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**NAVAL WAR COLLEGE  
Newport, R.I.**

**THE HUMAN ELEMENT OF OPERATIONAL FIRES: WHAT THE STAND-IN  
FORCE SHOULD DO TO INCREASE THE EFFECTIVENESS  
OF MARTIME STRIKES**

**The contents of this paper reflect my own personal views and are not necessarily  
endorsed by the Naval War College or the Department of the Navy.**

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## Introduction

In addition to providing the joint force with scouting and firepower capabilities inside the first island chain, the Stand-in Force (SIF) should significantly increase the effectiveness of joint maritime strikes by decreasing enemy defensive awareness (DA). Maritime experts may read this thesis statement and begin to think of the SIF as a force that could decrease enemy defensive awareness (DA) by neutralizing adversary scouting assets or conducting electronic attacks or offensive cyber operations to deny the adversary command and control of critical information, which would lower adversary defensive awareness. Although this intuition and approach are sound, the traditional “anti-scouting” and “counter-command and control measures” approach to the maritime fires problem set misses a key element in today’s maritime missile warfare, human cognition. This paper synthesizes the Maritime Advanced Warfighting School’s (MAWS) Relative Combat Power Analysis (RCPA) model for anti-ship cruise missile warfare with the United States Marine Corps concept of Stand in Forces (SIF) to lower an enemy task group’s DA in the following ways. First, *the SIF should create patterns of lower DA among enemy task groups*, making them more vulnerable without neutralizing their defensive capabilities. Second, *the SIF should alter enemy task group perceptions of its threats*, forcing the enemy to change task group formations in a way advantageous to operational maritime strikes. Third, *the SIF should desensitize the adversary to indications of operational level maritime strikes and decrease enemy task group decision makers’ confidence in their data*, to delay enemy defensive actions to operational maritime strikes. This paper will orient the reader to the fundamentals of DA and the SIF, describe the

“what” and “why” behind the SIF’s need to decrease DA in support of the joint force, and offer options for “how” the SIF could lower adversary task group DA.

### **What is defensive awareness and why is it so important?**

The Maritime Advanced Warfighting School defines defensive awareness as a surface combatant’s operators and decision makers ability to:<sup>1</sup>

- Understand what the threats to the ship are. (Are they scouting for the right threat?)
- Technically receive observations from scouting capabilities. (Do they have the right systems on? Are the systems functional?)
- Ability to understand that an attack is underway. (Can they rapidly orient to the information they are observing?)
- Ability to properly control and effectively operate its defensive assets. (Can they communicate the defensive decisions required and conduct the defensive action (engage with point defense/decoys/EW) properly and timely enough to defeat the threat?)

DA is not what CAPT Wayne Hughes would describe as “anti-scouting” or “C2 Countermeasures.”<sup>2</sup> It is not denying the adversary their sensors by neutralizing them kinetically or non-kinetically. It is not conducting electronic attack against a communications

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<sup>1</sup> LtCol Sama, Anthony USMC. “Relative Combat Power Analysis” (PowerPoint presentation, Maritime Advanced Warfighting School, Newport, RI, December 2022).

<sup>2</sup> CAPT Hughes, Wayne. Fleet Tactics and Naval Operations Third Editions (Naval Institute Press, 2018), 168-170.

link between two enemy ships in order to deny their ability to coordinate a defense. DA is focused on the ability of the ship's crew and its decision makers to understand their true threat, plan how they will sense and defend against it, understand that they are under attack, and properly fight the defensive action.<sup>3</sup> This defensive action is typically done by employing long range or short range air defenses as part of a single ship or multi-ship task group.<sup>4</sup> Viewing maritime engagements or maritime strikes in this manner opens up multiple paths to degrading an adversary's ability to defend a ship. To understand the ramifications of these new paths, an appreciation of the MAWS RCPA model and DA's role in determining salvo effectiveness is key.

Defensive awareness is unique and worthy of study because it provides exponential advantages to an attacker if it is low. Two scenarios will be used to describe how a low defensive awareness and a high defensive awareness affects the defensive combat power of individual ships. Each example will use the same type of ship with the same baseline capabilities and only alter the DA. These examples will use the People's Liberation Army Navy Luyang II Guided Missile Destroyer as the baseline ship. The Luyang II has the capacity to employ (48) HHQ-9 long range surface to air missiles, two Type 730 Close in Weapons Systems, and one Type 210 100mm gun,<sup>5</sup> making it a strongly defended naval asset. When computing the Luyang II DDG defensive combat power using the MAWS RCPA model, without including the defensive awareness as an input, a baseline Luyang II

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<sup>3</sup> LtCol Sama USMC, MAWS RCPA PowerPoint.

<sup>4</sup> Emch, George F. n.d. "Fleet Air Defense and Technology." Jhuapl.edu. Accessed April 19, 2023. <https://secwww.jhuapl.edu/techdigest/Content/techdigest/pdf/V11-N1-2/11-01-Emch.pdf>.

<sup>5</sup> "Pacific Challenge Scenario: Combined Intelligence Preparation of the Environment" (PowerPoint presentation, Maritime Advanced Warfighting School, Newport, RI, February 2023).

