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Systems Approach to Designing a Maritime Phase Zero Force for the Year 2020

by

Systems Engineering and Analysis Cohort 15 and Temasek Defense Systems Institute

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Naval Postgraduate School
Monterey, CA

Daniel T. Oliver
President

Leonard A. Ferrari
Executive Vice President and Provost

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SEA Students:

LT Jarrett Dunn, USN	LT Chet Lee, USN	LT Tim Thurston, USN
LT Christopher Gahl, USN	LT Brandon Luedke, USN	
Laurie Knowles	LT James Smith, USN	

TDSI Students

Chez Yee Ang	Han Chaun Lee	CPT Nir Rozen, IAF
LT Robert Bair	Hong Aik Lee	Mei Eng Elaine See
Chung Wai Boey	LTC Weng Wai Leong, RSAF	Chey Hock Sim
Wan Yin Chia	CPT Chaun Hao Mok, RSA	LT Jeffrey Smith
MAJ Wee Lee Chia, RSAF	LT James McClure	Giam Tan
James Devieash	Chee Yong Ng	I-Hsiang Leslie Tan
Chun Heong Eng	CPT Chiou Perng Ong, RSA	Kian Sing Tan
Yew Chong Foong	Choon Wei Roy Ong	MAJ Kwang Hui Yeo, RSA
Chien Cheong Gerald Ho	Kim Meng Anthony Quek	

Reviewed by:

Gary O. Langford
Project Advisor

Charles N. Calvano
SEA Coordinating Committee Chair

Accepted By:

David H. Olwell
Systems Engineering Dept.

Accepted By:

Robert Dell
Operations Research Dept.

Released By:

Karl van Bibber
Vice President and
Dean of Research

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This report details the construct of a maritime force designed solely for the accomplishment of Phase Zero missions. Accomplishment of Phase Zero missions will increase a region's stability thus decreasing the spread of radical ideologies that could spawn large scale terrorist attacks and prevent smaller conflicts from growing into larger more expensive ones. To devise this force the integrated study team had to take the broad idea of Phase Zero operations and determine which specific missions contribute to the completion of what they defined as the overall Phase Zero mission. Based on these missions, the integrated study team built scenarios that were representative of the entire Phase Zero mission area. These scenarios were used to establish what capabilities were important to a maritime Phase Zero Force. With these capabilities in mind, the team constructed maritime forces and then evaluated them against the same scenarios to determine which ones performed better. The recommended force can be fielded for an annual cost of $360 million and could accomplish all of the Phase Zero scenarios that the integrated study team built.

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A Maritime Phase Zero Force for the year 2020

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EXECUTIVE SUMMARY

Introduction to the SEA-15 Integrated Project:

The Naval Postgraduate School's Systems Engineering and Analysis integrated projects are designed to build tools that students in the Systems Engineering Analysis curriculum have learned over the 18 month enrollment in the program. During this particular integrated project thirty-three students from the United States, Singapore, and Israel worked together for six months to develop a maritime force capable of accomplishing all maritime Phase Zero missions that could be employable by the year 2020. One of the options had to be a force that could be fielded for $1.5 billion total annualized cost.

Phase Zero Background**:**

The fall of the Soviet Union in the early nineteen nineties left the United States Military without a formidable superpower peer competitor. During the Cold War the primary mission of the U.S. military was easily discernable. It was to deter the Soviet Union from launching a nuclear attack against the U.S. or its allies. Many different smaller missions fell within this mission group but they mainly consisted of narrowly defined one versus one conventional engagements. During this time period an easily defined adversary led to an easily defined set of required military capabilities. The peer competitor void created by the dissolution of the Soviet Union also made it difficult for policy makers to discern required future defense capabilities. The new environment that the U.S. military is required to operate in is very different from the Cold War environment

The original meaning of the term Phase Zero was delineated in Joint Pub 3, specifically the phasing diagram for joint operational planning. This document defines Phase Zero operations as shaping operations which it described as:

> "Joint and multinational operations — inclusive of normal and routine military activities — and various interagency activities are performed to dissuade or deter potential adversaries and to assure or solidify relationships with friends and allies. They are executed continuously with the intent to enhance international legitimacy and gain multinational cooperation in support of defined military and national strategic objectives. They are designed to assure success by

> shaping perceptions and influencing the behavior of both adversaries and allies, developing allied and friendly military capabilities for self defense and coalition operations, improving information exchange and intelligence sharing, and providing US forces with peacetime and contingency access. "Shape" phase activities must adapt to a particular theater environment and may be executed in one theater in order to create effects and/or achieve objectives in another." [1]

This definition of shaping operations emphasizes on multinational cooperation in setting the conditions for effective joint operations. This document gave the idea of Phase Zero operations its foundation of multinational engagement.

