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Warfighting and Logistic Support of Joint Forces from the Joint Sea Base

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Summary

Sea Basing, a fundamental concept in Sea Power 21, the Navy's operational vision for the 21st century, is designed to help joint force commanders accelerate deployment and employment of naval power and to enhance seaborne positioning of joint assets. It will do so by minimizing the need to build up a logistics stockpile ashore, reducing the operational demand for sealift and airlift assets, and permitting forward positioning of joint forces for immediate employment.

The cornerstone of sea-based logistics on the brigade scale is the Maritime Pre-positioning Force and its future version, the MPF(F). The Maritime Pre-positioning Force currently consists of three forward-deployed squadrons of maritime pre-positioning ships, each with five or six vessels with weapons, supplies, and equipment sufficient to support a force about the size of a Marine Expeditionary Brigade for up to 30 days. The MPF(F) will be composed of multiple ship types designed to support a Marine Expeditionary Brigade and provide functions not currently provided by the MPF, such as at-sea arrival, assembly, sustainment, reconstitution, and redeployment of Expeditionary Forces, as well as Expeditionary Strike Group interoperability. Current plans call for an MPF(F) squadron comprising three large-deck amphibious ships, three Mobile Landing Platform transport ships,[1] and eight cargo ships.

The Assessment Division of the Office of the Chief of Naval Operations (OPNAV N81) asked the RAND Corporation's National

[1] The Mobile Landing Platform is a new-design ship that will carry Landing Craft Air Cushion (LCAC) connectors for the MPF(F). The LCAC is similar to a large hovercraft.

Defense Research Institute to examine how the still-evolving concepts for sea basing could be applied to joint operations. The Navy is particularly interested in how the sea base could support Army operations while supporting Marine Corps operations. This monograph provides a high-level analysis of the sea base, its use in operations related to the Marine Corps, and the viability of Army operations using the sea base under varying conditions.[2] This effort is not a definitive logistics-based study. Rather, it is conceptual in nature and uses a broad-brush model to define throughput capacity (and overcapacity, as discussed below).

The Army has historically deployed its forces for overseas conflicts by sea, a concept it has again recently emphasized. Although the Army emphasizes deploying its forces directly into an area of operations, rather than through at-sea assets, such as the MPF(F), the capability to perform at-sea transfer of Army forces could greatly benefit the joint force, particularly by providing a means to rapidly introduce Army forces where a usable port is not available.

Analysis and Scenarios

We examined three operational scenarios, in addition to support of a Marine Expeditionary Brigade (MEB) alone, that explore potential joint operations using the sea base to (1) support an Army light or airborne brigade that arrives 50 nautical miles (NM) inland in an area of operations, (2) support an Army medium (Stryker) or heavy brigade that arrives through a seaport of debarkation, and (3) move ashore an Army medium or heavy brigade that deploys through the sea base to the area of operations. In our analysis, we always assumed that the MPF(F) would support the MEB as its first priority. Once that mission was accomplished, any remaining capacity was identified as potentially available to support other joint forces—specifically, Army brigades of various types. Our analysis concluded that, in many circumstances, brigade-level Army and Marine Corps ground elements can be sus-

[2] In operations involving both the Marine Corps and the Army, the joint force commander will determine how and when they will use a sea base.

tained simultaneously using the throughput capacities of planned MPF(F) components.

The Seabasing Joint Integrating Concept, in its assessment of seabasing risks, states, "Adverse weather conditions and sea state impact sea-based operations can affect the rapid build-up of combat power and timely sustainment of employed forces"[3] Issues of sustainment under unfavorable conditions, such as in high sea states with degraded ship-to-ship movement, can be addressed, in part, using the metric of *relative sustainment capacity*, defined as the ratio of maximum sustainment throughput capacity (in short tons per day) to sustainment requirement (also in short tons per day).[4] Overcapacity exists under favorable conditions when this ratio exceeds 100 percent. Overcapacity is needed to ensure adequate capacity under unfavorable conditions. Overcapacity can also release some sea base assets (notably, MV-22 aircraft) for support to ground forces under favorable conditions.

Our analysis began with the collection of data from the Army, Navy, and Marine Corps. Related studies were also collected and examined. We developed three illustrative scenarios judged most likely to represent logistic support to Marine Corps and Army ground elements. We then developed a simulation, the Joint Sea Based Logistics Model (described in Appendix E), to quantify the capabilities of the sea base in these three scenarios. This simulation was used for hundreds of combinations of distances, ground elements to be sustained, levels of combat, possibilities for reducing sustainment demand, and various ship-to-shore connector assets. Our insights and recommendations derive both from simulation results and from an improved understanding of sea-based logistic support. They led to the following distinct approaches to increasing sustainment capacity:

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[3] Department of Defense, *Seabasing Joint Integrating Concept*, Version 1.0, Washington, D.C., August 2005, p 12.

[4] For presentation purposes, our analysis consolidates all sustainment and lift requirements using the simple metric of tons per day. The underlying analysis considers classes of sustainment.

- Reducing distances from the sea base to supported ground elements or seaports of debarkation. Reducing sustainment distances from the planned distance of 110 NM is the most effective means of increasing sustainment capacity. Threat conditions can limit this option, necessitating others.
- Adding LCAC surface connectors to CH-53 and MV-22 aircraft in sustainment. The addition of LCACs could more than double sustainment throughput.[5]
- Increasing the ratio of CH-53K to MV-22 aircraft. The benefits of increasing the ratio of CH-53K to MV-22 aircraft can be similar to those from adding LCACs as sustainment assets.
- Reducing sustainment requirements. Reducing demand for external sustainment, such as that realized by eliminating ground elements' demand for bulk water, can significantly improve the ability to sustain ground elements.