DDG would have the defensive combat power of 28.<sup>6</sup> This means that the Luyang II DDG could defend against 28 incoming anti-ship cruise missiles with a shoot-shoot-look shot doctrine without suffering any hits. Having described the baseline defensive capabilities of this ship, the following scenarios will begin to alter the DA of the ship to illustrate its impact on the ship's ability to defend against ASCMs.

The first scenario focuses on understanding how a seemingly highly defensive ship can be defeated with only a few ASCMs if the ship possesses low DA. Assume that the ship is transiting from its homeport to a training area that it is familiar with in peacetime. The Luyang II DDG is not operating all of its organic scouting capabilities, is not at general quarters, and has just taken on a new combat information center team of naval officers for this training event. We would assess the defensive awareness of the Luyang II DDG as low (0.1) in this scenario. When inputting this low DA into the MAWS RCPA model, our output for defensive combat power would be 2, meaning that it could only defend against 2 ASCMs. That would mean that, in theory, only 3 Harpoons would be needed to hit this vessel and achieve a mission kill or take it out of action. A historical example of such a scenario would be the Moskva, the flag ship of the Russian Black Sea Fleet and a guided missile cruiser who possessed a baseline defensive combat power of 61, meaning that she should have been able to defend against 61 ASCMs.<sup>78</sup> Media reports highlight that the Moskva may not have been

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<sup>6</sup> LtCol Sama USMC, MAWS RCPA PowerPoint. The MAWS RCPA Model for Defensive Combat Power: [(Long Range Surface to Air Missiles/Shot Doctrine)+(Point Defensive Missiles/Shot Doctrine)+Point Defense Gun Systems] + (Soft Kill Decoy Systems+Soft Kill Jammer Systems) x (Defensive Awareness)=Defensive Combat Power. Variables used for the Luyang II are derived from the MAWS unclassified Pacific Challenge Scenario with values of Long Range Surface to Air Missiles of 48, Shot Doctrine of 2, Point Defensive Missiles of 0, Point Defense Guns of 3, Soft Kill Decoy Systems of 1 and Soft Kill Jammer Systems as 1.

<sup>7</sup> Saunders, Stephen, ed. 2009. Jane's Fighting Ships, 2009-2010. 112th ed. Coulsdon, England: Jane's Information Group.

<sup>8</sup> Using the same MAWS RCPA Model in Footnote 6, the values are updated to reflect the unclassified Wikipedia capabilities of the Moskva: Long Range Surface to Air Missiles 64, Shot Doctrine 2, Point Defense

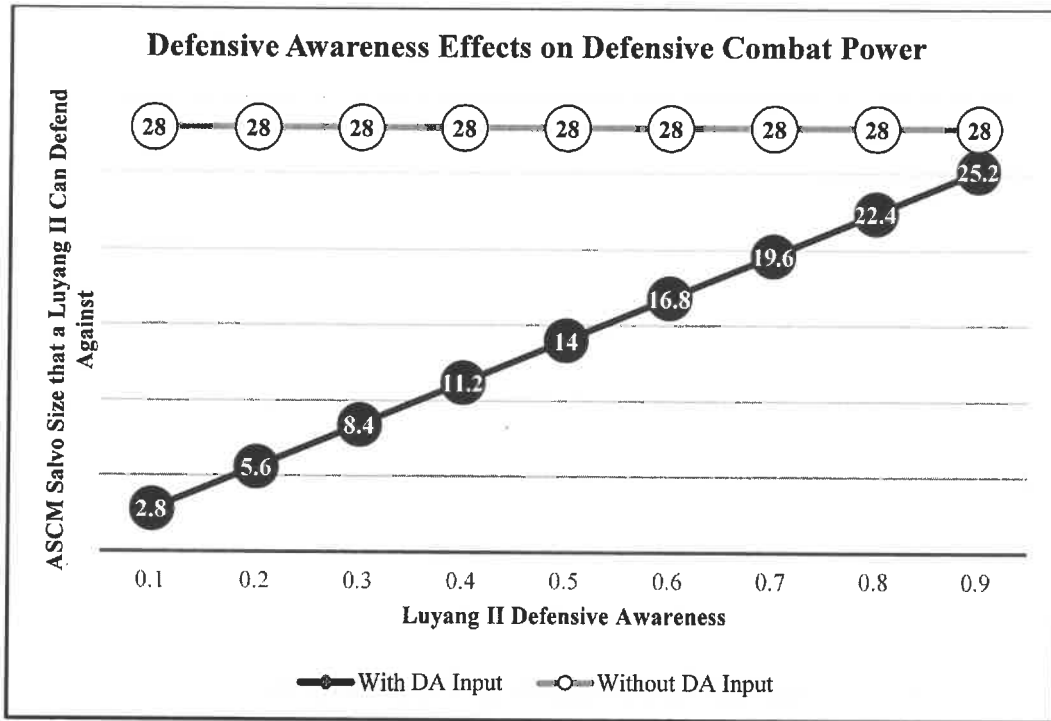
operating its radar the night of the attack, its crew suffered from poor training, and was subsequently sunk by two hits from a shore launched anti-ship cruise missile.<sup>9</sup> Even though the Moskva possessed high defensive combat power, its low defensive awareness allowed a small salvo size to achieve hits on the ship. The second scenario will describe how a high DA impacts the ships' ability to defend against ASCMs.

