

Enhanced Networked Seabasing (ENS): "Prioritizing Surface Sustainment Capabilities"

CSC 2004

Subject Area National Military Strategy

EXECUTIVE SUMMARY

Title: Enhanced Networked Seabasing (ENS): "Prioritizing Surface Sustainment Capabilities"

Author: Major M. W. Melso, United States Marine Corps

Thesis: An enhanced Combat Logistics Force (CLF) will be capable of providing the surface sustainment needed for ENS to become an operational practice.

Discussion: The Navy's vision and strategy for the future is Sea Power 21. It defines the Navy's operational concept being developed through four interdependent and synergistic Naval Capability Pillars (NCPs): Sea Shield, Sea Strike, Sea Basing, and FORCENet. ENS is a transformational concept that enables revolutionary forcible entry operations - the projection, protection, sustainment, and reconstitution of sovereign capabilities around the world. All combat, combat support, and logistics support operations will emanate from the network of ships/seabasing platform. This seabasing platform will be used to house, protect, supply, repair, sustain, and reconstitute the force throughout operations. The sea base will provide the U.S. military the sovereign territory it will need to prosecute combat operations against an enemy geographically protected by bordering nations or an enemy able to move fluidly within a geographic region.

If ENS is a viable operational concept for future battles, the Navy-Marine Corps Team must determine and prioritize the necessary surface sustainment capabilities from the logistics ships used in support of the sea base to the Underway Replenishment (UNREP) systems and practices. Prioritizing these requirements or capabilities today will ensure the funding needed will be budgeted for and available in the Fiscal Year (FY) it is desired. This prioritization must take into account the current operating force structure as aligned under the NCPs and the current acquisition plan for these capabilities to be able to take advantage of economies of scale. An example of an economy of scale that the services can take advantage of today is the building of the CLF ships because the manufacturers already have the plans and facilities to produce these ships, which in turn reduces costs for the subsequent ships that are produced. A significant investment would need to be made today by the Department of the Navy, Department of Defense and Congress to appropriate the funds for enhancing the CLF or establishing an alternative(s). The key to success, for full utilization of the ENS concept in a Joint Operations Area (JOA), will be the ability to sustain and replenish the seabasing platform.

Conclusion(s) or Recommendations: A sustainable sea base, using the operational maneuver space provided by the oceans of the world, opens the littorals to the U.S. Armed

Report Documentation Page

*Form Approved
OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 2004	2. REPORT TYPE	3. DATES COVERED 00-00-2004 to 00-00-2004			
4. TITLE AND SUBTITLE Enhanced Networked Seabasing (ENS)		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Marine Corps, Command and Staff College, Marine Corps University, 2076 South Street, Marine Corps Combat Development Command, Quantico, VA, 22134-5068		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 50	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Forces in the 21st century. The following prioritization is recommended for the funding and development of replenishment assets:

1. continued development of improved UNREP capability,
2. additional CLF ships over the next 6 -10 years,
 - a. re-tasking of the CLF now to support the operating ESGs
3. continued development of the MPF(F) fleet,
4. High Speed Vessel (HSV) development.

LIST OF FIGURES

Figure	Page
1. Depicts the strategic and operational support of Seabasing operations.....	10
2. Depicts the Surface Sustainment Concept for the Seabase.....	28
3. Provides an illustrated depiction of the sustainment network referred to as Factory-to-Foxhole Logistics.....	36

TABLE OF CONTENTS

	Page
Executive Summary	i
List of Figures	ii
Introduction	1
I. Preparing for Warfighting in the Future	3
A. The Naval Services in a New Age	3
B. Focus on Seabasing Sustainment	6
II. Understanding Seabasing	7
A. The Concept	7
B. Enhanced Networked Seabasing (ENS)	10
III. Seabasing Platform Components	12
A. Enhanced Network Seabasing Organizations	12
1. Carrier Strike Group (CSG)	12
2. Expeditionary Strike Group (ESG)	13
3. Surface Action Group	14
4. Maritime Prepositioning Group (MPG)	15
IV. Sustainment of the Sea Base	17
A. Strategic, Operational and Tactical Sustainment	17
B. Surface Means of Sustainment	18
1. Commercial Merchant Ships	19
2. Maritime Prepositioning Forces (MPF) and MPF(Future)	21
3. Combat Logistics Force (CLF)	25
C. Resupply Options	29
1. Underway Replenishment (UNREP)	29
2. Containerization	30
3. Container Transload at Intermediate Sea Base (ISB) in Sheltered Water Area	31
4. Advance Base / Forward Logistics Site (FLS) within 2,000 nm of AO	31
5. CLF vs. MPF(F) for Sea Base Resupply	33
D. Synergistic Effect	35
V. Joint Integration in the Sea Base	36
A. An Integrated Sea Base	36

VI. Conclusion and Recommendations	37
A. Conclusion	37
B. Recommendations	39
Works Cited	42
Bibliography	44

INTRODUCTION

The U.S. Naval services are adapting to the changing world by developing concepts for warfighting in the 21st century on an unknown, unfamiliar battlefield. These concepts are based on the need for a forward deployed naval force that will guarantee freedom of the world's seas and regional access. The Navy and Marine Corps are aligned in their fostering of operational maneuver through seabasing and sea based operations. Seabasing establishes an operational platform (network of ships) from which naval forces will initiate, conduct, and logistically support operations. Its functionality and flexibility support the capstone concepts of Expeditionary Maneuver Warfare (EMW) and the Naval Operating Joint Operations.¹

Expeditionary Maneuver Warfare (EMW) is the union of the Marine Corps' core competencies, maneuver warfare philosophy, expeditionary heritage, and the concepts by which that service organizes, deploys, and employs forces. The elements of EMW should guide the process of innovation, change, and adaptation to ensure the Corps continues its role as the Nation's total force in readiness. EMW focuses these competencies, evolving capabilities, and innovative concepts to ensure that the Corps can provide the Joint Force Commander (JFC) with forces optimized for forward presence, engagement, crisis response, antiterrorism, and warfighting.²

The Marine Corps, in its expeditionary nature and capabilities, provides the JFC with a force that is ready to deploy and be employed in any capacity. The Marine Corps, as an expeditionary force, has the strategic agility to transition from a "pre-crisis" state to being fully operational in a distant theater. The Marine Corps' responsiveness anywhere in the world and flexibility to execute multiple types of missions in any tactical situation are cornerstones of EMW. As an

¹ Nicolas Linkowitz, *Future MAGTF Logistics and Support from the Sea (2010+)*, Marine Corps Gazette, August 2003, 23

² Gen James L. Jones (CMC), *Expeditionary Maneuver Warfare (EMW)*, 10 November 2001, 1

effective expeditionary force the Marine Corps is capable of supporting and sustaining operations in theater for the duration. Striving to improve its expeditionary nature the Marine Corps, in coordination and integration with the Navy, is turning to the seabasing concept to utilize the maneuver space the sea provides, project power, and defeat anti-access strategies. Seabasing will allow Marine Corps forces to commence sustainable operations, enable the flow of the follow-on forces into theater, and expedite the reconstitution and redeployment of forces for follow-on missions.³

The Naval Operating Concept (NOC) for Joint Operations ties together the Marine Corps' EMW with the Navy's Sea Power 21 concept establishing the vision for how the naval services will conduct business/operations in the 21st century. The freedom of the seas is integral to sustaining the global economy and U.S. national security. Naval forces are flexible, rapidly employable, and able to respond to crises with a full range of combined arms and warfighting capabilities.⁴ The defense strategy calls for naval forces to be capable of coordinated joint military operations, in order to achieve the objectives and goals of assuring allies, dissuading adversaries, deterring aggression, and decisively defeating any adversary.⁵ The NOC refers to the Navy-Marine Corps Team; this reference to team gets to the heart of the integration, training, and capabilities necessary to ensure national security in the future.

Sea Power 21 defines the Navy's operational concept that is being built on four interdependent and synergistic Naval Capability Pillars (NCPs): Sea Shield, Sea Strike, Sea Basing, and FORCEnet.⁶ Sea Shield will assist the joint force in operating effectively despite adversary efforts to deny theater access to U.S. forces. It will exploit global sea control to defeat

³ CMC, EMW, 4

⁴ ADM Vern Clark (CNO), Gen Michael W. Hagee (CMC), *Naval Operating Concept for Joint Operations (NOC)*, April 2003, 1

⁵ CNO, NOC, 1

⁶ Department of the Navy, *Naval Transformation Roadmap (NTR) 2003* (Draft) dated 23 September 2003, 2

the enemy's area denial threats including aircraft, missiles, small littoral surface combatants, mines, and submarines.⁷ Sea Strike will capitalize on the strategic agility, operational maneuverability, precise weapons employment, and long-term sustainability of naval forces. Sea Strike is a broadened naval concept for projecting dominant and decisive offensive power from the sea in support of joint objectives.⁸ Sea Basing is a transformational concept that enables revolutionary forcible entry operations - the projection, protection, sustainment, and reconstitution of sovereign capabilities around the world. The inherent mobility, security, and flexibility of naval forces provide an effective counter to emerging military and political limitations to overseas access. FORCENet, as the integral naval component of the Department of Defense (DOD) wide Internet Protocol-based advanced network, will provide the open architecture and building blocks that integrate sensors, networks, decision aids, weapons, warriors, and supporting systems into a highly adaptive, human-centric, comprehensive system that operates from seabed to space and from sea to land.⁹

Seabasing is the transformational concept that will define how the naval services and joint forces will fight and support operations in the 21st century in order to thwart anti-access strategies.

