat and S-3B Viking) and replaced by one single platform, the FA-18 E/F Super Hornet. Due to its shorter endurance and multi-mission requirements, the introduction of the Super Hornet shortened the strike/sea control radius and limited the number of assets available to execute long-range missions. As a result, carrier aviation diminished the core elements associated with the CVW and limited its potential relevance in future conflicts.

During the past two decades, Carrier Strike Groups (CSGs) have successfully supported ground forces in the Middle East and Southwest Asia. Throughout each of these campaigns, the CSG operated in a permissive environment and benefited from the support of Air Force tankers to extend the range of its strikers. Analysis of potential future conflicts projects the use of advanced Anti-Access/Area-Denial (A2/AD) systems and the requirement for the carrier to achieve sea control[3]. In order to combat these more advanced enemy threats, carrier aviation must address the known capability gaps associated with its limited

[1] Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 58.
[2] Ibid, 46
[3] Seth Cropsey et al., "Sharpening the Spear: The Carrier, the Joint Force, and High-End Conflict." *Hudson Institute Policy Study*, October 2015, 6.

strike/sea control radius and limited number of strikers. An expeditious, fiscally conservative solution is to restore the S-3B Viking fleet and return it to an operational status. The return of the Viking would directly increase the number of available Super Hornets for Combat Air Patrol (CAP) and Strike missions. Additionally, it would also enhance the ability of the carrier to operate autonomously, increase the sea control radius and provide a fixed-wing, Anti-Submarine Warfare (ASW) capability to the CSG.

BACKGROUND - THE BIRTH OF THE SUPER CARRIER

On the morning of April 18, 1942, Captain Marc Mitscher was awakened when the radar of the *USS Hornet* detected unidentified contacts between his aircraft carrier and the Japanese coastline. Mitscher was operating under orders from Admiral Chester Nimitz, Commander-in-Chief, United States Pacific Fleet (CINCPACFLT), to "Bomb the Tokyo area with Army aircraft now aboard the *Hornet*, using high explosive and incendiary bombs. Select military objectives as practicable. Direct bombers to proceed to friendly territory in China after the bombing [sic]."[4] In fear of being discovered by the Japanese scouting vessels and thus targeted by Japanese aircraft, Mitscher conferred with Army Lieutenant Colonel Jimmy Doolittle. Doolittle, selected to serve as flight lead of a strike package consisting of sixteen B-25 aircraft, confirmed the carrier was in range of the targets. At 0824, Mitscher steered the bow into the wind and launched the sixteen bombers on 3.9 minute intervals until safely airborne. By 1100, the *Hornet* received news of mission success and conveyed it to the crew.[5]

[4] Theodore Taylor, *The Magnificent Mitcher* (Naval Institute Press, Bluejacket Edition, 2006).118
[5] Ibid, 120-121

Coined "The Doolittle Raid", the seven hundred nautical mile (nm) attack by bombers carrying 2,000 pounds of ordnance per aircraft was a significant indicator to the advantages of carrier aviation. It also served as an inspiration to Mitscher. The forces employed by the Japanese served as primitive, highly effective methods of A2/AD. Mitscher recognized that the United States needed aircraft optimized for long range power projection to ensure future success. In order to accommodate these aircraft, he also knew he needed an aircraft carrier capable of operating heavy planes with large bomb loads.[6]

Following the conclusion of World War II, Mitscher returned to Washington D.C. as the deputy chief of operations for air. In January, 1946 he authored a memorandum recommending the Navy create a new "Super Carrier" class of carrier.[7] In October, 1955, the first "Super Carrier", the *USS Forrestal* was commissioned into service providing the nation with the long range, power projection capability Mitscher envisioned.