A ship with high DA maximizes its ability to defend itself against ASCMs. The second scenario for the Luyang II DDG places the ship in armed conflict, transiting towards a known threat axis with an experienced and rested crew that is operating all of its sensors while receiving non-organic sensor support. This scenario replicates a ship operating with a high (.9) DA resulting in a MAWS RCPA model output of defensive combat power of 25, meaning that it would theoretically take 26 Harpoons to achieve a hit on the vessel. The change in the defensive awareness between the first and second scenarios results in a difference of 22 Harpoons required to achieve a hit, which provides a wide range of salvo effectiveness when planning for a maritime strike. To further illustrate how DA affects adversary defensive awareness and the required salvo size needed to achieve a hit, see Tables 1 and 2 which highlight that a smaller salvo size is required to achieve a hit on a target with lower defensive awareness.

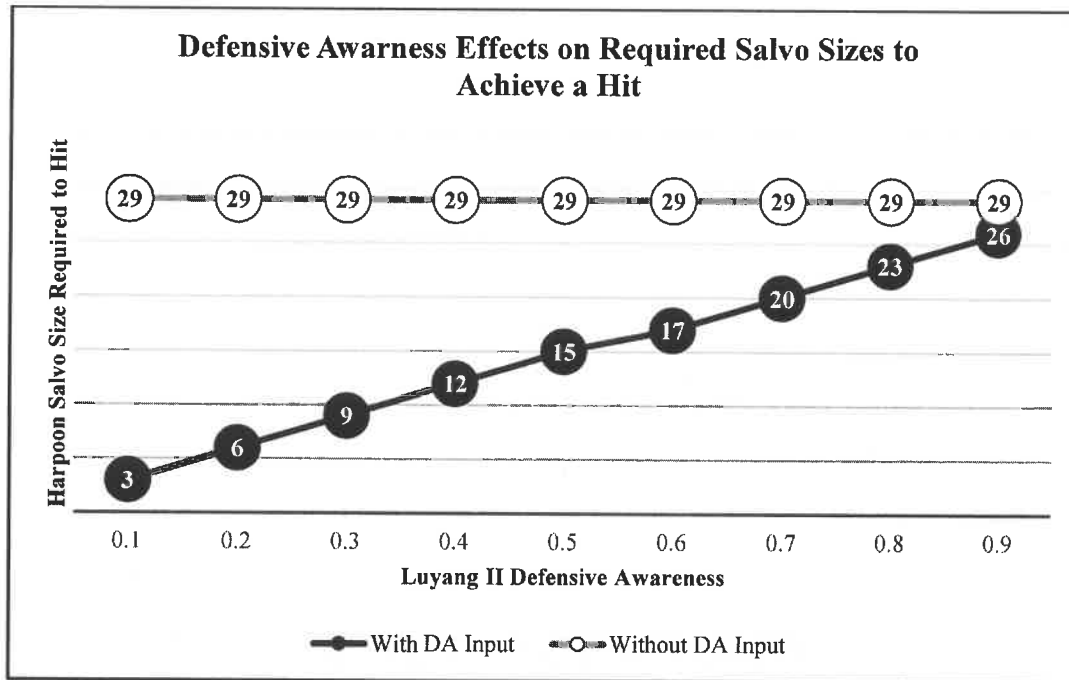
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Missiles 40, Shot Doctrine 2, Point Defensive Gun Systems 7, Soft Kill Decoy Systems 1, Soft Kill Jammer Systems 1.

<sup>9</sup>“Axe, David. 2022. “The Russian Cruiser ‘Moskva’ Dominates the Black Sea.” Forbes. January 20, 2022. <https://www.forbes.com/sites/davidaxe/2022/01/20/the-russian-cruiser-moskva-dominates-the-black-sea/?sh=16abf1275e57>.



**Table 1: Defensive Awareness Effects on Defensive Combat Power.** This table illustrates how considering DA when evaluating the defensive combat power of a ship impacts how effective a ship can defend itself.



**Table 2: Defensive Awareness Effects on Required Salvo Sizes to Achieve a Hit.** This table illustrates how fewer harpoons may be required to achieve a hit when factoring in DA when evaluating a ship's defensive combat power.

To optimize munitions capacity and reduce risk to force, the ideal composition of a salvo size would provide just enough ASCMs to achieve a hit while not wasting excess munitions or exposing firing platforms that were not needed in the salvo size. Therefore, if a planner could sequence operations to lower the defensive awareness of the target Luyang II DDG to low, in theory, a smaller salvo sized would be required and fewer forces would be required to achieve the desired effects. If one were to extrapolate the difference in salvo sizes from the two scenarios above (3 in the first scenario and 26 in the second scenario) and determine the combat power required to generate it, the need to lower the defensive awareness becomes increasingly appealing to the joint force. For example, to generate the salvo size required on the first scenario (Luyang II DDG with low DA) a section of F/A-18E/F super hornets<sup>10</sup> launched from one CSG or one Flight I Arleigh Burke class US DDG<sup>11</sup> would be sufficient to generate a salvo of 3 harpoons and achieve a hit. However, the second scenario (wartime Luyang II DDG with high DA) would require a strike package of (13) F/A-18E/F super hornets or four Flight I Arleigh Burke DDGs to generate a salvo of 26 harpoons to achieve a hit.<sup>12</sup> The second scenario requires a significant increase in resources and coordination up to the operational level, while the first scenario could be accomplished at the tactical level with limited coordination. Another way to view this opportunity is to view it

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<sup>10</sup> Filipoff, Dmitry. n.d. "Fighting DMO, Pt. 2: Anti-Ship Firepower and the Major Limits of the American Naval Arsenal." Cimsec.org. Accessed April 19, 2023. <https://cimsec.org/fighting-dmo-pt-2-anti-ship-firepower-and-the-major-limits-of-the-american-naval-arsenal/>.