I. PREPARING FOR WARFIGHTING IN THE FUTURE

A. "THE NAVAL SERVICES IN A NEW AGE"

A new age of naval service is now upon the United States Navy and United States Marine Corps, calling for a level of naval service integration not seen to date and interoperability with the other services in a joint environment. The naval services are taking the lead in preparations

⁷ Dept of the Navy, NTR, 2

⁸ Dept of the Navy, NTR, 4

⁹ Dept of the Navy, NTR, 5

for war in the 21st century that will be fought without access to bordering countries in an area of operations or with an enemy that may not have sovereign boundaries. These adversaries will vary from traditional armed forces to terrorist cells with the ability to use conventional and asymmetric methods to attack U.S. interests. Anti-access strategies used by friends and foes alike have caused the U.S. naval services to develop the concept of Enhanced Networked Seabasing (ENS). ENS will use the unique and integrated strengths of the U.S. Naval services to provide a force that will be able to conduct and support operations from an over-the-horizon (OTH) seabasing platform(s). All combat, combat support, and logistics support operations will emanate from the network of ships that make-up the seabasing platform. This seabasing platform will be used to house, protect, supply, repair, sustain, and reconstitute the force throughout operations. The sea base will provide the U.S. military the sovereign territory it will need to prosecute combat operations against an enemy geographically protected by bordering nations or an enemy able to move fluidly within a geographic region. ENS will enable the U.S. military to confront both conventional and unconventional threats that emerge and threaten the U.S. homeland, allies, or global interest.

The naval services will integrate their capabilities to maximize operational efficiencies. What this means is that the Navy and Marine Corps must truly integrate command and control (C²) and supply systems to ensure the entire sea based force can communicate and track, support, and sustain operations ashore and afloat. After successfully integrating these systems within the naval services and applying the lessons learned from years of expeditionary operations, the naval services will be ready to migrate this concept into functional practice. At this stage the Navy-Marine Corps Team faces another challenge essential to successful warfighting in today's world, the challenge of joint seabasing operations. Using seabasing in joint operations causes a

paradigm shift for all the U.S. Armed Forces forcing them to adjust to basing and fighting from the sea. The interoperability of seabasing in a Joint Operations Area (JOA) is vital to the success of the concept and to its utility to the JFC because the battles of today are fought by joint forces.

The seabasing concept is not just sea based logistics nor is it essentially a new idea. It is a new way of looking at how we will conduct and support expeditionary operations in years to come in order to defeat anti-access strategies and protect the force. With this new view come difficulties; the difficulties of systems integration and joint interoperability, but the "long pole in the tent" for concept success will be sustaining the force and replenishing the ships during a protracted war.

The means by which the seabasing platform could be sustained effectively are still not clear because the assets currently available and able to replenish the platform are designated to support the Carrier Strike Groups (CSG). The Combat Logistics Force (CLF) is the sustaining force today for the CSGs but there are not enough CLF ships to support the large seabasing platform(s). A significant investment would need to be made today by the Department of the Navy, Department of Defense and Congress to appropriate the funds for enhancing the CLF or establishing an alternative(s). The number of CLF ships must support the seabasing platform at the strategic level (inter-sea base sustainment) and operational level of logistics (intra-sea base sustainment). There are three alternatives that are currently are being explored to fill the gap that CLF cannot fill. One is building the Maritime Prepositioning Force (Future) (MPF(F)) to be able to act as support ships in addition to carrying Marine Corps equipment to the fight. The MPF(F) would be able to function as the oiler, supply ship, ammunition ship, and tender/maintenance ship. The second is using a commercial fleet to support seabasing operations. These commercial ships would transfer equipment, supplies, and repair parts to either the MPF(F) ships or to the

actual platform ship that is expecting replenishment. The third is making the LHA/LHD(R) amphibious assault ship capable of refueling the other ships of the Expeditionary Strike Group. The key to success for full utilization of the seabasing concept in a JOA will be the ability to sustain and replenish the seabasing platform.

B. FOCUS ON SEABASING SUSTAINMENT

As already described there are a number of concepts the naval services are exploring to ensure preparedness for the conflicts, battles and wars to be fought in the 21st century. None of these concepts are stand-alone operational practices. They are all inter-related and inter-dependent acknowledging this inter-relationship; herein, the focus will be on the surface sustainment of the seabasing platform for the Expeditionary Strike Force (ESF) of 2015+. The ESF consists of the Carrier Strike Group (CSG), Expeditionary Strike Group (ESG), Surface Action Group (SAG), Combat Logistics Force (CLF), and Maritime Prepositioning Group (MPG).

If seabasing is a viable operational concept for future battles, the Navy-Marine Corps Team must prioritize today the development of the necessary surface sustainment capabilities from the logistics ships used in support of the sea base to the Underway Replenishment (UNREP) systems and practices. Prioritizing these requirements or capabilities now in order to ensure the funding needed will be available in the Fiscal Year (FY) it is desired. This prioritization must take into account the current operating force structure as aligned under the NCPs and the current acquisition plan for these capabilities to be able to take advantage of economies of scale. An example of an economy of scale that the services can take advantage of today is the building of the CLF ships because the manufacturers already have the plans and facilities to produce these ships, which in turn reduces costs for the subsequent ships that are produced.

The concept of logistics for seabasing is currently being developed by the Navy and Marine Corps Team. It will encompass how inter-theater, intra-theater, intra-sea base, and tactical re-supply will be conducted. The organizational architecture for surface sustainment will be complex with ships having to conduct re-supply at Continental United States (CONUS) ports, advance bases, in sheltered waters, and underway at sea to ensure a logistics chain that will be able to indefinitely sustain the sea base.

II. UNDERSTANDING SEABASING

A. THE CONCEPT

This excerpt from the EMW concept paper sums up how the Marine Corps views seabasing and the important role it will play in future warfighting: " Marine Corps forces, as an integral component of a larger naval force, will be prepared to influence events within the world's littorals using the sea as maneuver space and as a secure "base" from which JFCs can project power to impact the early stages of a potential crisis. Seabasing supports versatile and flexible power projection. Seabasing enables forces to move directly from ship to objectives deep inland and represents a significant advance from traditional, phased amphibious operations. Sea based operations maximize naval power projection and enhance the deployment and employment of naval expeditionary forces by JFCs. More than a family of platforms afloat, seabasing will network platforms and promote interoperability among the amphibious task force, carrier battle group, maritime pre-position force, combat logistics force, and emerging high-speed sealift and lighterage technologies. Sea based operations will capitalize on the maneuver space afforded by the sea, rapid force closure using at-sea arrival and assembly, and the protection assured by the U.S. Navy's control of the sea. Combat support, C², and combat service support (CSS) capabilities will remain at sea to the maximum extent possible and be focused upon supporting

expeditionary air and land operations ashore. Forward-deployed naval forces will have access to a responsive worldwide logistic system to sustain expeditionary operations. Seabasing will allow Marine Corps forces to commence sustainable operations, enable the flow of follow-on forces into theater, and expedite the reconstitution and redeployment of Marine forces for follow-on missions." The specific size of the Marine amphibious force that will require the constitution of a seabasing networked platform is a Marine Expeditionary Brigade (MEB). The MEB is a tasked organized unit of approximately 17,000-20,000 Marines and sailors with 30 days of sustainment. This is not to say that a MEU(SOC) with 2,500-3000 Marines with 15 days of sustainment does not or cannot use the seabasing concept for operations.

The Navy's view of seabasing is derived from the EMW concept. Seabasing is the enabler that will provide the operational and logistics foundation for the other NCPs and lead the naval services down the road of transformation. Seabasing provides enduring forward deterrence and enables a wide range of armed responses to anti-access crises.¹⁰ Coming together to defeat an anti-access stratagem will only be possible through effective integration of the naval services and the continuous development of the concepts and the pillars that support seabasing. The Navy and Marine Corps, having made the commitment to forge new means and ways of conducting war to protect national interest and allies and realizing joint relevance as a most important component, are redefining the naval forces in structure and capability.

Currently and historically, Carrier Strike Groups (CSG) / Carrier Battle Groups (CVBG), Expeditionary Strike Groups (ESG) -- naval surface combatant ships attached to Amphibious Ready Groups -- Amphibious Ready Groups (ARG) -- amphibious shipping carrying a Marine landing force -- Marine Expeditionary Units (Special Operations Capable) (MEU (SOC)) -- embarked Marine forces of battalion size reinforced with aviation, combat support, and combat

¹⁰ Department of the Navy, *Seabasing Concept of Operations* (CONOPS) (Draft) dated 25 March 2003, 1

service support elements --, Surface Actions Groups (SAG), and submarines have demonstrated unique abilities to operate forward in critical regions for extended periods of time.¹¹ The titles, structure, and capabilities of these forces are changing to meet the requirements of warfighting in the 21st century. These subtle changes will make these forces more viable warfighters when fighting the enemy of today and tomorrow, with this enemy not being the Soviet Union of the Cold War. Forward deployed naval forces give a Geographic Combatant Commander (GCC) or JFC a credible, flexible, and self-sustaining force that is ready to respond across the full spectrum of military operations. As a conflict escalates or deescalates, the naval services can respond by increasing or decreasing the ESGs and/or CSGs required by the GCC or JFC. Additionally, the MPGs stand ready to reinforce the engaged forces with the equipment and replenishment they need to perform the mission at hand and supplementary missions as tasked. The MPGs will be prepared to offload in suitable ports or conduct an instream offload in secure waters to link up the MEB troops with the equipment within weeks of a deployment order.