ORGANIC TANKING AND AUTONOMOUS CARRIER EMPLOYMENT

The creation of the *Forrestal* class and its associate CVW demonstrated the Navy's ability to recognize a vulnerability and quickly find a solution. On the *Forrestal's* initial deployment, the CVW consisted of 80-90 aircraft, with an average unrefueled range of 1,210 nm and an average ordnance capacity of 4,522 lbs. This range marked a 58 percent increase of its World War II predecessors, and the payload capacity more than doubled the capabilities of a CVW flown from an *Essex* class.[8]

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[6] Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 18.
[7] Ibid 18
[8] Seth Cropsey et al., "Sharpening the Spear: The Carrier, the Joint Force, and High-End Conflict." *Hudson Institute Policy Study,* October 2015, 26-28. The *Essex* class was a 24-ship carrier class built for the United States Navy during World War II and was the class preceding the *Forrestal* class ships.

U.S. aircraft carriers and accompanying air wings would continue to evolve as the Navy faced diverse challenges in the Vietnam and Cold Wars. Due to the increased range of the new "Super Carriers", carriers would often operate without any land based diverts. This environment, also known as "Blue Water", necessitated the development of aerial refueling "organic" to the carrier. Additionally, as operational requirements increased during the Vietnam Conflict and early Cold War, Air Force tankers were deemed "not available" to support carrier strike missions in order to provide fuel to Air Force bombers.[9] Despite the introduction of the D-704 "Buddy Store" in 1953, it was not until the 1960's, when "Blue Water" recoveries and mission ranges increased, that organic tanking became standard operating procedure during carrier operations.[10] An analysis of the A-3 Skywarrior's transition from a bomber to a tanker during the Vietnam War illustrates how organic mission refueling increased the long range capability of the carrier.

The Skywarrior was originally designed as a heavy bomber but due to its size and lack of maneuverability it was highly vulnerable to the Integrated Air Defense Systems (IADS) of the North Vietnamese. Significant early losses convinced Navy leadership to re-task the A-3 as an organic mission tanker to be used after engineers reconfigured the aircraft's bomb bays with a specialty fueling system. Once the aircraft was introduced to the carrier air wing, mission planners instituted a highly efficient flight profile to maximize the available JP-5 for carrier attack aircraft[11]. By launching ahead of a strike package, the A-3 would fly a "maximum endurance" profile to a position off the Vietnam coast and out of

[9] Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 30-31. The Air Force used large tankers during the 1950's (and beyond) to refuel its bombers and tactical fighters airborne. The Navy had nominal access to Air Force tankers but during the roles and mission battles, the Air Force assets were "not available" to support Navy missions but rather those of the Air Force.

[10] Ibid, 30-31. The D-704 Buddy Store was an external wing mounted pod that could carry and distribute 2,244 pounds of fuel to airborne aircraft.

[11] Striking aircraft consisted of A-4's, A-7's and later A-6's.

range of any surface-to-air threats. Once joined by the strikers, the A-3 would fill each jet prior to them going "feet dry". The tanker would loiter in order to provide fuel to the strike aircraft following the attack. In addition to ensuring strike aircraft had the requisite fuel to conduct defensive maneuvers against Vietnamese IADS, the A-3 enabled mission planners to locate the carrier further away from the enemy land defenses. One tanker configured A-3 (KA-3) could extend the range of 12 strikers to 1800 nm, lengthening the carrier's lethal radius by 49 percent.[12] Single-handedly, the A-3 enhanced each of the core elements of the carrier: mass, range and firepower.

During the next thirty years, carrier aviation continued to rely on organic mission tanking to enhance the range of fighter and attack aircraft. Following the retirement of the A-3 in 1970, the Navy permanently modified 90 A-6 Intruders from bombers to aerial refueling platforms (KA-6). The KA-6 successfully operated until 1989 when extensive fuselage stretching was identified, forcing the Navy to retire the platform. By July 1991, the S-3B was introduced to every carrier air wing to assume the tanker mission and maintained this role until its "sundown" in 2009.[13]