<sup>11</sup> Karampela, Elli. 2023. "Arleigh Burke-Class (Aegis) Destroyer, USA." Naval Technology. January 29, 2023. <https://www.naval-technology.com/projects/burke/>.

<sup>12</sup> MAWS RCPA Model calculations above showed that a Luyang II DDG with high Defensive Awareness required salvo size 26 to achieve a hit. Unclassified sources (footnote 10) describe that an F/A-18E/F is capable of employing 2 Harpoons. Therefore to achieve a salvo size of 26 harpoons, a strike package of at least 13 F/A-18E/F aircraft are required. Unclassified sources (footnote 11) describe that a Flight I Arleigh Burke DDG possesses 8 harpoons, therefore four Flight I Arleigh Burke DDGs are required to achieve a salvo size of 26 harpoons. The same considerations were used when calculating the resources required to achieve a hit on the Luyang II with a lower DA.

from the lens of, “I have to strike this Luyang II DDG, but I can only muster 6 ASCMs against it over a two-day window with what I have now. How can I increase the effectiveness of this salvo, so I don’t waste my munitions capacity and place the platforms and crews at risk for a strike that may fail to fire effectively first?” If it is known that a target set must be serviced in a certain period of time, options are available to lower the DA of the target set to increase the effectiveness of limited ASCMs. Both of these opportunities are able to be created without employing CRUDES and CSG ASCMs or endangering the strike platforms, by using the stand in force in novel ways.

### **What is the Stand-in Force?**

In December of 2021, the Marine Corps released its Concept for Stand-in Forces to provide the nation with an “operational level response that allows naval forces to retain the initiative despite a rival’s use of counter-intervention efforts.”<sup>13</sup> The concept describes the SIF as “small but lethal, low signature, mobile, relatively simple to maintain and sustain forces designed to operate across the competition continuum within a contested area as the leading edge of a maritime defense-in-depth in order to intentionally disrupt the plans of a potential or actual adversary. Depending on the situation, stand-in forces are composed of elements from the Marine Corps, Navy, Coast Guard, special operations forces, interagency, and allies and partners.”<sup>14</sup> This paper focuses on the Marine Corps portion of the SIF and scopes these capabilities to III Marine Expeditionary Force over the time period 2027-2030.

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<sup>13</sup> General Berger, David USMC. 2021. “A Concept for Stand-in Forces.” [https://www.hqmc.marines.mil/Portals/142/Users/183/35/4535/211201\\_A%20Concept%20for%20Stand-In%20Forces.pdf](https://www.hqmc.marines.mil/Portals/142/Users/183/35/4535/211201_A%20Concept%20for%20Stand-In%20Forces.pdf).

<sup>14</sup> Ibid.

Highlights of III MEF capabilities as the stand in force include the 1st Marine Aircraft Wing, capable of deploying to austere airfields and conducting sea denial, scouting, and offensive anti-air warfare with fifth generation platforms, in addition to supporting the 3d Marine Division.<sup>15</sup> The 3d Marine Division is capable of rapidly deploying Marine Littoral Regiments, each capable of employing anti-ship cruise missiles and scouting in the littorals,<sup>16</sup> and traditional infantry regiments to be able to seize and defend key maritime terrain. These two primary elements of III MEF provide the joint force with rapidly deployable, tailored, and agile combat formations to advance the naval campaign in the first island chain. Simply put, the naval operational commander can leverage multiple task-organized Marine formations inside the threat ring of the adversary in multiple ways. These formations have been viewed in concepts as primarily contributing towards adding firepower to maritime strikes, providing the scouting for maritime strikes,<sup>17</sup> and have not yet been considered in lowering the enemy's defensive awareness. This paper does not intend to promote or critique the concept for the SIF, it only assumes its concepts and capabilities are being employed in the first island chain.

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<sup>15</sup> "F-35C Brings Advanced Strike Capabilities to Jungle Warfare Exercise." n.d. United States Navy. Accessed April 19, 2023. <https://www.navy.mil/Press-Office/News-Stories/Article/2946257/f-35c-brings-advanced-strike-capabilities-to-jungle-warfare-exercise/>.

<sup>16</sup> Courtesy Story. 2023. "Marine Littoral Regiment (MLR)." United States Marine Corps Flagship. January 11, 2023. <https://www.marines.mil/News/News-Display/Article/2708146/marine-littoral-regiment-mlr/>.

<sup>17</sup> Easley, Mikayla. n.d. "Improved Sensors, Loitering Munitions on Marine Corps Wishlist." Nationaldefensemagazine.org. Accessed April 19, 2023. <https://www.nationaldefensemagazine.org/articles/2022/6/17/improved-sensors-loitering-munitions-on-marine-corps-wishlist>.