The naval services have worked long and hard to establish logistics support networks throughout the world. These networks and advanced bases will not be disregarded in this concept, but will provide vetted/trusted resupply sources and warehouses or staging areas for supplies and equipment in theater. The networks and advanced bases will be key throughout the stages of the war. The Seabasing concept builds from current naval capabilities to achieve the more mobile and interoperable capability set needed to provide an operationally responsive and capable force to meet the strategic demands of the 21st century.¹²

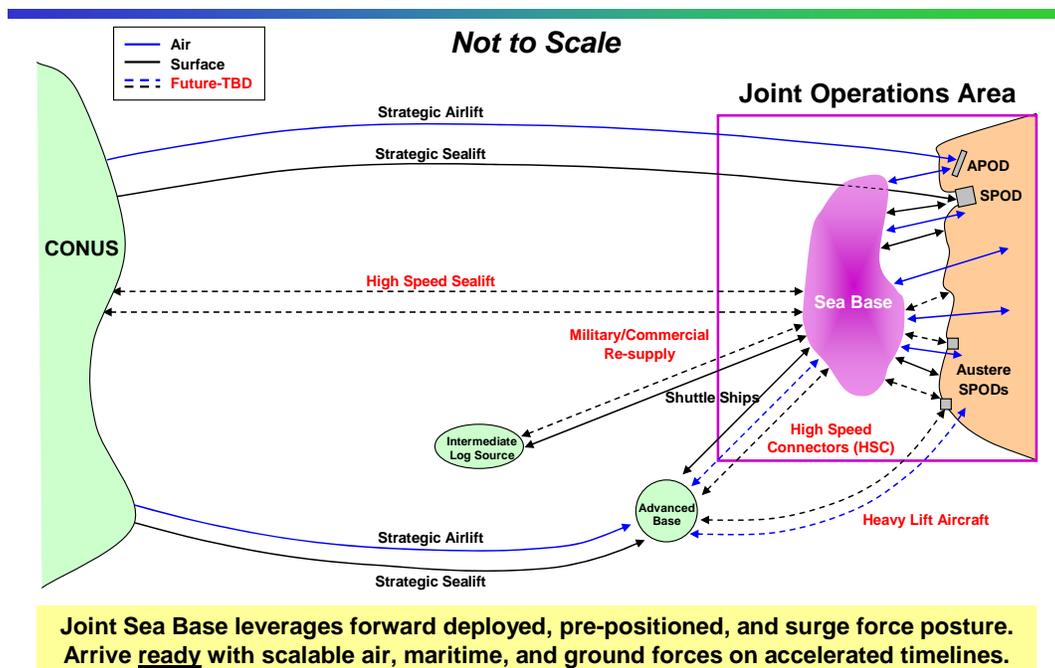
The Navy's global maritime dominance provides a secure maneuver space to conduct air and amphibious operations. The JFC can use seabasing to provide a sovereign, maneuverable and

¹¹ Dept of the Navy, Seabasing CONOPS, 2

¹² Dept of the Navy, Seabasing CONOPS, 3

secure base capable of assembling, commanding, projecting, sustaining and reconstituting combat forces across the full range of military operations.¹³ The naval services and joint forces will gain an asymmetric military advantage over the enemy, through the use of seabasing, by being able to project power and rapidly attack the enemy from the air or sea. Additionally, these forces will be sustained from the secure seabasing platform without imposing on a host nation (HN) or relying on Host-Nation Support (HNS).

Sea Base Overview



10 Mar 04

15

Figure 1. Depicts the strategic and operational support of Seabasing operations. Source: "Joint Seabasing Capabilites" brief given to Marine Corps Command and Staff College by Col J. C. Pross, USMC, 10 Mar 04.

B. ENHANCED NETWORKED SEABASING (ENS)¹⁴

Enhanced Networked Seabasing is defined as: "The integrated capabilities resident in a family of systems and assets afloat that maximizes the projection of all dimensional naval power

¹³ Dept of the Navy, Seabasing CONOPS, 3

¹⁴ LtGen Edward Hanlon Jr. (MCCDC), RADM Ronald A. Route, *Enhanced Network Seabasing (ENS)*, 26 August 2003, excerpt paragraphs from ENS concept paper that define ENS.

both at sea and ashore. It is a quantum leap forward in naval power projection capabilities through phased at-sea arrival and assembly, selective offload, and reconstitution at sea using a networked dispersed force -- enabled by FORCEnet -- which facilitates joint operations across the range of military operations.”

ENS includes four distinct advantages for the JFC - physical freedom of movement, freedom of action, reduced vulnerability from attack, and increased agility for forces. ENS provides Naval Expeditionary Forces the necessary degree of strategic and operational flexibility to rapidly project power ashore and provide theater wide influence from sovereign naval platforms. This concept is a new way of projecting, operating and sustaining Naval Expeditionary Forces to support and enhance the enduring missions of the naval services: sea control, deterrence, forward presence, and power projection.

ENS capitalizes on the maneuver space afforded by the sea, and on the improved decision support capabilities enabled by linked sensors, shooters, and command-and-control nodes. The increased mobility afforded by surface and aviation platforms, combined with the increased range and lethality of naval aviation, ground, surface, and sub-surface fires, provides an exponential increase in power projection ashore across an unprecedented depth and breadth of the battlespace.

Forces employed ashore from the enhanced networked sea base conducting Ship to Objective Maneuver (STOM) focus on operational objectives, obviating the need for securing a force beachhead lodgment. Surprise, initiative, and increased tempo of operations are the principal gains of “not stopping at the beach.” Eliminating operational pauses associated with a build up ashore reduces an adversary’s time to react while

increasing naval force agility.¹⁵

The ENS concept links all the necessary elements and capabilities of seabasing together to produce a new way of projecting power, defeating area access denial policies, and waging war. As the naval services strive toward the integration of systems, resources, and capabilities to bring ENS from concept to practice, they also begin to shape the battlespace of the future and provide the options/means a JFC will require to defeat the enemy of the 21st century.

III. ENS PLATFORM COMPONENTS

A. ENS ORGANIZATIONS

The “ENS platform(s)” consist of a number of ships and ship types with each playing its role in operations as part of one of the organizations that make up the platform. The elements that make up the networked seabasing platform/Expeditionary Strike Force (ESF) are the Carrier Strike Group(s) (CSG), Expeditionary Strike Group(s) (ESG), Surface Action Group(s) (SAG), Maritime Prepositioning Group(s) (MPG) [MPG = MPF(F) + CLF + high speed surface craft]. Each group brings several different types of ships to the fight with each supporting the organization's functions and capabilities. These groups are organized as follows.

1. Carrier Strike Group (CSG) {Sea Strike capability} (the Navy can form up to 12 CSGs based on the 12 carriers available)

A typical CSG consists of five different types of ships and a submarine:

- a. (1) Aircraft Carrier (CVN)
- b. (1) Guided-Missile Cruiser (CG)
- c. (2) Guided-Missile Destroyers (DDGs)
- d. (2) Frigates (FFGs)

¹⁵ MCCDC, ENS

- e. (1) Fast Combat Support Ship (logistics) (T-AOE)
- f. (1) Attack Submarine (SSN)

(Note: The CSG is tasked-organized, thus the ship mix is based on mission and ships available. The information above is a notional example.)

The CSG brings the fire power to the fight with a carrier wing of aircraft and the naval gunfire ships/Naval Surface Fire Support (NSFS) capability. It also brings the organic logistics requirements for these ships, aircraft, and personnel. In the current stand alone configuration, the CSG takes its logistics ship/capability with it and will be able to sustain itself indefinitely. Once the CSG becomes part of the seabasing platform, its logistics ship capability becomes part of the MPG. The MPG will be responsible for the sustainment and replenishment of each element of the ESF. This role and mission of the MPG is critical to the success of the ESF.

2. Expeditionary Strike Group (ESG) {Sea Strike capability}(the Navy-Marine Corps Team can form up to 12 ESGs based on the 12 big decks available; only 7 MEUs currently standing)

A typical ESG consists of five different types of ships and submarine:

- a. (1) Amphibious Assault Ship (LHD or LHA)

Note: A LHA Replacement (LHA(R)) is being designed to support the amphibious force and replenish fuel, ammo, stores, provide an enhanced/heavy UNREP capability, in order to effectively support the ENS concept.

- b. (1) Amphibious Transport Dock (LPD)
- c. (1) Dock Landing Ship (LSD)
- d. (2) Guided-Missile Cruisers (CG)
- e. (1) Guided-Missile Destroyer (DDG)
- f. (1) Attack Submarine (SSN)

The ESG is the ARG/MEU(SOC), but as an ESG it is an enhanced capability because it has NSFS capability and a submarine. This added firepower allows the ESG to provide its own at sea security which the ARG was not capable of and it also gives the MEU(SOC) organic NSFS and a strike Tomahawk capability which it did not have previously.

As the ESG undergoes its evaluation period the issue of sustainment is and will be watched closely by the Navy-Marine Corps Team to see how best to support the ESG. The additional ships may cause difficulties for the CLF ships tasked with the Underway Replenishment (UNREP) mission from the time aspect of conducting the UNREP to the quantity of cargo and supplies that need to be transferred.

The after action reports for the first three ESGs will make the picture clearer concerning the ship mix required to support the ESG, the C² requirements, how the limited logistics integration worked and if the command arrangements are properly aligned.

3. Surface Action Group (*Sea Shield* capability)

A typical SAG will consist of three surface warfare ships. The mix of ships will vary as the SAG is task-organized. The SAG provides additional strike capability and force protection to the ESF. The surface combatants of a SAG are capable of destroying enemy missiles, aircraft, surface ships, and submarines in a defensive or offensive mode. These Tomahawk Land Attack Missiles (TLAM) equipped SAGs will provide deterrence and near-instantaneous contingency response, while maintaining the ability to conduct maritime interdiction and other tasks normally assigned to surface combatants.¹⁶ In the future, as the United States strives to develop a ballistic missile defense system to protect the continental United States, the SAG will be utilized as a mobile ballistic missile defense shield to protect joint and coalition forces in the area of operations (AO). A SAG does not operate with its own logistics ship like the CSG, so the SAG's

¹⁶ Dept of the Navy, Seabasing CONOPS, 8

three ships will require scheduled UNREPs to sustain and replenish the ships and personnel. The ESF logistics requirement grows exponentially as necessary capabilities are added to the force.

4. Maritime Prepositioning Group (MPG) {Seabasing capability} (3 MPS Squadrons)

The MPG is formed by combining the MPF(F), CLF, and high speed surface craft sustainment capabilities. The MPG is at the "heart" of the seabasing concept's sustainment.

a. Maritime Prepositioning Force (MPF) - consists of sixteen prepositioning ships configured to transport U.S. Marine Corps equipment and supplies and sustain a 17,000 Marine force for 30 days. These are commercial type ships that were built or modified in the mid-1980s. The ships are organized three Maritime Prepositioning Squadrons (MPS) that are usually located in three different regions (MPSRON 1: Mediterranean, MPSRON 2: Diego Garcia, and MPSRON 3 Guam/Saipan) in order to respond and link up with a MEB to conduct contingency operations anywhere in the world.