THE EVOLUTION OF THE VIKING

The S-3 Viking originally emerged in 1974 as an anti-submarine warfare (ASW) platform, specifically with the Soviet submarine threat in mind. Manned by a crew of four: a pilot, two naval flight officers and one enlisted air warfare systems operator, the aircraft was equipped with a state of the art surface search radar, a magnetic anomaly detection sensor, an acoustic suite capable of monitoring and analyzing emissions of sonobuoys and a bomb bay

[12] Ibid, 31-32.
[13] Defense Industry Daily, "How We Rollo: Return of the USNs S-3 Vikings?", assessed 04 April 2016, http://www.navy.mil/search/display.asp?storyid=42263

that carried four torpedoes[14]. The Viking's most impressive capability was its superior range. Capable of remaining airborne for nearly ten hours, it could conduct a patrol over 2000 nm. In 1991, most S-3A models were modernized and enhanced to the S-3B variant. The upgrades included the capability to target and fire the AGM-84 Harpoon, AGM-84E Standoff Land Attack Missile (SLAM) and the AGM-65D/F/G Maverick (Infrared variant). After acquiring these anti-surface warfare (ASuW) capabilities, the S-3B changed its community description from "anti-submarine" to "sea control"[15]. This combination of robust ASW/ASuW combat systems and a 2000 nm lethality range, made the S-3B an invaluable asset to the CSG and its mission of sea control.

In addition to its role as a sea control platform, the S-3B performed extremely well as a tanker. When configured with a single buddy store, one S-3B was capable of transferring nearly 11,000 pounds of fuel[16]. During Operation Iraqi Freedom, the Viking was tasked as a mission tanker for the FA-18 A/C Hornets executing strikes into southern Iraq. Flying a similar profile to the A-3 in Vietnam, the fuel passed by the Viking enabled the attack aircraft to strike a target and recover on the carrier without the support of Air Force tanking assets. During Operation Enduring Freedom, fuel provided by S-3B's ensured carrier air wing strikers could reach Air Force tankers located 1,000-1,200 nm away. In the absence of the Viking, the Navy's ability to prosecute targets in North Afghanistan would have been limited or degraded.

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[14] Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 36. The four torpedoes were of the Mk 46, Mk 46 Advanced Capabilities (ADCAP) and Mk 50 variants.
[15] Ibid, 36
[16] NAVAIR 01-S3AAB-1, "*NATOPS Flight Manual Navy Model S-3B Aircraft"*, Section 11, September 2000. Number was generated assuming a 2,400 lbs/hr fuel burn rate, a 1 hour 30 minute cycle time, and "Blue Water" environment.

In 1994, "with a desire to operate the S-3B well into the next century, the Navy initiated a Service Life Assessment program (SLAP) to determine the S-3's remaining fatigue life using updated fatigue spectra based on anticipated usage."[17] The S-3 fleet at this point had logged an average of 6,000 flight hours and 1,000 catapults. These numbers constituted approximately one half of the initially desired service life of 13,000 flight hours. The goal of SLAP was to assess the extension of the Viking airframe to 17,500 hours for operations to the year 2015. In 1997, SLAP was completed and it was determined that a follow-on Service Life Extension program (SLEP) would be required for the Navy to achieve its desired service life. In November 2002, SLEP, which required "removing fasteners in some highly stressed aircraft areas and cold working the fastener holes for fatigue enhancement", was completed. The effort successfully extended the S-3 service life to 17,750 hours and 4,331 catapult arrestments[18]. The Navy's missions of Sea Control and organic refueling were now solidified for the next thirteen years.

Although this was an apparent victory for the platform, while the S-3B was inducted in SLAP (1994-1997), Navy leaders debated cancelling the Viking's ASW mission. After the fall of the Soviet Union, ASW was no longer a priority. Convinced that other ASW assets, such as cruisers, destroyers, SH-60 Seahawk helicopters and P-3C Orions (non-organic to the CSG), could successfully execute the mission, the Navy elected to eliminate the ASW detection capabilities of the S-3B.[19] Although, these platforms possessed the