We identified the following approaches to reducing Army ground element movement time from the sea base ashore:

- Increasing the ratio of CH-53K to MV-22 aircraft. A modest reduction in movement time for Army forces can be achieved by increasing the ratio of CH-53K to MV-22 aircraft. Put another way, such a change would, as described above, enhance sustainment performance significantly without increasing movement time.
- Adding Joint High-Speed Vessels to augment LCACs as surface connectors. Adding a single Joint High-Speed Vessel to augment LCACs roughly doubles surface connector throughput capacity and halves the movement time of Army brigade combat teams.

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[5] Maintenance requirements limit LCACs to not more than 16 hours of operation per day. Crew fatigue can further limit LCACs to 12 hours or less of operation per day. Sixteen-hour days are used as a baseline for LCAC operations in the main body of this monograph; 12-hour days are considered as an excursion in Appendix E.

Sustainment Findings

Our analysis indicates that a Sea Base Maneuver Element, that portion of a Marine Expeditionary Brigade projected ashore for operations, can be sustained with some difficulty at a range of up to 110 NM from the sea base, using only CH-53K and MV-22 aircraft. Simultaneously sustaining both a Shore Based Maneuver Element and an Army airborne brigade using only these aircraft would require reducing significantly the distance from the sea base to these forces.

Using LCACs to augment sea base aircraft in sustainment has substantial benefits, particularly when LCACs contribute to both Marine Corps and Army ground element sustainment. When LCACs can contribute only to Marine Expeditionary Brigade sustainment, the limitations of airborne sustainment to Army ground elements determine the feasibility of joint sustainment. The use of a mix of sea base aircraft more rich in CH-53K aircraft than currently planned could enable joint sustainment at greater distances.

Reducing sustainment demand (by, for example, eliminating demand for bulk water from the sea base) is particularly helpful when sustainment capacity is marginal.

Movement Findings

An Army Stryker or heavy brigade can be transloaded at sea[6] and moved ashore from the sea base in three to six days (depending on the distance off shore), using MPF(F) assets also sustaining a MEB. The ability to move an Army brigade ashore in a few days represents a new capability for the Army.

If a single Joint High-Speed Vessel can augment the LCACs, it will roughly halve the time required to transport an Army brigade ashore. This finding reflects the observation that, when operable, the throughput capacity of a single Joint High-Speed Vessel about matches

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6 *Transloading* entails ship-to-ship movement by ramp. Transloading operations are illustrated in Figures B.3 and B.4.

the combined throughput of MLP LCACs. There are, however, issues of Joint High-Speed Vessel operability in this role in even moderate sea states, as well as the need for a small port where the Joint High-Speed Vessel can offload.

Other Findings

- The CH-53K is better suited than the MV-22 for sustainment; with external loads the MV-22 loses its speed advantage on ingress and the CH-53K carries at least twice the load of the MV-22. CH-53K helicopters are especially valuable under conditions of heavy sustainment demand or long sustainment distances.
- The Sea Basing concept is not consistent with, and in some sense conflicts with, the Army's desire to deploy directly to a port via High-Speed Ships. The Army has not developed doctrine and has not funded systems for operating with sea bases. However, our analysis illustrates that, once ashore, an Army brigade could, in many situations, be sustained by a sea base if (1) it moves away from its port of debarkation or (2) enemy action causes that port to become unavailable for sustainment.
- To capitalize on the potential of the sea base, Army shipping should be configured for "selective offload" rather than "dense pack." The interface between Army pre-positioning ships and the MLP is a potential bottleneck in moving Army forces. To avoid such bottlenecks, a built-in loading system should be considered for the MLP. Integrating such a loading system into the MLP might be less expensive in net than integrating it into Army and Navy pre-positioning ships and might also hasten joint interoperability.
- MPF(F) ships can provide deck space for a limited number of Army helicopters on a temporary basis (1–2 deck spots per "big deck") without significant loss of throughput capacity. However, there is not sufficient space on the MPF(F) to base significant numbers of Army aircraft as long as large numbers of Marine Corps MV-22 and CH-53K aircraft are based on these ships. Space for Army

aircraft could be created temporarily by moving MV-22 aircraft ashore, but several problems would remain, including rotor issues (braking and folding), corrosion, and maintenance.

Key Assumptions

To conduct the analysis, a number of assumptions were made. They included the following:

- Army unit equipment and supplies arrive at the sea base via Army shipping. Therefore, the Army units would not consume the MEB's supplies that are on the MPF(F) ships.
- Army ships arrive at the sea base "combat loaded" for selective offload, as opposed to "dense packed." Combat loaded ships are filled to roughly 60–70 percent of capacity in order to provide room to move vehicles and equipment below decks so that a specific item can be offloaded when needed. On the other hand, "dense packed" ships are loaded in a manner to maximize their carrying capacity. In that case, the ship can unload cargo only in the reverse order from how it was placed in the ship (i.e., the first piece of cargo loaded deep inside the ship will be the last item that can be removed).
- The connectors (e.g., ramps) between the Army's ships and the Mobile Landing Platform vessels will permit the movement of Army vehicles onto the MLP and its LCACs. Additionally, we assume that Army vehicle drivers would be properly trained to move their vehicles on board ships, including onto connecting ramps between ships.
- When LCACs are used to move Army and Marine Corps supplies ashore, sufficient trucks are available to move those supplies inland to where they would be consumed, and those trucks are adequately protected. It should be noted that an examination of the required number of trucks was not part of this analysis for the Navy. This issue, however, clearly merits more detailed analysis.