This fleet is being redesigned to meet the needs of the naval services in the 21 century. The naval services are in the process of designing a fleet of ships that will be multi-functional to meet the requirements and enabling ENS. This is the MPF (Future) fleet that will be able to embark and deploy all the new systems and platforms developed to enable seabasing. MPF(F) will provide flexible platforms that are functional beyond just carrying equipment and supplies to the fight. The "jury is still out" on exactly what the ships of the MPF(F) will look like, exactly what capabilities they need and their role in sustaining the sea base.

b. Combat Logistics Force (CLF) - consists of approximately 34 ships that carry a significant amount of the commodities needed by the CSGs, ESGs, and SAGs. The CLF fleet can replenish ship and aviation fuel (DFM and JP-5), ammunition/ordnance, and most of the

other classes of supply. Currently, the CLF is sized and dedicated to only sustaining the CSGs, but in the ENS concept the CLF merges with the MPF(F) to increase the sustainment capability of the ESF. A caveat to this is that if a CSG has to leave the sea base to accomplish its mission the logistics ship(s) assigned to that CSG will go with it.

c. High speed surface craft - these craft are the vessels that will transfer personnel, equipment, and supplies between the ships of the seabasing platform and between the platform and land (Ship-to-Ship and Ship-to-Shore operations). These craft are identified in the ENS concept as *connectors* for their functionality. The surface craft that the naval services are currently using, the Landing Craft Air Cushion (LCAC) and Landing Craft Utility (LCU), are being redesigned and improved to be capable of supporting the sea base and work from over-the-horizon (OTH). The LCAC will become the Heavy LCAC (HLCAC) and its improvements over the LCAC will make it capable of 100% payload increase for combat vehicles, increased speed of delivery, maximized well deck efficiency, ability to transport a mix of vehicles, internal capacity of 75-100 troops and capacity for 400 troops with the personnel transport modules installed.¹⁷ The LCU will become the LCU (Replacement) (LCU(R)) and its improvements over the present LCU are increased payload/lift capacity, speed, and range.¹⁸

Also, part of the high speed surface craft group not mentioned above and still under testing and evaluation is the High Speed Vessel (HSV) which will serve as the ultimate connector for the sea base. It will be the intra-theater connector that will provide greater operational mobility, theater logistics support and an additional force closure option.¹⁹ As a connector the HSV

¹⁷ ADM Vern Clark (CNO), *Naval Expeditionary Forces... Globally Engaged*, August 2003, 65

¹⁸ CNO, *Naval Expeditionary Forces*, 65

¹⁹ Marine Corps Warfighting Laboratory (MCWL), *High Speed Vessel (HSV) Final Experiment Report: Period of 18 October - 30 July 2002 (FY-02)* dated 17 September 2002

capability will reduce stress on the already stressed strategic lift assets, both surface and air, because the naval forces and joint forces will be able to move about the theater via HSV. The HSV will be capable of traveling 600 NM at 35 knots with maximum payload, carrying 545 Short Tons or 23,000 SqFt of cargo, embarking 240 personnel and its flight deck will be certified for a MH-60 and CH-46.²⁰ A last note, on HSVs, is that the Army is developing and evaluating Theater Support Vessels (TSV) that may also tie-in to the sea base and provide an additional source intra-theater high speed lift.

IV. SUSTAINMENT OF THE SEA BASE

A. STRATEGIC, OPERATIONAL AND TACTICAL SUSTAINMENT

The sustainment of the seabasing platform will cross all three levels of war. At the strategic level a logistics plan will be developed to support the platform from CONUS using a combination of strategic airlift and sealift. Although both delivery means are available, strategic sealift will be the primary means of sustainment because it best accommodates the size and quantities of supplies that will be required. Sealift or surface sustainment provides the most economical means to sustain the platform especially in cases where the resupply is planned well in advance of the requirement. Planning the requirements should not be problematic because this is how Naval shipping conducts its underway replenishment today.

At the operational level a two-pronged plan must be developed to sustain the ships and the expeditionary force on the ground. This plan will have to sustain the ESF and possibly other joint forces in theater, if tasked to do so by the JFC. The requirement for the sea base to support other joint forces may be dependent upon the development of the theater.

²⁰ MCWL

A tactical level plan will focus on supporting the forces ashore and sustaining through all phases of the operation. The three classes of supply that will be the most difficult to resupply are classes I, III, and V ((W) and (A); ground and aviation ordnance respectively) . These three classes will be the focus of the tactical sustainment effort if the U.S. is able to prosecute a war with the same speed and over the same distance as conducted during OIF. All the classes of supply may become critical at a point in time but classes I, III, and V (W)(A) will be resupplied in the largest quantities and with the most frequency. The fact that the tactical level plan requirements for classes I, III, and V will be large must reverberate back through the operational plan and strategic plan if the sea base is to be effective in its sustainment, replenishment, reconstitution, and redeployment of the ESF.

B. SURFACE MEANS OF SUSTAINMENT

There are currently five sustainment options being explored to support the sea base. Three of the five options are viable and in use today to sustain the CSGs and ESGs. The first is using contracted commercial ships as the strategic and possibly operational lift required, second is making the MPF(F) ships capable of replenishing the seabasing platform, third is a modified LHA or the LHA(R) which would be capable of replenishing the ESG, fourth is an updated and improved CLF fleet of ships, and last is utilizing a combination of the four alternatives. The key point here is determining the means that will be most cost effective without limiting the ability to support the warfighters. As the options are studied the "acid" test for each of them is how weather limited or dependent is the option and does it take a capability away from its primary mission. If naval forces are to effectively operate from a sea base, force sustainment operations

such as UNREP must not be limited to less than sea state five.²¹ Any limitation that could leave the naval and amphibious forces without the supplies they need is a risk and must be mitigated to the lowest degree to ensure the forces are able to fight.

1. Commercial Merchant Ships

Commercial merchant ships seem to offer a potentially quick solution to the sustainment issue but they are not configured to conduct UNREP operations like the fast combat support ships. The commercial ships are also built to carry 20-foot containers or Twenty-Foot Equivalent Units (TEU) that are onloaded and offloaded pierside and this presents several problems.

Naval warships and amphibious ships are not capable of taking on a large number of TEUs and if there is sufficient space to place a container it would mean capability would have to be sacrificed. Although the LHD does have a designated area for TEUs, these spaces are for the aviation technical support equipment and once they are in place they cannot be offloaded until the well deck is empty and the ship is pierside. Even if the naval ships could carry these containers, they are not an effective means to replenish the sea base because pierside onload/offload is not an option. The container exchange has to be done at sea.

UNREP transfer of TEUs is not a capability that exists today but a heavy lift capability is being developed at the Navy's Underway Replenishment Test Site in Port Hueneme, California. The UNREP department at Port Hueneme is using the Marine Corps' "Quadcon" containers, which is about one-fourth the size, to develop a heavy lift highline transfer capability. The current maximum weight for a highline transfer is approximately 6,000 pounds so the team at Port Hueneme is looking to double the maximum weight to 12,000 pounds, which would enable

²¹ Sea state five is described when the following weather conditions exist: strong breeze-moderate gale, large waves forming foam crests-seas heads up, extensive spray-white foam blows in streaks, wind at 22-33 kts, and an average wave height of 6.4-16 ft (the high end of these conditions begin sea state six conditions).

the transfer of a quadcon. Eventually, the commercial ships and naval ships will have the ability to transfer TEUs and unload them on the warship and transfer them back to the commercial ship during an UNREP. The capability to onload/offload these containers will be beneficial in sustaining the sea base because the 20-foot container is how the private sector moves dry bulk cargo. Thus, this capability would mean that a supplier could pack out one of these containers to get the supplies to forces at sea somewhere else in the world. It would eliminate building pallets or loading other containers and therefore reduce steps in the process and theoretically/actually reducing the Order-to-Ship Time (OST) and help to prevent pilferage, loss, and confusion with respect of final destination or unit.

The commercial container ships are also not capable of transferring fuel to the naval ships so if the sea base needs fuel a commercial contractor or Military Sealift Command (MSC) would have to use two ships (a container ship and a tanker) to accomplish the mission. This problem is an issue that could potentially be fixed through modifying the commercial ships or as new commercial ships are built for a contractor, a fueling station is added.

What is questionable though, even if the ships are capable of fuel and cargo transfer, is the naval ships Commanding Officers' confidence in conducting UNREP operations with a commercial ship and the ability to conduct operations in a sea state greater than three. The sea state matter is possibly the hardest to address because the sea state cannot be controlled by man, the construct of the commercial vessels may not allow it to get as close as the CLF ships, and a lack of training or experience may not allow for operations at sea state three or greater.

The commercial merchant ship option is viable with the modifications discussed, but in the long run the cost of a contract or problems with a contract in the midst of a conflict could leave the warfighters without the equipment and supplies that they need to fight. Operating in a

hazardous area may also delay or prevent a merchant ship from making a timely link-up for resupply. Reliance on only the commercial ships to provide the strategic sealift necessary to sustain the ESF is not feasible.

2. Maritime Prepositioning Force (MPF) and MPF(Future)

Maritime Prepositioning Force has been an invaluable asset to the Marine Corps, enabling the Marine Corps to move this fleet of ships with the equipment needed to outfit and sustain a MEB for up to 30 days. These ships arrive in theater where they can link up with their associated fly-in MEB to reinforce a force already conducting operations in the AO. This capability offers a force closure responsiveness that the Army cannot match and provides the GCC or JFC with an additional option to respond to a contingency. The success of the MPF program today does not ensure its success tomorrow so the naval services are planning and developing a MPF(Future) that will support the warfighting concepts being developed to fight in the 21st century. MPF(F) will be the enabler of sea based operations and perform four additional functions that are not provided by the MPF of today. These additional functions are:

1. at-sea arrival and assembly of units,
2. direct support of the assault echelon of the ESF,
3. indefinite sea based sustainment of the landing force,
4. at-sea reconstitution and redeployment of the force.²²

Development of the MPF(F) is challenging at this time because there is not a defined “concept of operations” for ENS, nor one for how the MPF(F) will operate in support of the sea base. Even with the hurdle of not knowing exactly how all the pieces will be applied to the seabasing concept, it is critical now that the design alternatives for the MPF(F) continue to be developed to meet the expected needs of the sea base.