[17] Reade, David, "S-3 Viking Service Life Assessment Program," *Airborne LOG: The Magazine of Naval Sea Control and Maritime Patrol*, Fall 1994, 16
[18] Kandebo, Stanley W., "Structural Tests Target S-3B Service Life," *Aviation Week & Space Technology* Volume 157, Issue 3, July 2002, 52
[19] Wolf, Frank "Future of the S-3B Mission in Doubt," *Defense Daily Potomac*, October 20, 1998

mission capabilities, the range in which it could be executed diminished from a 460 nm radius to 125 nm.[20]

During the years following the loss of the ASW mission, the Viking performed exceptionally well in the remaining mission sets. Serving as a long range ASuW platform, it continued to provide significant situational awareness of the surface picture to the CSG. Despite this capability, in 2004, "the Navy made the decision to draw down the number of aircraft types on its carrier decks to save costs and to increase the efficiency of the carrier air wings."[21] The Viking completed its final carrier deployment on 15 December 2007 onboard the *USS Enterprise*. Sea Control Wing, U.S. Atlantic Fleet was disestablished on 30 January 2009 during a ceremony at Naval Air Station (NAS) Jacksonville. Despite averaging 8,000-9,000 hours of useful service life remaining per aircraft remaining, 87 Vikings were retired to the 309th Aerospace Maintenance and Regeneration Group—the Boneyard—at Davis-Monthan AFB, Tucson, Arizona.[22]

Following the Navy's decision to minimize the costs associated with the air wing, the core elements of the carrier (mass, range and firepower) were decimated. According to Dr. Jerry Hendrix, a Senior Fellow and the Director of the Defense Strategies and Assessments Program at the Center for a New American Security, "within a decade the character of the flight deck would change radically, shrinking the average unrefueled range to 496 nm and the size of the air wing to approximately 60 aircraft, a situation not seen since the carrier air wings of the 1930's Fleet Problem era."[23] Mass, range and payload capacity, core elements

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[20] Ibid
[21] Lockheed Martin, http://www.lockheedmartin.com/us/100years/stories/s3.html
[22] Ibid
[23]Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 10, 36. The "Fleet problems" were a series of 21 exercises conducted at sea between 1922 and 1940. The objective was to develop alternate means of conducting war at sea through experimentation and exploration.

that have enabled the Navy's combat success, had surrendered to cost analysis and sequestration.

THE (K)FA-18E/F SUPER HORNET

In the early 1990's, as the F-14 Tomcat was nearing its end of service life, a suitable replacement platform needed to be selected. The Tomcat, equipped with two 27,600 pound thrust General Electric engines, could loiter at its combat air patrol station 650 nm for a prolonged period of time. Initially tasked with the Fighter role, the Tomcat had an integrated weapons system that enabled it to employ beyond visual range (BVR) weapons at ranges exceeding 60 nm. Later modified to employ air-to-ground Laser Guided weapons, the F-14 became a prolific attack platform, with a long on station time and accurate employment[24].

As early as the late 1980's, proposals for the "Tomcat 21" (a modified Tomcat for use in the 21st century) as its successor were met with resistance. The Department of Defense was enamored with the FA-18's low costs, ease of maintenance and forgiving nature in the air. As related in a Congressional Research Service FA-18E/F program brief conducted in 1991-1992, Navy officials believed, "greater range/payload capabilities…were less essential for fleet defense with the demise of a Soviet threat."[25] "In the language of strategic planners, long range was an area where the Navy and the Department of Defense decided to "accept risk."[26] The Navy elected to purchase the FA-18E/F Super Hornet to replace the Tomcat. Due to the later decision to eliminate the S-3B from the air wing, the Super Hornet would also be required to assume the tanker role within the air wing.