During the late eighties and nineteen nineties military decision makers began to make the case that the military should be able to participate in several smaller low intensity engagements. This was largely due to local issues away from global conflicts. The World's landscape was dominated by a number of small conflicts and humanitarian crises. Examples of these engagements were the U.S. interventions in Somalia and Haiti and the U.S. military support after hurricane Hugo.

On September 11, 2001 Al Qaeda proved that a small non-state actor could cause severe damage to a large opponent by crashing airplanes into buildings. This idea was enforced by follow on bombings in Africa and Europe. A focus on Al Qaeda and terrorism identified regional instability as a primary enabler of the growth of radical ideologies. Although the term Phase Zero already had a definition, it was through the efforts to curb the rise and spread of terrorism that the concept of Phase Zero operations positively influencing World security by increasing the stability of a region began to take hold. General Charles F. Ward (ret) explained the underlying thought process when he stated,

> "The Al Qaeda network inspires its operatives to disguise themselves among thousands of peaceful immigrants in largely unassimilated Muslim enclaves throughout Europe and the vast under governed spaces of North Africa serve as fertile recruiting grounds for fundamentalists/extremists/aspiring

[1] Joint Publication 3-0, 17 September 2006, Joint Operations, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_0.pdf, Accessed on 26 May 2009

terrorists. To confront this growing threat, USEUCOM's Phase Zero campaign places a new emphasis on theater security cooperation and capacity-building with our allies throughout the region." [2]

Phase Zero proponents use similar rationale to make the argument that similar means can be employed to prevent or minimize the resources needed to quell a large scale conflict. General Ward goes on to say,

> "Moreover, leaders at USEUCOM also realized that the preventive focus of Phase Zero is less costly (in both lives and resources) than a reactive approach to crisis. At the very least, Phase Zero helps set conditions for an easier location transition to a more comprehensive U.S. intervention in a crisis." [3]

When the Department of Defense completed the 2006 Quadrennial Defense Review, the importance of being able to complete these smaller and differing missions was realized. Although the 2006 QDR did not create a specific mission grouping for such operations, it did recognize that these missions were embedded within the three larger areas of homeland defense, war on terror/irregular warfare, and conventional campaigns.

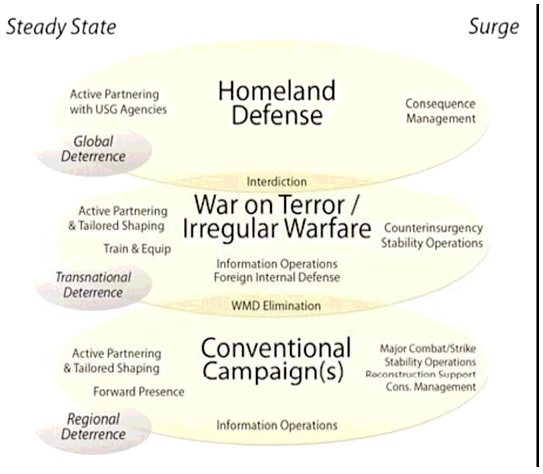

Figure 1: Balance of Missions from Naval Operational Concept 21 September 2006

[2] WardCharles, F: The Phase Zero Campaign, Washington D.C. International Peace Operations Association，2007
[3] WardCharles F: The Phase Zero Campaign, Washington D.C. International Peace Operations Association，2007

During Dr. Thomas Fedyszyn's lecture at the Naval Postgraduate School in Monterey CA, on President Obama's maritime strategy, he gave a new and interesting take on the role of the military in this changing world. He separated the missions of the United States Military into two broad categories. The first category was made up of conventional roles of the U.S. military such as power projection and deterring major wars. His second category consisted of smaller scale regional and cooperative engagements. Although he only listed contribute to homeland defense in depth, foster and sustain cooperative relationships, and prevent or contain local disruptions in this category, they inherently contain many smaller actions that enable the accomplishment of these larger missions. Phase Zero missions include the countless missions that make up this new category of military operations.

After reviewing many references and publications, the Integrated Project Team decided on the following mission description for a Phase Zero force.