²² Global Security.org, Maritime Prepositioning Force (Future) MPF(F) / Sea base

The sea based 2015 MPF(F) MEB has been modified and reorganized so that it will be more responsive to the various levels of conflict that are envisioned as the USMC transitions to sea based STOM operations.²³ In accordance with the need to be more responsive and enable sea based operations the Table of Organization (T/O) and Table of Equipment (T/E) of the MEB are being adjusted to reflect the desired force. Sizing of the MEB affects the sizing of the ships because the berthing requirements that MPF(F) will have to accommodate. The estimated berthing requirement for the naval forces that will reside aboard MPF(F) is 11,233 naval services personnel.²⁴ Another sizing consideration that is being analyzed is the size of the Military Sealift Command (MSC) crew that will be required to operate the new MPF(F) ships. If these size estimates are not properly projected in the design of the ships initially, the sustainment requirements for both the onboard personnel and ships will change affecting the overall sustainment plan for the ESF.

Adjustments to the Table of Equipment for the MEB also affect the sustainment plan for the sea base. The MEB T/E consists of over 200,000 items from supply classes II, IV, VII, and VIII with an overall weight of 42,500 short tons.²⁵ These items are only the T/E items not including classes I, III, and V that will be carried for sustainment. The plan for MPF(F) will reduce the number of days of sustainment on the ships from 30 days to 20 days of supply (DOS) based on the underway replenishment capability that is planned for the MPF(F).²⁶ MPF(F) will have a replenishment capability similar to the CLF station ships and it will potentially be used as a station ship to distribute supplies and replenish the sea base platform. The function of the station ship will be further described in the Resupply Options section of this paper.

²³ Jeffery Peters, MPF(F) Ship Design Assumptions and Cargo Sizing Methodology, Center for Naval Analysis April 2003, 5

²⁴ Peters, MPF(F), 6

²⁵ Peters, MPF(F), 8

²⁶ Peters, MPF(F), 8

Class I (subsistence) consists of food stuffs and water. The Center for Naval Analysis MPF(F) study on ship design assumptions and cargo sizing methodology analyzed the MRE requirement, assuming there would be 11,981 personnel ashore associated with the MEB, with each individual receiving 3 MREs per day. The daily requirement would be 718,860 MREs for 20 days of sustained operations ashore and this equates to 59,905 cases (1,248 pallets of USMC MRE LFORM) or a net weight of 629 short tons of MREs. The total potable water requirement for the MPSRON was also analyzed, using 6.5 gallons of water per man per day ashore and 25 gallons of water per man aboard ship (berthing daily requirement per OPNAVINST 9640.1A, Shipboard Habitability Program) with 10,222 personnel of the sea based increment aboard the MPSRON or with a maximum of 11,981 ashore and 5,637 still aboard equates to 6,085 barrels (bbls)/per day or 5210 bbl/per day. These estimated quantities for class I drive the development of space and capacity that must be accounted for in the design of MPF(F). Not discussed here is the non-potable water requirements for the ships and aviation equipment operations, washdown, and maintenance. This will not be discussed, but is important to keep in mind that there is a requirement for non-potable fresh water. The amount needed is not significant with respect to the potable water necessary to quench the thirst of the ESF.

Class III (petroleum, oil, lubricants (POL)) is the determined amount of fuel the MPSRON will carry to keep the MEB forces moving and shooting. Fuel is the lifeblood of the ESF with its numerous pieces of rolling stock and equipment that require fuel. Both the air and ground forces of the MEB will use the fuel available within the MPSRON. MPF(F) squadron must carry a minimum of 153,000 barrels (bbls) of JP-5 to support sea based operations and 20 DOS of class III for sustained operations.²⁷ In order for the MPF(F) designated ships to function as station ships each of them would need to carry 153,000 bbls total with at least 50,000 bbls earmarked

²⁷ Peters, MPF(F), 13

for the fuel replenishment role. There is also a fuel requirement that applies to the OTH lighterage which MPF(F) will utilize and the landing craft that may be used to offload the MPSRON - although the fuel used for this equipment will not be JP-5 but rather Diesel Fuel Marine (DFM). The studies on the DFM requirements are still not finalized because of the ongoing efforts to evaluate and determine which lighterage variants and landing craft will be used with MPF(F).

Class V (ammunition (A), (W)) for all the different weapons systems in the MEB and ESF is a considerable foot print, in both weight and short tons, for the initial requirement and 20 DOS. The analysis of class V will not be reviewed like classes I and III were above, but the square and short tons are a factor in the design of the MPF(F) fleet and the sustainment plan although probably not the consistent and persistent requirement that classes I and III prove to be throughout all the phases of a campaign.

MPF(F) design and functionality will be essential to the sustainment of the sea base and the success of the Seabasing concept. It is critical that the time and money needed are allocated to this project so that an effective design(s) is developed, if the naval services are to have a fleet of ships in MPF(F) that will fit the MEB and NSE units in the minimal number of ships. The ships of tomorrow will probably be larger in an attempt to cut the number of ships necessary to support the MEB and ESF. Though the MEB and associated units may be smaller than today, the sustainment requirements will see an exponential increase to successfully sustain persistent sea based operations. Speed and range are also factors in the ship design. Accordingly, the ship is required to have a range of 12,000 nautical miles while traveling at the speed of 20 knots.²⁸

The last two factors that need to be addressed without getting into technical dimensions of the ships are the UNREP systems/capabilities and the ability to selectively offload the MPF(F)

²⁸ Peters, MPF(F), 18

fleet. The Seabasing concept relies on an efficient and responsive supply pipeline, with the reduction of DOS required to be carried by the MPSRON. The UNREP system design on these ships is an element of the ship that will become its "all star" player. Improving the system from what is available today for these MPF(F) ships will lead to improvement for both the future CLF ships and the commercial ships used for UNREP in the 21 century. Current UNREP stream rigs are rated to transfer 5,700 lbs. through sea state 5 with the throughput of 35 st/hour/station. Future heavy UNREP systems are currently under development and rated at 12,000 lbs. throughput of 150 st/hour/station. This heavy system will be on the MPF(F) ships.²⁹ MPF(F) will be able to deliver fuel using two systems; the Amphibious Assault Bulk Fuel System (AABFS) when near shore and a twin probe fueling at sea (FAS) system.

The most significant capability modification to the MPF(F) ships will be the ability to conduct a selective offload and onload that allows an in-stream tactical offload and tactical onload or replenishment of vehicles. A selective offload/onload capability is required if the Marine Corps does not have a benign port for offload or backload due to anti-access policies and to be able to originate operations from the sea. The MPF(F) fleet being developed will provide the naval services with the capability and flexibility needed to operate from a sea base, sustain the force, and provide the JFC with a capable option to execute his mission in the theater.

3. Combat Logistics Force (CLF)

Military Sealift Command (MSC) operates the CLF fleet or Naval Fleet Auxiliary Force providing underway replenishment services to U.S. Navy ships worldwide alleviating the need for them to constantly return to port for resupply. CLF ships provide food (Class I), fuel (Class III), ammunition (Class V(A),(W)), repair parts (Class IX) and any other supplies needed to keep the U.S. Navy fleet at sea, on station and operating at the highest possible tempo.

²⁹ Peters, 19

Specialized ships compose the force; fast combat support ships, oilers, combat stores ships, and ammunition ships. The fast combat support ship is a high-speed vessel, designed as an oiler, ammunition and supply ship. Oilers provide underway replenishment of fuel to Navy combat ships and jet fuel for aircraft aboard aircraft carriers at sea. The combat support ship provides underway replenishment of all types/classes of supplies including fresh, frozen and chilled food; dry provisions; repair parts; clothing; and mail using tensioned cargo rigs and MH-60 / CH-46 -- or commercial equivalent-- helicopters. An ammunition ship provides underway replenishment of all types of ammunition via connected replenishment (CONREP) and vertical replenishment (VERTREP).

The CLF exists today to sustain the CSGs giving the CSG an indefinite sustainment capability. It also is used to support the ESGs deployed but its primary function is to replenish and sustain the CSG. The current CLF is unable to sustain the 12 CSGs and 7 ESGs available if all of them were deployed independently at the same time. As stated above, the primary mission of the CLF is to support the CSGs, so if the CSG leaves the sea base for operations the supporting CLF ships go with it, but in the seabasing concept the CSGs and ESGs gain a sustainment capability and economy of force in consolidating the CLF and MPF(F) into the MPG. While all forces of the ESF are in the sea base the inherent sustainment capability can replenish the ESF and a sustainment plan can be effectively managed when there is an advanced base (AB) or Forward Logistics Site (FLS) within 2,000 nautical miles available to replenish the CLF and/or MPF(F).

The capabilities of the ships in the CLF and the experienced crews make the CLF the force of choice for sustaining the seabasing platform. New logistics ships are currently being built to replace the aging fleet but this replacement program does not account for or meet the needs of

the ESGs or the seabasing concept. That is not to say that the Navy is not aware of the need to sustain the ESG. Upwards of an additional five CLF ships, bringing CLF platform numbers to 39, would be required to support the ESGs.³⁰ Using CLF platforms, or a similar capability, as shuttle ships will allow the most efficient means to sustain and replenish the sea base without taking away equipment or forces needed to conduct combat operations. The MPG with an enhanced CLF capability (by number of ships or combined/multi-mission capability in new type ships) and as studies have shown logistics nodes within the 2,000 nm³¹ will make the concept an operational application. Enhancing and/or enlarging the CLF is costly compared to the alternatives of making the MPF(F) more capable to sustain the platform -- assuming the sustainment capability is a planned capability for the MPF(F) and that the MPF(F) is actually built within the next 15 years -- or establishing an ESG self-sustaining capability that is being examined for the LHA(R). The naval services and Joint Staff need to put the money into the program if Seabasing is the way the U.S. will fight in the 21st century.