## How the Stand in Force Can Lower Enemy Defensive Awareness

First, the SIF can create patterns of lower DA among enemy task groups, making them more vulnerable without kinetically neutralizing their defensive capabilities. The SIF develops these patterns of lowered DA by creating conditions that force an adversary to sustain general quarters longer than 48 hours, which impairs adversary cognitive functions. The degradation of the adversary's cognitive functions can be compounded by conducting operational maritime strikes outside of the enemy's circadian rhythm while exploiting the vulnerability of adversary ships that have smaller crews and are unlikely to be able to sustain longer periods at general quarters.

Forcing an adversary task group to sustain general quarters for longer than 48 hours will impair the cognition of its key decision makers and its crews. A 2007 study by a sleep research unit in Finland defined sleep deprivation as generally between 24-72 hours and stated that the "decrease in attention and working memory due to sleep deprivation is well established. Vigilance is especially impaired, but a decline is also observed in several other attentional tasks."<sup>18</sup> Sleep deprivation's decline in vigilance and other attentional tasks is further supported by a 1990 U.S. Navy psychological study which found that, "The negative effects of sustained readiness during Condition I or II are cumulative, and involve degradation of critical thinking, reaction time, accuracy, memory, coordination, communication, and crew mission integrity."<sup>19</sup> These psychology studies are reinforced by

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<sup>18</sup> Alhola, Paula, and Päivi Polo-Kantola. 2007. "Sleep Deprivation: Impact on Cognitive Performance." *Neuropsychiatric Disease and Treatment* 3 (5): 553–67.

<sup>19</sup> R. G. Burr, L. A. Palinkas, G. R. Banta, M. W. Congleton, D. L. Kelleher, C. G. Armstrong. 1990. "PHYSICAL AND PSYCHOLOGICAL EFFECTS OF SUSTAINED SHIPBOARD OPERATIONS ON U. S. NAVY PERSONNEL." Dtic.Mil. August 1990. <https://apps.dtic.mil/sti/pdfs/ADA224791.pdf>.

combat experience from the U.S. Navy's lessons conducting Radar Pickets while defending against masses of kamikazes near Okinawa during World War II. The CO of USS Calhoun stated, "From dawn of Love day until Love plus five, except for one night retirement and fueling, Calhoun was assigned to radar picket duty, most of the time controlling a CAP. Except when raids occurred or no CAP was present in the area, CIC personnel both of ship and CASCU fighter director team stood watch and watch...It is recommended, therefore, that if possible, fighter director DD's be relieved on station at least every 48 hours."<sup>20</sup> Additionally the Commander of Destroyer Division 126 stated, "Radar Picket duty is very trying on ships. They fully realize that ceaseless vigilance is their only salvation and that to relax for an instant and give the suicide attacker the advantage of surprise is suicide for them. The Battery, Engineering Plant and Combat have to be ready to function at 100% efficiency, immediately, 24 hours a day. *Four days*, it is believed, is about the maximum length of time a ship can maintain the peak alertness required for picket duty in this area."<sup>21</sup> Sustaining heightened stages of alert, or in this case maintaining general quarters, will result in the cumulative cognitive decline in key decision-making capabilities vital to the rapid decision making required for defensive action in missile warfare.

Additionally, the same 1990 U.S. Navy psychological study notes that extending the period of watch or general quarters further increases the fatigue of the crew,<sup>22</sup> suggesting that if the crew perceived that general quarters were to end soon, and then be extended, they may

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<sup>20</sup> "Battle Experience - Radar Pickets." n.d. Navy.Mil. Accessed April 19, 2023. <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/b/battle-experience-radar-pickets.html>.

<sup>21</sup> Ibid.

<sup>22</sup> R. G. Burr, L. A. Palinkas, G. R. Banta, M. W. Congleton, D. L. Kelleher, C. G. Armstrong. 1990. "PHYSICAL AND PSYCHOLOGICAL EFFECTS OF SUSTAINED SHIPBOARD OPERATIONS ON U. S. NAVY PERSONNEL." Dtic.Mil. August 1990. <https://apps.dtic.mil/sti/pdfs/ADA224791.pdf>.

fatigue at an increased rate. This would make the crew more susceptible to short bursts of high threat actions, separated by short lulls in activity in order to maximize fatigue of a crew at general quarters. After creating a pattern of lowered defensive awareness by creating conditions of sustained general quarters for 48 hours and causing sleep deprivation, the joint force can take actions to further compound the enemy's situation.

The joint force can take advantage of the vulnerabilities of smaller crewed ships that are more susceptible to fatigue. The 1990 U.S. Navy study mentioned previously, found that U.S. Frigates experienced higher levels of fatigue when compared to U.S. cruisers, which "may be attributed to longer periods of watch standing and less time available for rest because of its small complement of personnel."<sup>23</sup> This study suggests that ships that possess insufficient crew capacity to facilitate multiple watch rotations are more likely to experience fatigue than those ships with greater crew capacity and watch rotations. Therefore, the joint force could take advantage of the lower DA of adversary ships in a task group with smaller crews when planning salvo allocations. The joint force should consider using the SIF to strike these targets effectively with less exquisite weapons, and allow the joint force to focus on higher value units in the task group that may be more difficult to neutralize. These effects can be compounded again by leveraging an additional factor in planning.