> *A Phase Zero force will work closely with multinational, interagency and other partners to maintain or enhance stability, prevent or mitigate crises and set the conditions for access and responsive crisis intervention.*

Defining Mission Objectives:

After combining the ideas above into a working mission statement for a maritime Phase Zero force, the integrated project team defined which smaller missions contribute to the accomplishment of the overall Phase Zero missions. The integrated project team completed a functional decomposition of the Phase Zero mission statement.

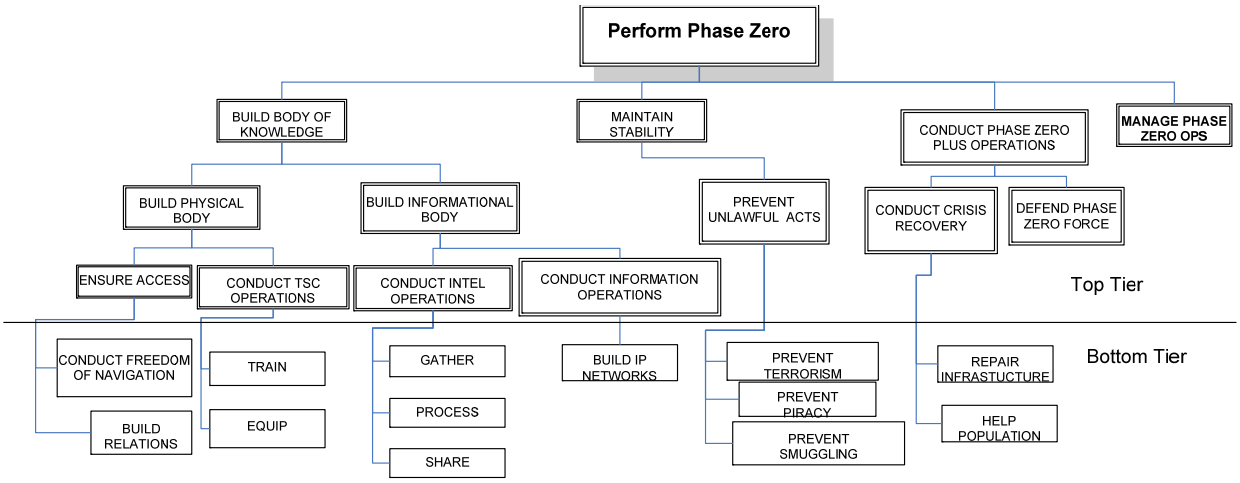

Figure 2: Phase Zero Decomposition

The bottom tier functions of the decomposition serve as the primary framework for the Phase Zero missions. The Phase Zero mission list consists of the following missions:

- Civil Support
- Train the local defense force
- Equip the local defense force
- Build relations with foreign nations
- Restore critical infrastructure
- Anti-smuggling operations
- Anti-terrorism operations
- Anti-illegal fishing operations
- Force protection against threats
- Anti-piracy operations
- Information sharing
- Freedom of navigation
- Non-combatant evacuation operations (NEO)

While this list is representative, but not exhaustive, we do believe it is comprehensive. Additional missions will most likely be colligated or subsumed.

It was challenging to derive a force that simultaneously completed 13 individual missions. However there are similarities in how they could be completed and in the platform and force characteristics that were integral to their completion. The integrated project team used multidimensional scaling to determine degrees of similarities between the missions. The

approach was to survey subject matter experts from the integrated project team, Naval Postgraduate School, and Naval War College faculty. Participants were asked to rate the similarity or dissimilarity of each of the thirteen missions. Each pair was rated for a total of seventy eight pairs. The result of the surveys led to three primary missions within the thirteen essential missions. These primary missions are Anti-smuggling, Civil Support, and Information Sharing. The missions that made up these individual groupings were similar enough to each other that a force that can accomplish any one of the missions can accomplish all missions.

Deriving the Phase Zero Force:

After defining the three primary missions we determined which attributes were important in the accomplishment of each of those missions. Two mission scenarios were created to simulate the Civil Support and Anti-smuggling missions in the Latin American area of responsibility. Latin America was chosen as the base for the mission scenarios primarily for two reasons. First SOUTCHOM maintains a comprehensive archive detailing Phase Zero type missions that have taken place over the last decade. This gave the modeling and simulation team a historical basis from which to build the mission scenarios. Secondly, Latin America is home to two of the most challenging Phase Zero type problems, the fight against drug trafficking and the response to humanitarian crises.

The Anti-smuggling scenario was modeled using a barrier patrol concept to simulate an effort to quell drug smuggling along the western coast of Mexico. The model identified the type of aviation elements and the size and speed of intercept vessels as the most important force attributes to identify and interdict drug smugglers.