A multi-mission LHD/LHA(R) concept will be capable of underway replenishment for the ESG.³² A relatively simple modification to the LHD/LHA(R) could give the ship the capability of transferring fuel, ammunition, and cargo. The LHD/LHA(R) would be able to transfer the commodities to amphibious shipping but it would also be able to underway replenish using the CLF, MPF(F) ships, or a commercial tanker. The modifications would consist of:

1. installing a heavy UNREP cargo delivery station near the current fuel delivery station.
2. installing a second cargo receiving station for consolidation with Sea base Station Ship.

³⁰ CAPT Mark Lamboni, Combat Logistics Force Program Updates Brief dated 20 November 2002

³¹ The 2000nm distance is in accordance with the Sustained Integrated Warfare Architecture (IWAR) 2002 Combat Logistics Force Requirements for Global CONOPS Brief (Draft) dated 10 May 2002 and the proposed LHA(R) refueling capability.

³² Naval Surface Warfare Center, (NSWC), Port Hueneme, Underway Replenishment Department, *An Affordable ESG / MPG Combat Logistics Capability* paper (Draft) dated 10 July 2003, 5

3. an increased cargo fuel capacity to allow for replenishing the ESG combatant ships during transit at 20 knots for up to 2,000 nm from an advance base/FLS (about an additional 15,000 bbls), and carry about 250 tons of land attack ammunition for UNREP of DDX / CG / DDG. This ammo would be stowed in containers in the LHD/LHA(R) rolling stock area/space, (The displaced USMC cargo would be carried on the MPF(F) station ship).³³ This option is feasible and would actually add to the capability of the ESG but by no means does this answer the sustainment support needed by the ESG to conduct uninterrupted combat operations.

A multi-mission LHD/LHA(R) is a step in the right direction in that it gives the ESG a valuable capability that could be used as a tertiary course of action if the ESG is unable to be serviced by the CLF (primary resupply) or the MPF(F) station ship (secondary resupply).

The CLF platforms should be the primary source of the inter-sea base sustainment plan for the elements of the sea base. As accomplished today the CLF would conduct its mission utilizing logistics nodes within 2000 nm of the AO or underway replenishment with a Military Sealift Command ship(s) or commercial merchant ship(s) (both container and tanker).

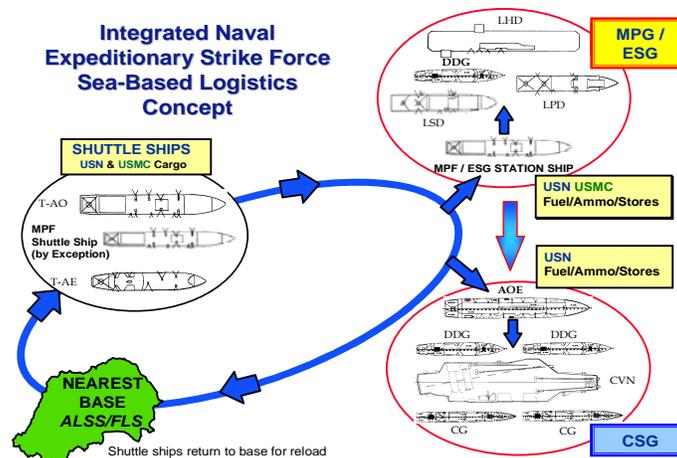


Figure 2. Depicts the Surface Sustainment Concept for the Sea base. Source: "Future Expeditionary Logistics" brief given to Marine Corps Command and Staff College by Mr. Nick Linkowitz, 16 Mar 04.

³³ NSWC, 5

C. RESUPPLY OPTIONS

Inter-sea base (strategic-to-operational) and intra-sea base (operational-to-tactical) resupply will be conducted in order to sustain and replenish the sea base platform. Inter-sea base resupply is accomplished using ships that will go off station or leave the sea base to get replenished at an advance base/FLS or conduct underway replenishment with a ship that came from CONUS or a FLS. Currently, the ships that are responsible for inter-sea base resupply are called shuttle ships. These are ships that belong to the CLF, MPF(F), or are contracted commercial carriers that would bring the needed fuel, ammunition, and supplies from the FLS or to the conduct underway replenishment with a ship that came from CONUS or a FLS. Intra-sea base resupply is conducted to sustain and replenish each of the seabasing components' ships. This mission will be accomplished using ships from the CLF, MPF(F), high speed surface craft (connectors), and the LHD/LHA(R). These ships are known as station ships and will remain on station to facilitate intra-sea base underway replenishment. The CLF and MPF(F) will have a station ship(s) that will conduct underway replenishment with the shuttle ships enabling the station ship(s) to meet the resupply needs of the ESF.

1. Underway Replenishment (UNREP)

Today's operational UNREP is more capable than what was invented out of necessity in World War II, but it has reached its time to catch-up with technology. UNREP is how the US Navy conducts sustainment in the open ocean. This allows a naval force to continue en route to its AO without stopping at a port for replenishment. UNREP is conducted between a combatant and CLF ship using two primary methods; Connected Replenishment (CONREP) and Vertical Replenishment (VERTREP). A specialized third method called Vertical Launch System(VLS) is used to transfer missiles between CLF and combatants or combatant and combatant.

CONREP - uses lines and pulleys connected to each ship to move cargo from ship-to-ship. Currently, 5,700 lbs. is the maximum weight of the cargo that can be transferred. To support future requirements for the transfer of heavier containers, a heavy UNREP capability is able to transfer 12,000 lbs. and has been developed and successfully tested by the Port Hueneme UNREP department. Fuel is also transferred by connecting hoses from each ship to a fueling station on each ship.

VERTREP - helicopters are used to externally lift cargo from one ship to the other.

VLS - a new high-lined system has been being developed at Port Hueneme for missile transfer. The new system reduces the number of sailors to transfer the missiles and it reduces the amount of time it takes.

Improvements, through the use of technology and automation, will reduce the manpower needed for UNREP and the time a combatant needs to be along side the logistics ship. The amount of time it takes to transfer cargo or refuel ship or ships affects the preparedness of the sea base. It will also affect establishing the inter-sea base and intra-sea base logistics plan for the sea base platform and how CLF and MPF(F) ships will sustain the sea base. The efficiencies gained from technology will enable the shuttle and multi-mission station ships to rapidly replenish the sea base.

2. Containerization

Twenty foot containers (or TEUs) are how commercial cargo is shipped in the U.S. and internationally because of the efficiency containers provide the manufacturer, shipper, and customer. A container is packed at the manufacturer and not unpacked until it is received at the customer's warehouse, all the while protecting the product from damage, lose, pilferage, and enabling en route tracking and visibility.

TEUs are used by the military for shipping cargo using commercial carriers but the TEUs has to be opened and the pallets or equipment must be broken out for shipping on naval logistics ships because naval shipping does not currently have the capability to underway replenish combatants or MPS using TEUs. This capability will be developed for use in the future allowing the naval services to take full advantage of the efficiencies provided by TEUs.

3. Container Transload at Intermediate Sea Base (ISB) in Sheltered Water Area

A sheltered water ISB, with a constant sea state between 0-2, needs to be established so the shuttle ships have a transshipment point to rendezvous with the commercial carriers to transfer containers, other cargo, and replenish fuel. The container transfer in this situation would be conducted between the one or two shuttle ships with the commercial ship using shipboard cranes, additionally a commercial tanker could replenish the shuttles at the ISB. The ISB would be located somewhere between the FLS and the sea base, thus reducing the time of transfer and travel for the shuttle ships, ultimately reducing the replenishment cycle time. The essential ingredient for the ISB is a constant sea state of two or less for its use to be beneficial.

This is more critical in some regions more so than others due to the sea state variances. Using Korea as an example, the sea state in the open ocean in the Korean AO is below sea state 3 only 50 percent of the time over the course of the year.³⁴ At sea state 3 containers can be transferred in the open ocean using shipboard cranes but if this can only be done 50 percent of the time, it does provide the assurance necessary to depend on open ocean operations to sustain the sea base so a secure, sheltered ISB is required.

4. Advance Base / Forward Logistics Site within 2,000 nm of AO

Effective resupply and long-term sustainment of the seabasing platform will require an advance base or FLS in theater (probably not in the AO) or logistics nodes within 2,000 nm that

³⁴ Phone conversation with Mr. Marvin Miller the Director of the NSWC Underway Replenishment Department

can be used to stage and manage a continuous logistics flow of fuel, ammunition, supplies and repair parts. The advance base will also provide a staging area or trans-shipment point for follow-on forces and cargo flowing into theater prior to arriving at the sea base. Optimally, this advance base would be collocated with a commercial or military port and airfield in order to use strategic sealift and airlift assets in one location saving transfer time. This would also enable the transloading of personnel and cargo on a HSV. Minimally, the FLS would be a secure pier, beach or sheltered water area with a constant sea state of 0-2 to facilitate the offload/onload/transload of cargo/containers and personnel from strategic sealift to the sea base shuttle ships. This facility would have to be within 2,000 nm, of the AO, to effectively use the LHD/LHA(R) as a multi-mission platform and a distance beyond 2,000 nm also begins to affect the efficiency of the shuttle ships and HSV.

A logistics network is currently established in each region of the world that the naval services use to support forward presence and contingency operations. The two regions that the U.S. has found its military conducting most of the contingency operations over the last 15 years are Europe and the Middle East. Serving as an example, both of these regions have long-standing logistics networks in place that enable naval operations today and the support of operations in these regions in the future. Although these two regions have established networks, the United States has to continue to logistically shape each region of the globe. From Europe to the Middle East to Asia/Pacific, the United States has to be prepared to support operations today and in the future. Even with the intention of totally eliminating host nation support requirements through seabasing, the naval services will need to conduct land based support operations in the region to use strategic lift assets coming from CONUS and to reduce the turn-around time for

shuttle ships. The key point here is that seabasing will eliminate the pause on the beach during an assault allowing speed and tempo of the force to remain high and focused on the enemy.

