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# Warfare Analysis of Logistics Agility in a Contested Environment

Appleget, Jeffrey A.; Burks, Robert E.; Kline, Jeffrey E.;  
Jones, Marianna J.

Monterey, California: Naval Postgraduate School

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**NPS NRP Executive Summary**

Warfare Analysis of Logistics Agility in a Contested Environment

Period of Performance: 10/23/2021 – 10/22/2022

Report Date: 10/22/2022 | Project Number: NPS-22-N140-A  
Naval Postgraduate School, Operations Research (OR)



**NAVAL RESEARCH PROGRAM**

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

**WARFARE ANALYSIS OF LOGISTICS AGILITY IN A CONTESTED  
ENVIRONMENT  
EXECUTIVE SUMMARY**

**Principal Investigator (PI):** Dr. Jeff Appleget, Operations Research (OR)

**Additional Researcher(s):** Professor Jeff Kline, OR; Dr. Robert Burks, Defense Analysis (DA)

**Student Participation:** MAJ Mark Adams USA, OR; LCDR Timothy Palik USN, OR; ENS Braedon Mead USN, OR; LTJG Edrie Orpilla USN, OR; LCDR Matt Stymfal USN, OR; LCDR Eddie Castellanos USN, OR; MAJ Trevor Klemin USA, OR; Maj Steve Warner USMC, OR; LT Violeta Lopez USN, OR

**Prepared for:**

Topic Sponsor Lead Organization: N4 - Material Readiness & Logistics

Topic Sponsor Name(s): VADM Ricky Williamson, N4; Mr. Steven Black, N4/N4I

Topic Sponsor Contact Information: [stephen.p.black@navy.mil](mailto:stephen.p.black@navy.mil), 703-695-5083

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### Project Summary

This project conducted two distinct studies. The first (fall) study examined how maritime forces can best address casualty and medical evacuations during conflict in a contested environment set in a Western Pacific scenario. It investigated these key issues:

- What is the best mix/breakdown of supporting transport?
- How does the casualty evacuation infrastructure handle mass casualties?
- Where are the best locations for Role II medical treatment facility (MTF) placement?
- Which Role III MTFs are most utilized in the Pacific?
- How does seasonal climate impact such operations?

The second (spring) study examined the warfighting effectiveness of the expeditionary strike group (ESG) based on the mission capability of its ships as enabled by forward-deployed maintenance and repair assets. It investigated the change in status of warships from Non-Mission Capable (NMC) to Partial-Mission Capable (PMC) in these three Western Pacific vignettes:

- What is the threshold at which an NMC ship within an ESG becomes PMC in a permissive environment in a humanitarian assistance and disaster relief (HADR) scenario?
- What is the threshold at which an NMC ship within an ESG becomes PMC in a permissive environment during patrol of an area with increasing near-peer tensions?
- What is the threshold at which an NMC ship within an ESG becomes PMC in a non-permissive contested near-peer conflict?

The insights in response to the two wargames were carefully analyzed from wargaming output and were compiled, briefed, and reported to the sponsor. Because of the sensitivity of these results, they are controlled unclassified information (CUI). The insights from the fall wargame were provided to the sponsor via the CUI Wargaming Executive Summary submitted to the sponsor in December 2021. The insights from the spring wargame were provided to the sponsor via the CUI Wargaming Executive Summary submitted to the sponsor in June 2022.

**Keywords:** *casualty evacuation, medical evacuation, Non-Mission Capable, Partial-Mission Capable*

### Background

The fall study examined the Navy's casualty and medical evacuation capabilities in the following scenario:

The year is 2025, and conflict is imminent in the Northwest Pacific. The US Navy's 7th Fleet has deployed two surface action groups and two carrier strike groups to the area to accompany three Marine Expeditionary Advanced Bases. These units are the United States' and allies' first line of defense against aggression. In the event of armed conflict, casualties will be evacuated from these seven units to one of three allied hospitals, or the US Navy hospital ship.

The wargame was designed for a single team of one to three players. This team represents a United States Navy or United States Marine Corps Operational/Strategic Level Commander. The Commander is responsible for the execution of medical evacuation (MEDEVAC) transport. This game focuses on the transport of each type of casualty from the point of injury to Role III care. This system wargame has an open information format except for predictive weather that is given to the



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players following their random weather draw and executed by the white cell. The wargame examined three different configurations of MEDEVAC assets:

- Configuration 1 (Hybrid) consisted of 4 expeditionary fast transports (EPFs), 4 concrete piers, 6 US-2 medical, and 6 US-2 transports.
- Configuration 2 (EPF) consisted of 20 EPFs.
- Configuration 3 (US-2) consisted of 10 US-2 medical and 10 US-2 transports.