The Civil Support scenario was modeled after the need to support the Latin American populace following a natural disaster. The team looked at three severities of natural disasters in order to quantify force characteristics and determine which were most important to the rendering of aid during such events. In all three cases the models showed that a force's airlift capacity and shipboard cargo capacity were the primary factors in the accomplishment of Civil Support missions.

The Information Sharing scenario provided the basis through which our developed forces would be able to complete the Anti-smuggling and Civil Support missions. In both cases the ability to access and pass information quickly and reliably would serve as a force multiplier.

The force structure team created six force structures that could complete the three groups of scenarios. Three force structures comprised of platforms currently in the U.S. inventory and three force structures comprised of platforms currently in the inventory and platforms that are able to be produced and delivered by 2020. These include platforms that are under development and can be operational by 2020 based on procurement timelines and platforms that are currently being used by foreign nations. The force structures were selected based on their ability to satisfy the critical characteristics identified by the models of the Anti-smuggling and Civil Support scenarios. Concurrently the force structures were compared with the results from a linear optimization to determine the optimum mix of platforms. The result was six force structures satisfying the two premises of current and future forces and the three levels of mission severity.

The force comprised solely of current platforms that could complete the Anti-smuggling mission and support the populace following the highest severity natural disaster was:

- LHD 1 class
  - (4) CH-53
  - (11) SH-60B
- (3) FFG 7 class
  - (6) SH-60B

The force that was comprised of current and future platforms that can complete the Anti-smuggling mission and the highest severity natural disaster was:

- JMSDF DDH
  - (7) CH-53K
  - (6) RQ-8
- LPD-17
  - (2) SH-60
  - (3) RQ-8
  - (2) M-80 Stiletto
- JHSV
- Visby
  - (3) RQ-8

The RQ-8 Fire Scout was selected after a detailed trade study analyzing the costs and characteristics of current and future unmanned aerial vehicles. The extended endurance of the RQ-8 over that of the SH-60 reduced the number of aerial assets needed.

Cost analysis of the Current and Future force structures showed that the Future Force could accomplish the Phase Zero mission for approximately $115 million less than the Current Force. Included in the force cost considerations were funding for a marine detachment to

provide security at potential crisis relief sights and a medical detachment to provide relief in support of Civil Support missions. The overall price of the Phase Zero force composed of Current and Future platforms came to approximately $360 million. The Current Force totaled $475 million. Since the price benchmark set by the tasking statement was $1.5 billion, the U.S. government could construct four of these maritime Phase Zero forces.

The Phase Zero Force and the World:

The forces that result from this analysis are the most operationally effective and cost efficient forces that can be employed to accomplish all Phase Zero maritime missions. The overall mission of a Phase Zero force is to work closely with multinational, interagency and other partners to maintain or enhance stability, prevent or mitigate crises and set the conditions for access and responsive crisis intervention. However, it is extremely difficult to monitor how much the stability of a country or region is changes in response to the efforts of a Phase Zero force. It is equally as difficult to quantify how well a force is at preventing or mitigating a crisis. The Geneva Center for Security Policy developed a matrix of preventative measures that contribute to the stability of the international system. The Geneva Center looked at several existing indices comprised of economic and political factors and formulated its own set of indicators. The indicators were distributed across five categories - economic, environmental, military and security, political, and societal. The direct links that could be drawn between the force and these indicators were in the military and security indicators. However, it is reasonable to assume that successful accomplishment of the 13 maritime Phase Zero missions will influence many of the other outcome based indicators. For example, the addition of a Phase Zero force to the Gulf of Aden region will definitely bolster the enforcement of the rule of law at sea but may also boost the societal indicator of secondary school enrollment due to the decreased profitability of piracy.

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I. INTRODUCTION

The Naval Postgraduate School's Systems Engineering and Analysis integrated projects are designed to use tools that students in the Systems Engineering and Analysis curriculum have learned over the 18 month enrollment in the program. During this integrated project thirty-three students from the United States, Singapore, and Israel worked together for six months to develop a maritime force capable of accomplishing all maritime Phase Zero missions that would be employable by the year 2020. One of the options had to be a force that could be fielded for $1.5 billion total annualized cost.