An in-theater logistics network requirement is potentially the "Achilles heel" of the ENS concept. However, it is not a matter of major concern because long term relationships and multinational agreements with our allies will ensure that the essential support is available in the theater of operations. Difficulties were experienced in the initial stages of Operation Iraqi Freedom (OIF) with Turkey and other allies in the region because of their non-support of the U.S. led coalition actions, but there were allies in the region such as Kuwait, Bahrain and Qatar that allowed the U.S. to base and establish a logistics pipeline through their countries. U.S. strategy and policy must ensure and does ensure that the majority of our allies in each region will support coalition military operations in exchange for region security and stability.

5. CLF vs. MPF(F) for Sea Base Resupply

Limited resources and funding forces the naval services to get the most for the dollars that are allotted for a project. Today, the Navy-Marine Corps Team is developing and evaluating the most cost efficient and capable ships to resupply the sea base. The compromise that will have to be made will be between building additional specialized CLF ships or making the MPF(F) multi-mission capable to support the ESG. A multi-mission MPF(F) is a necessity to sustain the sea base and adds depth in the replenishment capability to the MPG and ESF; however, the CLF ships are better equipped overall for underway replenishment as its single function. When CLF ships are used as the shuttle ship vice the MPF(F), the landing force does not lose any of its available flow of equipment or logistical support. An estimated additional five CLF ships³⁵ would be able to fill the requirement to replenish the ESGs and support the sea base. Additional ships to support the newly established ESGs would give the ESG the same indefinite sustainment

³⁵ CAPT Lamboni, CLF Update

capability - vice the current 15 days - as the CSG and would ensure the UNREP support is on hand at all times for the ESG. This is a critical point because currently the number of CLF ships could not support both the ESGs and CSGs in wartime simultaneously.

The CLF is a tested and proven capability that can work with the surface combatants, amphibious ships, MPSs and commercial ships to conduct container transfer and underway replenishment. CLF is able to conduct underway replenishment with the combatants at sea state 5³⁶ today when none of the other options can match this capability. Making the funding of additional CLF ships a priority today, to support the ESG capability, would at the same time be enabling the forward progress of making the Seabasing concept an operational application within the next 15 years. Funding the CLF for one additional ship each Fiscal Year from FY06-FY11 would define a variable in the sea base sustainment equation today that could be solved by FY-11, a year before the first MPF(F) ship would be delivered, based on the CLF transition plan and MPF(F) Procurement and Inventory Projection.³⁷

MPF(F) is still yet to be finalized with respect to design and essential capabilities. The MPS(F) will be a capable multi-mission platform that will provide the 2015 MEB with operational and logistical support. It will be essential that the MPSRON stay on station to ensure all the assets needed by the MEB are in the sea base and available for immediate delivery ashore when requested. The MPF(F), having a station ship capable of fuel UNREP, heavy UNREP, and quadcon and eventually TEU transfer, would assist the CLF in the intra-sea base resupply mission. A theory proposed by the Port Hueneme UNREP department would be to fill the gap if the CLF is not capable of supporting the sea base, because of its requirement to leave the sea

³⁶ UNREP can be conducted at sea state 5 with a reduced maximum transfer load as depicted in Figure 6-1, p 6-2 in NWP 4-01.4: *Underway Replenishment*.

³⁷ Projection based on CLF Transition Plan in CNA brief Combat Logistics and Operational Logistics Studies dated 25 June 2001 and the Revised CONOPS Procurement and Inventory spreadsheets received from Nick Linkowitz, USMC Logistics Vision and Strategy Center.

base with the CSG, then a second MPSRON, if available, could be used to sustain the sea base. This is a potential short term solution during sea base operations absent the CSG and CLF. If the MPF(F) UNREP capability is the same as the CLF and essentially the MPF(F) capability proposed is a comparable capability³⁸, it will be able to effectively sustain the sea base but its limitation due to a lack of TEU space (ships already loaded for another MEB) will not be able to move the same amount of containers as the CLF during each shuttle run. The current MPF(F) designs will provide for a capable UNREP platform to enhance the CLF capability to sustain the sea base.

The CLF procurement plan must address the current need to support the ESG as it does the CSG. If the ESG is to function as an independent strike force the landing force must know that it will be resupplied on day sixteen without a doubt. This assurance is not there because a CLF capability is not in direct support of the MEU and an overriding requirement could delay its resupply. Another case where the landing forces sustainment could be delayed would be if the rate of movement or ammunition expended is greater than the planned resupply. A direct support CLF capability for the ESG now, sets the naval services up for success in the future as the concept of Seabasing begins to be realized and Operational Maneuver from the Sea (OMFTS) is practiced. It would also demonstrate the Navy-Marine Corps Team's focus on equally developing the NCPs of Sea Power 21.

D. SYNERGISTIC EFFECT

The synergistic effect of using all the ways of resupply optimally will result in a sustainment network for expeditionary operations. This network will have to efficiently manage the logistics

³⁸ Analysis of capability derived from CNA brief, Sea Based Logistics Replenishment Alternatives dated August 2002.

flow necessary to sustain the ESF. There are four stages within the network that the supplies will transition through during the shipment process:

1. from the depot/factory to CONUS port for shipment overseas onboard commercial ships;
2. from CONUS port to FLS or ISB in theater;
3. from the FLS or ISB via shuttle ship to the station ship or sea base;
4. from the sea base to the landing force or joint combat forces operating ashore.

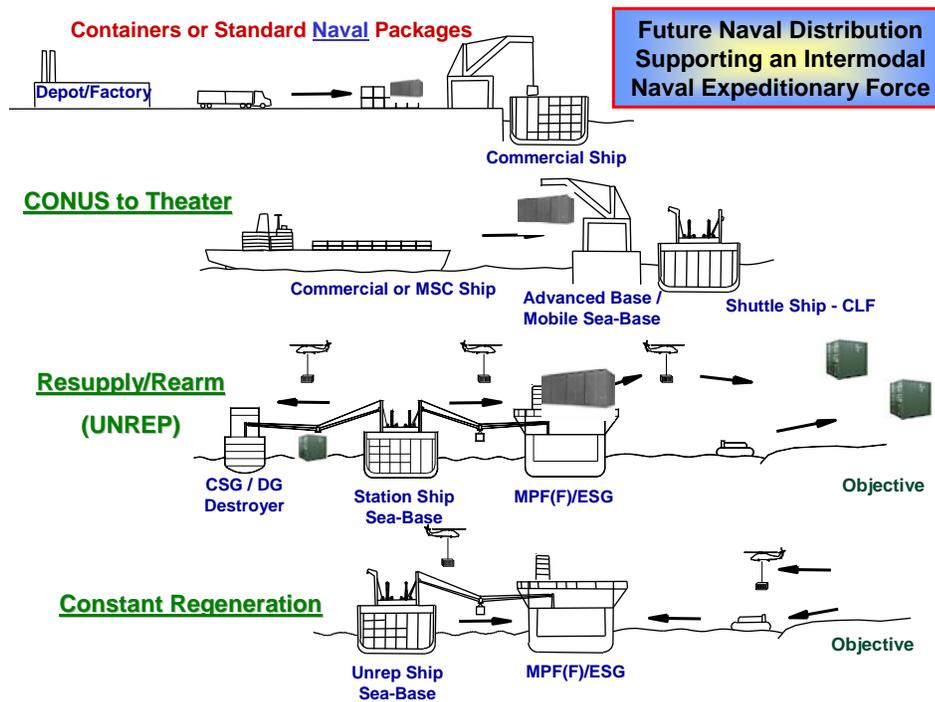


Figure 3. Provides an illustrated depiction of the sustainment network, using quadcons and TEUs, referred to as the Factory-to-Foxhole Logistics.

Source: "Future Expeditionary Logistics" brief given to Marine Corps Command and Staff College by Mr. Nick Linkowitz, 16 Mar 04.

V. JOINT INTEGRATION IN THE SEA BASE

A. AN INTEGRATED SEA BASE

As the Navy-Marine Corps Team develops the ENS concept and begins to apply the concept to its conduct of operations at the lowest-to-highest levels, from an ESG operation to an

ESG/CSG operation to an ESG/CSG/MPG operation to a full blown sea base operation with all of the components and sustainment of seabasing, the joint team is analyzing how to take advantage of the idea of seabasing. While the Army, Marines, and Navy may directly employ seabasing techniques, all services including the Air Force, must operate in close cooperation.³⁹ The ability to sea base and the application of seabasing is relevant to all the services in the 21st century.

At this time, MSC operates a fleet of Army and Air Force prepositioning ships that could be used in the sea base and in support of the sea base. Integrating these capabilities to some extent in the future will benefit the sea base platform and the capabilities of joint forces operating in the AO or in theater. These ships could be used in the sustainment plan for the sea base and the combat forces ashore. An interoperable and sustainable joint sea base strives to defeat anti-access strategies by limiting the logistics build-up ashore and it gives the GCC and JFC additional flexibility and courses of action.

VI. CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

A sustainable sea base, using the operational maneuver space provided by the oceans of the world, opens the littorals to the U.S. Armed Forces in the 21st century. The Navy-Marine Corps Team is aggressively seeking the development of new and better systems to produce a logistics network that will be able to effectively, efficiently, and indefinitely sustain the sea base. These systems, or resupply options, are competing interests for funding and order of precedence for development and refinement. Establishing the priority order for the development of sustainment

³⁹ Office of the Secretary of Defense for Acquisition, Technology, and Logistics, Defense Science Board Task Force on Seabasing report dated August 2003.

assets is critical to pushing forward in the right direction to achieve a network that will meet the replenishment needs of the sea base and ESF.

The naval services have to define the needs of today, matching these needs with the equipment and ships that will be interoperable with the sea base in the future. The first need today is to provide an indefinite sustainment capability to the ESG in order to enable the ESG to act as a independent strike force. This capability should be provided by the CLF through additional ships or a redistribution of CLF assets. In the current environment, a redistribution of CLF ships could fill the immediate need to provide the ESG with the same capability as the CSG and the additional new CLF ships would fill the deficit in a war that deploys all of the CSGs. Making this adjustment today would give the Navy-Marine Corps Team the opportunity to evaluate the need to have an ESG that is self-sustaining and that can sustain itself beyond day sixteen.