Wargame design: The game is played in a sequence of turns, where each turn represents a 6-hour period. At the start of the game, the player draws a weather card that sets the weather season for the game.

Players complete the following actions each turn:

- Determine the Red Attack
- Determine the location and number of Blue Casualties
- Respond to casualties and reposition forces

Data was collected for each turn by dedicated data collectors.

The spring study's purpose was to determine the warfighting effectiveness of the ESG based on the mission capability of its ships as enabled by forward-deployed maintenance and repair assets. It investigated the change in status of warships from NMC to PMC in these three Western Pacific scenarios:

- The U.S.S. *America* ESG is tasked to immediately get underway from Brisbane to conduct a HADR mission in Tonga. A typhoon has struck Tonga, leaving the island in shambles.
- With tensions rising in the Pacific, the ESG has been ordered to patrol the South China Sea.
- While in the South China Sea, combat has broken out, and the ESG is targeted and suffers several casualties on most of its ships.

Wargame design: This wargame used a hybrid type with open information for the format. The board used a linear-timeline square-based design, with each block in the timeline representing one month at sea. We used individual pamphlets representing each ship, with basic capabilities listed next to a pictorial description. Player decisions were tracked through an Excel file by a single data collector after each casualty was dealt to each ship.

### Findings and Conclusions

The insights in response to the two wargames were carefully analyzed from wargaming output and were compiled, briefed, and reported to the sponsor. Because of the sensitivity of these results, they are CUI. The insights from the fall wargame were provided to the sponsor via the CUI Wargaming Executive Summary submitted to the sponsor in December 2021. The insights from the spring wargame were provided to the sponsor via the CUI Wargaming Executive Summary submitted to the sponsor in June 2022.

Limitations of the fall study include the following:



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- The study could only address one scenario.
- The posture mix included only manned assets.
- The care levels of interest only considered Role II and Role III MTFs.
- Homeland-theater and inter-theater medical logistics are not considered.
- The study only considered assets that will be technologically mature as of 2035.
- There is no real-world data on casualty rates produced by near-peer weapons against US ships and bases.

Limitations of the spring study include the following:

- The study was conducted in a CUI environment. A classified environment could have produced more relevant insights.
- The study only reviewed the impact on warfighting effectiveness of material condition changes in individual surface combatants.
- A classified study would have used more precise technical detail:
  - casualty specifications
  - operational taskings
  - maintenance tasks/progress

The findings both confirmed original expectations and presented areas for future research. The sponsor will use the study's results to inform a path forward for future research.

### Recommendations for Further Research

Fall study: We recommend that future wargames and analytic events be conducted. We recommend workshops to better understand casualty evacuation and medical evacuation requirements in both competition and conflict phases. More studies need to be made to better understand how to stand up both Role II and Role III medical treatment facilities (MTFs), to include considering mobile Role II MTFs both with seaborne and airborne assets.

Future wargames may include the following:

- 1) Conducting casualty and medical evacuation wargames with players who have more appropriate backgrounds and expertise.
- 2) Conducting casualty and medical evacuation wargames at higher levels of classification.
- 3) Expanding the casualty and medical evacuation wargames to incorporate new and emerging knowledge of projected medical evacuation and casualty evacuation capabilities as well as new and emerging logistics platforms.

Because this is such a relevant topic whose findings should drive OPNAV N4 policies, we recommend that there be an annual recurring wargame that continues to examine these issues in order to inform new policy and doctrinal choices for the U.S. Department of Defense.

Spring study: We recommend future wargames and analytic events be conducted to analyze forward maintenance and repair. We recommend workshops to better understand and define Full-, Partial-, and Non-Mission Capable ratings for both surface and subsurface manned and unmanned Naval assets across the competition and conflict phases.



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Future wargames may include the following:

- 1) Conducting forward maintenance and repair wargames with players who have appropriate backgrounds and expertise.
- 2) Conducting forward maintenance and repair wargames at higher levels of classification.

Because this is such a relevant topic whose findings should drive OPNAV N4 policies, we recommend that there be an annual recurring wargame that continues to examine these issues in order to inform new policy and doctrinal choices for the U.S. Department of Defense.

### Acronyms

CUI	controlled unclassified information
EPF	expeditionary fast transport
ESG	expeditionary strike group
HADR	humanitarian assistance and disaster relief
MEDEVAC	medical evacuation
MTF	medical treatment facility
NMC	Non-Mission Capable
PMC	Partial-Mission Capable