Attacking a task group during periods outside of its circadian rhythm reduces their ability to recognize new threats. A 1990 Florida Gulf Coast University study found that "during circadian "off-times", participants were more likely to rely on stereotypes when

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<sup>23</sup> R. G. Burr, L. A. Palinkas, G. R. Banta, M. W. Congleton, D. L. Kelleher, C. G. Armstrong. 1990. "PHYSICAL AND PSYCHOLOGICAL EFFECTS OF SUSTAINED SHIPBOARD OPERATIONS ON U. S. NAVY PERSONNEL." Dtic.Mil. August 1990. <https://apps.dtic.mil/sti/pdfs/ADA224791.pdf>.

making judgments relative to circadian “on-times.””<sup>24</sup> While this study was focused on discrimination, it highlights that when individuals make observations outside of their typical sleeping pattern, they will “bin” observations into expected categories. Additionally, engaging at night is supported by previous naval experience. U.S. Navy 1934 War Instructions warned, “At night the superior or equal force risks forfeiture of its superiority or equality of its most valuable asset, its coordinated hitting power.”<sup>25</sup> While the context of the night in 1934 and throughout the early years of World War II meant that scouting information was limited at night, today, modern-day sensors diminish the effects of operating in the maritime environment at night. However, the cognitive dimension of interrupted sleep cycles has not changed since before World War II, and continues to be a seam that can be exploited today. Therefore, it is reasonable to conclude that individuals operating outside of their usual circadian rhythm find it more challenging to rapidly understand new information that they have not grown accustomed to. This means that the joint force can take advantage of an adversary’s crew rest patterns by attacking outside of their circadian window and in ways they have not previously observed, to increase the effectiveness of operational maritime strikes.

The SIF has the capability and capacity to force an adversary task group to sustain general quarters for 48 hours to lower the task group’s defensive awareness and can strike smaller-crewed ships to facilitate the joint force focusing its exquisite capabilities on higher value targets. For example, the Marine Division can employ multiple individual coastal

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<sup>24</sup> Bodenhausen, Galen V. 1990. “Stereotypes as Judgmental Heuristics: Evidence of Circadian Variations in Discrimination.” *Psychological Science* 1 (5): 319–22. <https://doi.org/10.1111/j.1467-9280.1990.tb00226.x>.

<sup>25</sup> War Instructions, United States Navy, FTP 143 (1934) [hereafter FTP 143], World War II Command File, Chief of Naval Operations, box 108, Operational Archives, Naval Historical Center [hereafter OA/NHC], pp. 11–13

defense cruise missiles with its Marine Littoral Regiments (MLRs) to present an ASCM threat to the task group and keep it at general quarters or, destroy lesser-crewed vessels. A single battery of the Navy Marine Corps Ship Interdiction System (NMSIS) possesses 64 Naval Strike Missiles (NSM)<sup>26</sup> which can be creatively employed over 48 hours to present different threat axis to the enemy task group. The Marine Division can employ its High Mobility Artillery Rocket Systems (HIMARS) against the task group during windows that the NSMs are not firing, which will force the Task Group to respect the inbound trajectory of its flight profile and keep it at general quarters. These NMSIS and HIMARS capabilities can be rapidly deployed to new locations with the Marine Aircraft Wing KC-130Js to expand their reach if the task group maneuvers away from the first CDCM threat.<sup>27</sup>

The SIF also has multiple options that do not require employing munitions and that can fatigue adversary forces beyond the littorals. The Marine Aircraft Wing (MAW) can keep threats further out to sea at alert by surging air operations to facilitate persistent F-35 strike packages near their optimal ASCM launch boxes or by conducting electronic attacks<sup>28</sup> while maintaining their low observable profile to keep the Task Group at alert. The MAW could employ their MQ-9s to shadow the Task Group or deploy bulk chaff to alert the task group, while the Marine Division could utilize their AN/TPS-80 Ground/Air Task-Oriented Radar (G/ATOR) radar in their MLR to illuminate task group Airborne Early Warning helicopters. Additionally, the SIF could consider integrating the DARPA/USAF X-61A

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<sup>26</sup> LaGrone, Sam. 2021. "Anti-Ship Missiles Top Marines \$2.95B Fiscal Year 2022 Wishlist." USNI News. June 2, 2021. <https://news.usni.org/2021/06/02/anti-ship-missiles-top-marines-2-95b-fiscal-year-2022-wishlist>.

<sup>27</sup> Axe, David, "The F-35: The New Way the Marines Sink Enemy Warships?" The National Interest. Accessed April 19, 2023. <https://nationalinterest.org/blog/reboot/f-35-new-way-marines-sink-enemy-warships-186496>.

<sup>28</sup> "Manufacturing Advanced Block 4 F-35 Electronic Warfare Systems to Defeat Evolving Threats." n.d. Baesystems.com. Accessed April 19, 2023. <https://www.baesystems.com/en-us/article/manufacturing-advanced-block-4-f-35-electronic-warfare-systems-to-defeat-evolving-threats>.

Gremlin Air Vehicle swarms<sup>29</sup> with the MAW KC-130J fleet to provide an air launched and air recoverable munitions and unmanned sensor capability to create the most logistically feasible option for sustainable DA operations. These unclassified options provide sufficient capability, capacity, and flexibility to force an adversary task group to sustain general quarters for 48 hours, while providing the depth in firepower to strike smaller-crewed ships when the joint force requires effects.