The continued development of exactly what MPF(F) should be to support air, sea, and land operations should continue with an emphasis on the replenishment capability required by each MPF(F) ship. The enhanced role of the MPF(F) will support operations and logistics in the sea base. MPF(F) ships will potentially be either shuttle or station ships in the sustainment network. A MPF(F) ship as a shuttle ship could pose a problem in that it would take away capabilities the ESF needs during operations. The MPF(F) should be designed to have both a shuttle and station ship capability but the primary mission of these ships should be as station ships in order to keep all the ESF assets available to the force operating ashore.

Improvements in UNREP and container/TEU handling and usage must be at the forefront of research to increase the efficiency of the UNREP cycle in support of the sea base. Any time saved during an UNREP or container transfer improves the preparedness of the ESF.

Seabasing will move from concept to operational application in the 21st century enabling the naval services and joint forces to defeat anti-access strategies and conduct operations in the littorals. The sea base will be sustained using the CLF, MPF(F), commercial shipping, a forward logistics site, and an intermediate sea base. Sustaining sea based operations will be possible in the future and will enable expeditionary joint forces to conduct OMFTS.

B. RECOMMENDATIONS

The Navy-Marine Corps Team must now -- at this time -- establish the priorities for developing the sustainment capabilities required to support the concept of Seabasing. While prioritizing these capabilities it needs to account for supporting the naval forces today such as the ESG. In doing so, though the needs of the fleet today must be delineated and prioritized, the question that needs to be asked: Does the Navy have the required number of logistics ships to sustain the fleet today? A perspective that fills the requirements of today -- with an eye on the future -- should allow for the cost effective development and fielding of capabilities⁴⁰ that are applicable today and in support of seabasing.

Developing the heavy-lift UNREP capability is the first place to start. It needs to have the ability to transfer 12,000 pounds versus the 6,000 pound maximum that UNREP is currently capable of lifting. Increasing the UNREP transfer weight means that Marine Corps can use quadcons to send equipment and supplies to forward deployed units and continuing the development of the UNREP with the ability to transfer TEUs as the goal for seabasing. The cost-to-benefit ratio of developing this capability makes it the place to start and will immediately impact how UNREP is conducted.

⁴⁰ The LHA/LHD(R) is not prioritized here because the replacement ships for the current LHA/LHDs need to stay on schedule as these ships are to replace older amphibious platforms. Also, these ships are primarily operational platforms not a seabasing sustainment capability; although a replenishment capability would be beneficial to the ESG.

Second, the support the CLF provides for the fleet today is essential to the Navy to sustain deployed ships during times of extending operations that do not allow for an in-port period to replenish food, supplies, and fuel. An aging CLF must be updated with the technology available today that would increase each ship's operational capabilities. The CLF program is being evaluated and new ships are being programmed into the budget, but the new ships will be built as one-for-one replacements, not adding ships to the force.

There is a gap between the Navy's operating structure today with the creation of the ESG and the requirement to sustain a sea base tomorrow. The CLF assets need to be capable of supporting both the CSGs and ESGs, if required, in potentially two regional conflicts in distant areas of operations. An option is to use the MPF(F) in the future to sustain the ESG and sea base once the requirements are determined and the ships are built. But to meet the current needs of the Navy and take advantage of the economy of scale available, because of manufacturers currently building new CLF ships, would make tremendous sense and be fiscally responsible. An additional five to six ships could be built and fielded over the next six to ten years to meet the need of today and the sea base of tomorrow. At least four of these additional ships could be actively supporting the fleet prior to the fielding of the first MPF(F) ship (based on the MPF(F) projected fielding for FY-11 or 12).

If additional new ships cannot be funded due to current budgetary priorities, then a redistribution of these assets should be examined so that the ESG and CSG are supported equally and could sustain indefinitely as independent units.

Third, continued development of the MPF(F) ships that will make them much more operationally capable by allowing for selective offload, increased maintenance, and overall operational air and surface capability. The MPF(F) ships are critical to the support of the sea

base for intra-sea base sustainment. The MPF(F) is the "way ahead" for the sustaining the sea base in the future but the need to sustain the ESG today takes priority to ensure the forces today have the sustainment capability required to execute their missions.

Fourth, the development of a high speed vessel to operate within the sea base and intra-theater as a connector is important to the at-sea arrival and assembly function/capability of the sea base. The HSV is required to tie the sea base and an in-theater advance base together for efficient movement of forces, equipment, and supplies. The sustainment of the sea base is not dependent on a HSV but the HSV will definitely save time and efficiently transport personnel for a distance of up to 2000 nm.

As the concept of logistics for seabasing is delineated, it must ensure that it accounts for the capabilities needed today and tomorrow. It must also take advantage of the efficiencies available today such as the economy of scale available to build additional CLF ships that have been the work-horses of the Navy in the past and will continue to be in the future.

WORKS CITED

Clark, Vern, ADM (CNO), *Naval Expeditionary Forces... Globally Engaged*. N.p., August 2003.

Clark, Vern, ADM (CNO), Hagee, Michael W. Gen (CMC). *Naval Operating Concept for Joint Operations (NOC)*. N.p., April 2003.

Department of the Navy. *Naval Transformation Roadmap (NTR) 2003 (Draft)*. N.p., 23 September 2003.

Department of the Navy. *Seabasing Concept of Operations (CONOPS) (Draft)*. N.p., 25 March 2003.

Douglas, Carl, Keenan, John, and Peters, Jeffery. *Sea Based Logistics Replenishment Alternatives*. Center for Naval Analysis brief. August 2002.

Global Security.org. Maritime Prepositioning Force (Future) MPF(F) / Seabase. URL: <http://globalsecurity.org>. Accessed 15 Oct 2003.

Hanlon Jr, Edward, LtGen (MCCDC), Route, Ronald A. RADM (NWDC). *Enhanced Network Seabasing (ENS)*. N.p., 26 August 2003.

Jones, James L., Gen (CMC). *Expeditionary Maneuver Warfare (EMW)*. N.p., 10 November 2001.

Lamboni, Mark, CAPT. *Combat Logistics Force Program Updates*. Center for Naval Analysis brief. 20 November 2002.

Linkowitz, Nicolas. *Future MAGTF Logistics and Support from the Sea (2010+)*. Marine Corps Gazette, August 2003, 23

McCaffree, Mike, Douglas, Carl, Trickey, Wendy, Csontos, Al. *Combat Logistics and Operational Logistics Studies*. Center for Naval Analysis brief. 25 June 2001.

Marine Corps Warfighting Laboratory (MCWL), *High Speed Vessel (HSV) Final Experiment Report: Period of 18 October - 30 July 2002 (FY-02)*. 17 September 2002

Naval Surface Warfare Center (NSWC)Port Hueneme Underway Replenishment Department, *An Affordable ESG / MPG Combat Logistics Capability (Draft)*, N.p., 10 July 2003

Office of the Secretary of Defense for Acquisition, Technology, and Logistics. Defense Science Board Task Force on Seabasing report. August 2003.

Peters, Jeffery. *MPF(F) Ship Design Assumptions and Cargo Sizing Methodology*. Center for Naval Analysis report. April 2003

Source, Nick Linkowitz. USMC Logistics Vision and Strategy Center. Revised CONOPS Procurement and Inventory Excel spreadsheets.

Sustained Integrated Warfare Architecture (IWAR) 2002. *Combat Logistics Force Requirements for Global CONOPS* brief (Draft). 10 May 2002

BIBLIOGRAPHY

Interviews:

Linkowitz, Nicolas. Logistics Vision & Strategy Center, Headquarters, U. S. Marine Corps, Installations and Logistics, Washington, D.C.. Interview by the author, 20 October 2003.

Strock, James. Deputy Director Expeditionary Force Development Center, Marine Corps Combat Development Center, Quantico, VA. Interview by the author, 18 November 2003.

Torres, Lynn. Office of Naval Research Analyst, Washington, D.C.. Interview by the author, 6 November 2003.

Pross, John, Colonel, USMC. N75V OPNAV, Sea Basing Integration, Expeditionary Warfare Division, Washington D.C.. Telephone interview by the author, 5 November 2003.

Miller, Marvin. Director of Underway Replenishment Department, Naval Surface Warfare Center Port Hueneme. Telephone interviews by the author, 1 October 2003 and 16 January 2004.

Primary Sources:

Clark, Vern ADM (CNO), *Naval Expeditionary Forces... Globally Engaged*. N.p., August 2003.

Clark, Vern ADM (CNO), Hagee, Michael W. Gen (CMC). *Naval Operating Concept for Joint Operations (NOC)*. N.p., April 2003.

Hanlon Jr, Edward LtGen (MCCDC), Route, Ronald A. RADM (NWDC). *Enhanced Network Seabasing (ENS)*. N.p., 26 August 2003.

Jones, James L. Gen (CMC). *Expeditionary Maneuver Warfare (EMW)*. N.p., 10 November 2001.

Marine Corps Warfighting Laboratory (MCWL), *High Speed Vessel (HSV) Final Experiment Report: Period of 18 October - 30 July 2002 (FY-02)*. 17 September 2002

Miller, Marvin. *Expeditionary Maneuver Warfare: Concepts for Resupply of Marine Corps Cargo to Sea-Based ARG/MPF Ships*. 2001

Office of the Secretary of Defense for Acquisition, Technology, and Logistics. Defense Science Board Task Force on Seabasing report. August 2003.

U.S. Navy. Naval Warfare Publication (NWP) 4-01.4. *Underway Replenishment*. Washington, DC: Department of the Navy, August 1996.

Secondary Sources:

Kreisher, Otto. *Logistics Takes Higher Priority in Navy Planning*. *Sea Power*, May 2001, 44-47.

Linkowitz, Nicolas. *Future MAGTF Logistics and Support from the Sea (2010+)*. *Marine Corps Gazette*, August 2003, 23

Electronic Sources:

Global Security website. URL: <<http://www.globalsecurity.org>>

Military Sealift Command website. URL: <<http://www.msc.navy.mil>>

Seabasing Share Point Site. URL: <http://nwcportal.nwc.navy.mil/nwdc/sea_basing>