A. TASKING STATEMENT

On 27 August 2008, OPNAV N8F formulated tasking that was adopted by the Naval Postgraduate School Systems Engineering and Analysis Integrated Project Team – that of building a maritime force to complete the Phase Zero mission in the year 2020. Specifically:

> Design a system of systems to employ a regional Maritime Theater Security Force to conduct all maritime missions associated with Phase Zero operations. Consider current fleet structure and funded programs as the baseline system of systems to execute security and shaping missions in developing these concept of operations, then develop alternative fleet architectures for platforms, manning, command and control, communication, logistics and operational procedures to evaluate against the current program. A complete redesign of a *naval* force capable of executing phase 0 operations, employable by 2020, and using total procurement and operating costs of $1.5B (FY08 constant dollars) per annum, should be one of the alternatives.

B. STATEMENT OF THE PROBLEM

The Integrated Project Team interpreted the tasking statement to include an analysis of current and future fleet architectures in completing Phase Zero operations. The final result of the tasking would be a force employable by 2020 that will be able to adequately perform Phase Zero operations for a cost of $1.5 billion a year. Some things to be considered in the analysis and

development of the fleet architecture were: platforms, manning, command and control, communications, logistics, and operational procedures.

C. STATEMENT OF NEED

Existing maritime force structures are ineffective in accomplishing Phase Zero operations. This is a problem because the role of the U.S. Navy has evolved from fighting big ship on ship conflicts against the Soviet Union to more of a police force utilized for sustaining regional stability and security. The U.S. fleet was designed to be able to project power from the sea and to put "bullets downrange" which is inherently not the purpose of Phase Zero.

D. PROBLEM SOLVING APPROACH

The initial tasking from OPNAV N81 created four challenges that were unique to this particular integrated project. First, the study team developed a group of missions, instead of a single mission. Second, there were differing opinions as to what constituted the set of maritime missions associated with Phase Zero operations. Third, the tasking indicated a budgetary constraint in addition to the typical performance and schedule requirements. Fourth, measures of effectiveness for the group of Phase Zero missions involve sociological theory seemingly beyond the scope of this project. In order to meet the needs of the tasking, the team deviated from the organization used in past integrated projects. The initial action was to create a Phase Zero research group to investigate the different explanations, interpretations and definitions of Phase Zero. The budgetary constraint required a cost analysis group to analyze and identify the annual costs for every platform in the current and future U.S. fleets. A preamble to grasping the totality of Phase Zero was first determining which maritime missions comprise Phase Zero operations. There were many considerations as to what operations should be regarded as Phase Zero. The operations planning phasing document in Joint Pub 3 served as the starting point for defining Phase Zero. The research revealed a range of definitions of Phase Zero. The Phase Zero team used systems engineering to identify three groups of operations that could likely be considered Phase Zero (i.e. Anti-smuggling, Civil Support and Information Sharing). The next step was to determine how to model these three somewhat fluid groups of missions. If three missions were different enough from each other; the force designed to combat those missions would also be able to accomplish any other missions that may fall under the auspices of Phase Zero. Three

individual scenarios were matched to the three groups and were the catalysts to create a set of requirements for the maritime force. To fulfill these requirements, both existing and non existing platforms and force structures were examined and considered. Since no U.S. maritime force has been designed specifically for only Phase Zero type missions, the integrated study team examined the current multinational missions of training, humanitarian assistance missions, and maritime interdiction operations. Although not inclusive of the missions that could be considered in the Phase Zero grouping, they provided a number of force structures to evaluate. The current force structures that accomplish these missions were evaluated against the three Phase Zero groupings. Simultaneously, the integrated study team postulated future force structures that would satisfy the requirements determined by the three groupings. The results of these evaluations were used to determine how effectively the current force and future force structures perform Phase Zero type missions.

The integrated study group also conducted a study to identify and evaluate the threats to the stability of a region in the year 2020. The threat study further delineated the requirements for Phase Zero force during the lifecycle of the proposed force. The integrated project team constructed a detailed cost model from which to compare candidate force structures. A key constraint on the proposed force structures was that one force structure needed to have a $1.5 billion cost per year. It was not a desired output for the force structures to be limited in effectiveness by the $1.5 billion dollar price tag. Therefore, the team sought to demonstrate what level of Phase Zero effectiveness could be achieved for $1.5 billion as well as how much it would cost to achieve higher levels of effectiveness.

1. Systems Engineering Process

In order to derive a force that could effectively accomplish all maritime missions associated with Phase Zero missions, the integrated project team needed a method that could begin from an abstract mission and mature into a highly structured set of force requirements. To facilitate deriving the force requirements, the integrated study team chose to modify the systems engineering Vee model by adapting the phases of the model that pertained to our project. Below is a list of what the team accomplished during each phase of the Vee model.