Second, the SIF can alter enemy task group perceptions of its threats, forcing the enemy to change task group formations or commit its scouting assets in ways advantageous to operational maritime strikes. During World War II, the allies used “chaff, radar-reflecting balloons and wire cages attached to floats, corner reflectors on small ships, and even false-target generators...”<sup>30</sup> Traditionally, readers may view the use of these types of capabilities as countermeasures to deny the enemy vital scouting information and protect an attack that was in progress. But, when used collectively to achieve a greater cognitive effect, they actually were used to “convince enemy radars that a major naval force was operating in a given area.”<sup>31</sup> This trend continued after World War II, where the “U.S. Navy periodically demonstrated against the SOSS (Soviet Ocean Surveillance System) during the Cold War, decoy groups can draw reconnaissance-strike resources away from a main force in EMCON.”<sup>32</sup> These historical examples describe how a properly conceived and executed deception plan in the maritime domain can commit an adversary to expend scarce scouting

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<sup>29</sup> Hambling, David. n.d. “DARPA Gremlin Swarm Will Carry Weapons or Sub-Drones and Re-Arm Mid-Air.” *Forbes*. Accessed April 20, 2023. <https://www.forbes.com/sites/davidhambling/2021/06/17/darpa-gremlin-swarm-drones-to-carry-weapon-and-re-arm-mid-air/?sh=3497cfe16e59>.

<sup>30</sup> Solomon, Jonathan F. n.d. “Maritime Deception and Concealment: Concepts for Defeating Wide-Area Oceanic Surveillance- Reconnaissance-Strike Networks.” *Usnwc.edu*. Accessed April 19, 2023. <https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1413&context=nwc-review>.

<sup>31</sup> *Ibid.*

<sup>32</sup> *Ibid.*

resources. This paper does not seek to use deception as a means or an end, but recognizes that an adversary will respect and respond to changes in their perception of the threat environment when it comes to their formation and employment of resources.

The SIF can conduct actions inside the first island chain to shape how the adversary perceives its threats, organizes its formations, and employs its scouting assets and these actions can be enhanced by deceptive actions. For example, an adversary naval task group screening a maritime choke point would prefer to defend against salvos of air launched cruise missiles in a wedge formation and employ its limited helicopter based long range radars along the perceived threat axis (threat axis 1). However, this task group is now threatened by the presence of air and ground launched anti-ship cruise missiles from a different axis (threat axis 2), presenting two primary threat axes. This task group may consider it prudent to adjust its formation to unmask all of its air search and tracking radars towards the two threat axes at the same time, making the original threat axis (threat axis 1) less effective than it originally was. The simple perception of this threat may drive the changing of a formation beneficial to a threat along a different axis. Therefore, the SIF should consider presenting additional threat axis to adversary task groups in ways that force the adversary to either change their formation or divide their scouting capacity which increase the effectiveness of operational maritime strikes.

Third, the SIF can delay enemy defensive actions by desensitizing the adversary to indications of operational level maritime strikes thereby reducing enemy task group decision makers' confidence in their understanding of the threat they are facing. Desensitizing the adversary begins with reinforcing the adversary's perceptions of the indications they will face. This is done by taking advantage of human limitations in decision-making to present an

adversary with an indication that they would expect to observe. A 2000 U.S. Navy study on the cognitive factors of air defense using U.S. naval offers found that air defense officers are more likely to focus on inconsistencies in observations, associate them with higher threats, and are more likely to identify inconsistencies during “tense” situations.<sup>33</sup> Furthermore, the study highlighted how the geopolitical situation determined the threshold of how much of a threat these inconsistencies were.<sup>34</sup> This evidence suggests that individuals perceive inconsistencies as threats and the threat situation drives how they react to each inconsistency. Therefore, if an adversary air defense operator consistently receives indications that are expected of a maritime strike, but the strike does not occur, and these actions are repeated, the individual may no longer view the indications as a high threat over time. Although further study on the desensitization of air defense operators is required, it is plausible that individuals presented with repeated indications of threats will dilute the weight of their responses over time. Therefore, the SIF should consider replicating key indicators that task group air defense operators will observe prior to operational maritime strikes in order to delay the defensive actions taken by the task group and increase the effectiveness of the maritime strikes. The SIF could replicate these key indicators by employing its HIMARS, NSM, Gremlins, and F-35s along the same threat axis as operational maritime strikes during the 48 hours prior to the strike that are designed to fatigue the enemy task force. Additionally, the SIF could program electronic attack capabilities to mimic the electronic

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<sup>33</sup> Liebhaber, Michael J., Engineering Group, and Suite 200 San Diego. n.d. “Naval Air Defense Threat Assessment: Cognitive Factors and Model.” [Dodccrp.org](http://www.dodccrp.org). Accessed April 19, 2023. [http://www.dodccrp.org/events/2000\\_CCRS/html/pdf\\_papers/Track\\_4/029.pdf](http://www.dodccrp.org/events/2000_CCRS/html/pdf_papers/Track_4/029.pdf).