[24] Ibid, 35
[25] Ibid, 46
[26] Ibid, 46

The Super Hornet was developed with significant mission enhancements to the older legacy Hornet. Stealth accruements that lowered the aircraft's radar cross section, a new APG-73 radar, an increased weapons payload and a greater fuel capacity each improved the tactical capabilities of the larger aircraft. Although the aircraft carried more fuel, the Super Hornet flies a less efficient flight profile than the legacy variant due to a higher drag index. As a result, the increase in fuel capacity does not proportionally translate to additional range. When simply configured with an external drop tank (not as a tanker), the lethal radius of the aircraft is approximately 700 nm. When configured with five external fuel tanks (commonly referred to as "5-Wet"), the Super Hornet is capable of providing 8,000 - 9,000 lbs of fuel give for a standard 90 minute carrier cycle[27]. Due to the high drag associated with the 5-Wet configuration and short intrinsic range of the airframe, the aircraft will deplete its fuel give at 600-700 nm, a mark that falls well short of the KA-3, KA-6 or S-3B.

The necessity for FA-18 E/F's to serve in a tanker role has the added disadvantage of diminishing the number of available assets for missions it was designed to execute. A Super Hornet squadron (tasked with tanking), will deploy with 12 aircraft[28]. Due to the standard tanker requirements in the carrier recovery stack, two-three of those aircraft will always be configured as tankers. Additionally, scheduled maintenance periods will negate the availability of another aircraft thereby decreasing the overall complement of available assets to eight. As a result, thirty three percent of assigned aircraft will not be available for combat tasking. Missions such as Combat Air Patrol, Close Air Support and Large Force Strikes are therefore limited in scope due to aircraft availability. Other missions such as ASuW and

[27] A "5-Wet" configuration consists of four drop tanks and one Aerial Refueling Store (ARS). The ARS has a hydraulically controlled hose assembly that is designed to refuel aircraft airborne.
[28] Typical FA-18E/F squadrons are designated as "tanker" squadrons. Those that are not will deploy with a total of ten aircraft.

ASW are impossible due to deficiencies in aircraft capabilities. As a result of decisions made nearly twenty years ago to prioritize ease of maintenance and sortie generation, carriers no longer possesses assets that have the capability of establishing sea control, nor does an air wing have an ability to autonomously project power long range. Due to the increased ranges associated with weapons systems developed by China, Russia and Iran, and the limited range of a carrier air wing, future conflicts will require CSGs to operate within a threat envelope or not at all.

CHALLENGES ON THE HORIZON

As previously noted, since the fall of the Soviet Union, the United States military has been largely focused on long campaigns in Iraq and Southwest Asia. The Navy's role during these conflicts has primary been as a support asset for ground forces and has conducted operations in a relatively permissive environment. As multiple states, including Russia and China, develop A2/AD capabilities, the Navy must be prepared to assume a more traditional role and assume the classic naval functions of sea control and power projection.

In January 2012, the Department of Defense released a new strategic guidance document, "Sustaining U.S. Global Leadership: Priorities for 21st Century Defense". The document states, "While the U.S. military will continue to contribute to security globally, *we will of necessity rebalance toward the Asia-Pacific region."*[29] It delineates the primary missions of the U.S. Armed Forces and includes "Project Power Despite Anti-Access/Area Denial Challenges".[30] Specifically, in response to the development of sophisticated weapons systems by China and Iran "the U.S. military will invest as required to ensure its ability to

[29] U.S. Department of Defense. *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington D.C, January 1982), 1
[30] Ibid, 4

operate effectively in anti-access and area denial (A2/AD) environments. This will include implementing the Joint Operational Access Concept, sustaining undersea capabilities, developing a new stealth bomber, improving missile defenses, and continuing efforts to enhance the resiliency and effectiveness of critical space-based capabilities."[31] Five years after the guidance was released, air wings continue to operate at the lowest organic range since the 1930's and still do not have a fixed wing platform devoted to ASuW or ASW.