<sup>34</sup> Ibid.

signatures of operational maritime strikes and employ them from different Marine Air Wing platforms during the same 48 hours to achieve similar effects.<sup>35</sup>

Another way to delay an adversary's defensive actions is to make them question the validity of the information they are receiving, to effectively make them question whether an actual attack is under way. As previously mentioned, during the Cold War, the U.S. utilized deception against the SOSS to force the Soviets to commit scouting resources away from the main U.S. force. A Georgetown University paper recognized the utility of these Cold War actions and recognized that similar techniques in peacetime could be used to decrease an adversary's confidence in their information.<sup>36</sup> "By routinely denying information to, deceiving, or plausibly threatening to deceive the adversary's surveillance and reconnaissance sensors, EW and tactical deception can cause the adversary's operational and tactical-level commanders to lose faith in their ability to obtain reliable situational pictures."<sup>37</sup> Furthermore, the paper concluded that such actions may "make adversary commanders more hesitant to commit reconnaissance-strike assets into the field."<sup>38</sup> The continued desensitization of the adversary to indications of a maritime strike, without the actual strike occurring, could have the additional effect of making the key task group decision makers doubt when an actual attack is underway, even when their air defense operators have recognized the inconsistencies of an actual attack. Therefore, actions to desensitize adversary air defense operators can, over time, both delay air defense operator

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<sup>35</sup> Manaranche, Martin. 2021. "USMC MV-22B Osprey Test New Electronic Warfare Weapon System." Naval News. July 12, 2021. <https://www.navalnews.com/naval-news/2021/07/usmc-mv-22b-osprey-test-new-electronic-warfare-weapon-system/>.

<sup>36</sup> Thesis, A. n.d. "Defending the Fleet from China's Anti-Ship Ballistic Missile: Naval Deception's Roles in Sea-Based Missile Defense." Georgetown.edu. Accessed April 19, 2023. <https://repository.library.georgetown.edu/bitstream/handle/10822/553587/solomonJonathan.pdf>.

<sup>37</sup> Ibid.

<sup>38</sup> Ibid.

reactions and induce doubt upon the task group key decision makers when actual maritime strikes occur. The SIF can achieve these effects during the 48 hours before an operational maritime strike by utilizing the electronic attack capabilities from the Marine Radio Battalion in the Marine Air Wing and the Marine Division to, at times, deny the adversary key scouting information. These operations would be sequenced with operations to keep the enemy at general quarters, deconflicted with operations designed to mimic indicators of operational maritime strikes, and concurrent with operations to present new threat axes to the adversary.

### **Recommendations**

The following list contains recommended tasks and planning considerations for implementing this analysis into a campaign requiring operational maritime strikes:

- SIF Task: Cause adversary Task Groups to sustain general quarters continuously for 48-72 hours preceding an operational maritime strike in order to cause the cumulative cognitive decline in key decision-making capabilities vital to the rapid decision making required for defensive action in missile warfare.
  - Method: The most effective means of achieving this effect are to conduct short bursts of a high threat actions separated by short constants of lower-level anomalies in order to maximize fatigue of a crew at general quarters.
- SIF Task: Create the perception of a land-based and air launched ASCM threat to task groups transiting the Target Area of Interest in order to cause the Task Group to select a formation that decreases the number of defensive systems it can employ against the primary attack axis.

- Method: In addition to electronic indications, consider the use of launch and recovery of munitions whose routes can be programmed to present a threat to multiple different surface contacts while remaining outside of long range surface to air missile engagement envelopes.<sup>3940</sup>
- SIF Task: Conduct kinetic and non-kinetic feints that replicate the indications of maritime strikes in order to desensitize task group air defense operators and key decision makers and delay their defensive actions against actual maritime strikes.
- Planning Consideration: The joint force should take advantage of the lower DA of adversary ships in a task group with smaller crews which are more susceptible to fatigue by using the SIF to neutralize these vulnerable “picket ships” in order to maximize joint firepower on higher value targets in the task group.
- Planning Consideration: The joint force should take advantage of an adversary’s circadian window vulnerabilities and inability to rapidly re-orient to new threats by making the time on target at night to increase the effectiveness of new capabilities. The SIF should reinforce expected behavior during these time periods before the new capabilities are employed.
- Research: Direct the Office of Naval Research to study how maritime hypersonic and ballistic missile defenders and decision makers react to perceived threats, conduct defensive actions in a people, processes, systems framework, and how their cognitive

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<sup>39</sup> Filipoff, Dmitry. n.d. “Fighting DMO, Pt. 4: Weapons Depletion and the Last-Ditch Salvo Dynamic.” Cimsec.org. Accessed April 19, 2023b. <https://cimsec.org/fighting-dmo-pt-4-weapons-depletion-and-the-last-ditch-salvo-dynamic/>.

<sup>40</sup> Hambling, David. n.d. “DARPA Gremlin Swarm Will Carry Weapons or Sub-Drones and Re-Arm Mid-Air.” Forbes. Accessed April 20, 2023. <https://www.forbes.com/sites/davidhambling/2021/06/17/darpa-gremlin-swarm-drones-to-carry-weapon-and-re-arm-mid-air/?sh=3497cfe16e59>.

processes can be challenged without kinetic actions in ways beneficial to the joint force.

## **Conclusion**

The Stand in Force possesses the capability and capacity to significantly increase the effectiveness of operational maritime strikes by decreasing enemy defensive awareness. The SIF can do this by creating patterns of lower DA among enemy task groups, altering the adversary's perception of the threat to make them change in ways advantageous to the joint force, and can desensitize operators while decreasing key decision maker's confidence in their information to delay their defensive actions. These actions should be considered during the planning of maritime operations and should drive further research regarding the human cognitive aspects of hypersonic and ballistic missile warfare.

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