The 2014 Quadrennial Defense Review reiterated this new strategic guidance. The review called for the Joint Force to "project power and win decisively" in spite of "increasingly sophisticated adversaries who could employ advanced warfighting capabilities."[32] One of these adversaries, the People's Republic of China (PRC), has developed capabilities that challenge the U.S. ability to project power.[33] Among the threats are the land based DF-21D and DF-26 Anti-Surface Ballistic Missiles (ASBMs). These systems have an estimated range of 1,000 to 1,500 nm and 1,600 to 2,160 nm, respectively. These missiles represent a modern version of the WWII A2/AD threats faced by Mitscher. Other PRC platforms, to include land-based bombers and submarines, possess the ability to lethally reach from similar distances or beyond.[34] Whether employing from land, air, surface, or sub-surface platforms, the lethal range of the PRC far surpasses the current capabilities of a carrier.

While ASBMs present a significant threat to the CSG, they arguably pose more of a threat to stationary, forward operating air bases. For the past decade, the carrier has relied on

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[31] Ibid, 4-5
[32] U.S. Department of Defense, "Quadrennial Defense Review" (2014): 14,19, quoted in Seth Cropsey et al., "Sharpening the Spear: The Carrier, the Joint Force, and High-End Conflict." *Hudson Institute Policy Study*, October 2015, 30
[33] Seth Cropsey et al., "Sharpening the Spear: The Carrier, the Joint Force, and High-End Conflict." *Hudson Institute Policy Study*, October 2015,, 30
[34] Ibid, 38.

Air Force land-based tankers as its primary source of fuel to execute the long-range strike mission. Due to the presence of the ASBMs, these assets will most likely be unavailable due to the required proximity of the tankers to the carrier and potential PRC strikes against U.S. forward operating air bases. Air Force tanker availability will also be limited with the retirement of the KC-135 which will be replaced by the KC-46A. The KC-46A is expected to replace less than half of the current KC-135 inventory, thus the potential for support will be limited.[35] In the absence of a capable, organic air wing tanker, the CSG will not be capable of projecting its power by striking land targets.

In addition to a robust ASBM arsenal, the PRC also possesses a mounting submarine threat. Independent of the CSG, land based aircraft such as P-3/8's, MQ-4's and E-3's have assumed a vital role in the detection of enemy submarines[36]. Due to the ranges associated with the PRC A2/AD threats, these platforms will not be available to integrate with the CSG and will force the carrier to combat the submarine threat organically. Since the retirement of the S-3B, the SH-60R has served as the primary carrier ASW platform. Based on the limitations associated with the helicopter (a short 125 nm combat radius and 2.7 hours of endurance), enemy submarines will operate in a relatively unmolested sea space and the CSG will be extremely vulnerable to attack.[37]

FUTURE CARRIER AIR WING FORCES

On January 15, 2017, the first operational F-35C Lightning II (JSF) arrived in NAS Lemoore, CA. The aircraft was designed to serve as a 5th Generation, stealth, long range

[35] "Assessment of U.S. Air Force: Capacity, Capability and Readiness", *2016 Index of U.S. Military Strength,* http://index.heritage.org/military/2016/assessments/us-military-power/us-air-force/
[36] Seth Cropsey et al., "Sharpening the Spear: The Carrier, the Joint Force, and High-End Conflict." *Hudson Institute Policy Study*, October 2015, 38
[37] Ibid, 39

fighter to replace the legacy variant of the FA-18. It is the largest of the JSF variants and is capable of carrying 20,000 lbs of internal fuel and a larger payload capacity than the Super Hornet. Directly correlated to the increase fuel capacity, its combat radius with internal fuel is 610 nm, 56 percent greater than the FA-18E/F.[38]

Despite the longer range, the endurance of the JSF pales in comparison to the F-14 or its predecessors. Additionally, due to the anticipated presence of an advanced PRC threat, typical strike packages will require electronic attack support provided by EA-18G Growlers. Thus, the overall strike radius will remain relatively consistent with the current air wing capabilities..[39] While the JSF will enhance the tactical capabilities of the air wing, it will not enable the carrier to operate outside of the A2/AD threat envelope and reach land based PRC targets.

Recognizing this reality, the Navy is currently pursuing an unmanned aerial refueling drone to extend the strike range of carrier strikers. In 2016, Boeing, Lockheed Martin, General Atomics and Northrup Grumman were awarded developmental deals for the MQ-25 Stingray.[40]. The airframe of the Stingray will be a redesigned variant of the X-47B Unmanned Carrier Launched Surveillance and Strike (UCLASS) program. The program successfully conducted a series of sea-based trials in 2013-2014 and proved the platform's capability to launch and recover aboard the carrier. The Navy is expected to award the contract during second quarter of 2018 with an expected Initial Operational Capability (IOC) in the mid 2020's..[41]

[38] Ibid, 39
[39] Ibid, 39
[40] Kris Osbourn, "Navy Awards MQ-25 Stingray Deal", 2016, https://defensesystems.com/articles/2016/10/24/stingray.aspx
[41] Ibid

The development of the MQ-25 Stingray is a step forward but it remains unclear what capabilities the platform will provide. It is also unclear how many of these assets will be produced (there is currently $2.1 billion earmarked in the defense budget through 2021).[42] There are also concerns surrounding the expected IOC. As evidenced by the F-35 and K-46A programs, operational completion is often delayed. Even if the aircraft meets scheduled IOC there will be a capability gap for the foreseeable future.

A SOLUTION

Returning the S-3B to an operational status would provide the Navy with an interim solution to its current deficiencies. By simultaneously assuming the organic tanker and ASW mission sets, the aircraft would immediately enable the CSG to be an offensive asset against an A2/AD threat and decrease its vulnerability to the robust enemy submarine fleet.

Due to extended campaigns in Iraq and Afghanistan, the FA-18 fleet has been depleted. Deployments and training requirements are continuing to place demands on a force that is already short 140 aircraft[43]. In addition to extending the range of air wing strike aircraft, utilizing the Viking to fill the tanker role would relieve the Super Hornet and prolong its shortened service life. Free from the responsibilities of tanker configured Super Hornets, air wings could provide 25 percent more assets to assume the tactical roles the platform was designed to execute. More available Super Hornets would directly correlate to enhancing the CSGs ability to both strike the enemy and defend itself with Combat Air Patrols against enemy aircraft. Finally, despite the anticipated availability limitations

[42] Naval Drones, *MQ-25 Stingray*, http://www.navaldrones.com/MQ-25-Stingray.html
[43] Dr. Jerry Hendrix, "Retreat from Range: The Rise and Fall of Carrier Aviation." *Center for a New American Security* October 2015, 55

associated with the KC-46A, the Viking will enable the air wing to organically provide requisite fuel to strikers and perform as it once did in Japan and Vietnam.

Although restoring the S-3B would immediately enhance the capabilities of the carrier air wing, there are challenges associated with the proposal. Reintegrating the Viking would require the Navy to efficiently restore the training pipeline (for both aviators and maintainers), recreate the maintenance supply chain and develop a personnel career plan. Although these tasks would require a significant monetary commitment, gapping the problem until the MQ-25 reaches an operational status is not prudent. The presence of advanced threats coupled with the depletion of the Super Hornet fleet, has created an urgent need for Navy leaders to identify and implement a solution. Despite the logistical challenges associated with a Viking return, failure to restore the platform could lead to insurmountable risk.

The future of carrier aviation is uncertain. Although the F-35C is a highly capable strike-fighter aircraft, concerns remain about its ability to withstand an extended carrier deployment. The MQ-25 is in the infancy of development and should not be relied upon to combat the threats facing the United States today. "The Boneyard" currently houses 87 mission capable S-3Bs with an average available service life of approximately 8,000-9,000 hours. Restoring these aircraft would serve as an expeditious, cost effective method to improve carrier capabilities and prolong the life of existing Super Hornet aircraft. As the Navy's focus transitions to a non-permissive environment, it is vital for the aircraft carrier to be able to project power from an extended range. Currently, this is not possible. Poor decision making and extended campaigns have depleted air wing forces. Restoring the S-3B

will serve as a method to mitigate these realities and enhance the mass, range and firepower the CSG was designed to project.

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