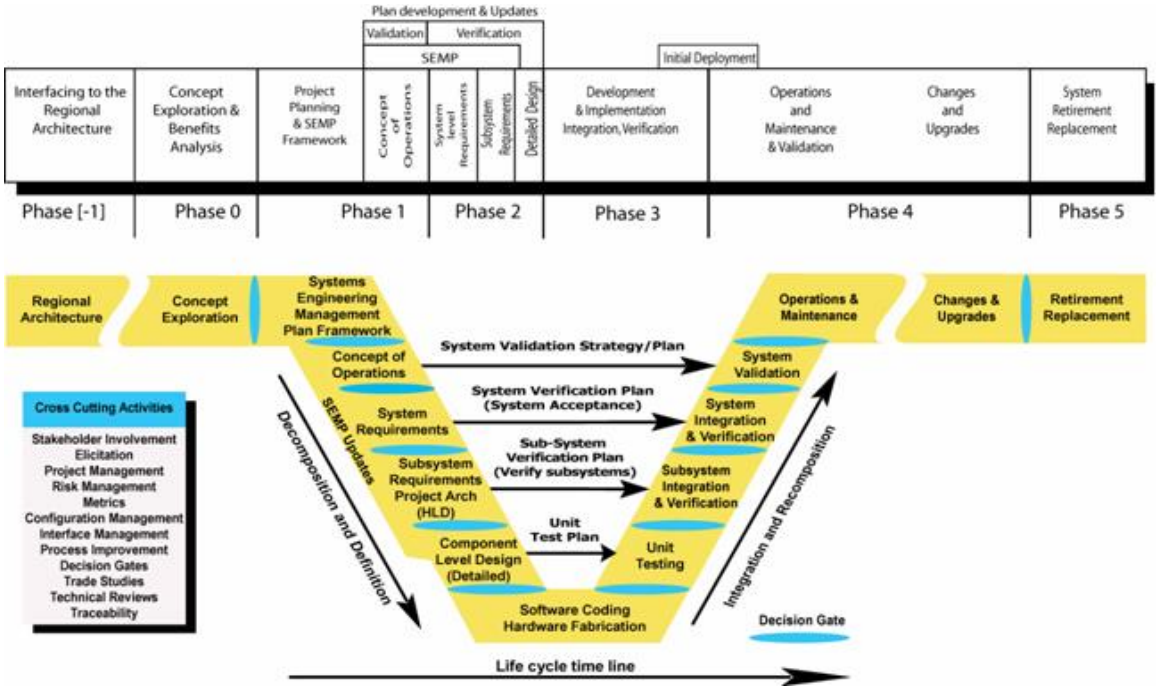

Figure 3: System's Engineering Vee Model [4]

Feasibility Study/Concept Exploration: During this portion of the process the Phase Zero research team explored the broad concept of Phase Zero operations. Topics of research included the origins of the Phase Zero mission area and how militaries have accomplished these type of missions in the past.

System Requirements: During this phase in the vee process the integrated study team solicited and received inputs from the research team and stakeholders to develop the tasks a maritime Phase Zero force would need to be able to accomplish. The result of the system requirements phase was the development of the 13 maritime Phase Zero missions.

High-Level Design: During this phase the integrated project team used modeling and force structure to develop the critical capabilities that a maritime Phase Zero force would need to possess.

Detailed Design: During this phase the integrated project team selected specific platforms to make up the alternative maritime Phase Zero force structures based on the critical platform capabilities that were identified.

[4] U.S. Department of Transportation web site. "Overview of the Vee Technical Development" http://www.fhwa.dot.gov/cadiv/segb/views/document/Sections/Section1/1_1.htm accessed on 15 June 2009

Subsystem Verification/System Validation: During these phases the integrated project team used modeling to discern which force structure was the most efficient in performing the overall Phase Zero mission.

E. STAKEHOLDER ANALYSIS

Primary inputs to the development of required missions that a maritime Phase Zero force would need to complete were the needs of the project's key stakeholders. The key stakeholders and their applicable inputs were as follows:

- U.S. Navy OPNAV N8F RADM Myers and N8FB Mr. McCarthy – Original project tasking. (Tasking statement)
- U.S. component commanders – Possible roles a Phase Zero force could fill within their areas of responsibility. (Scope)
- Various aid organizations – Possible roles a Phase Zero force could play in assistance to the rendering of aid following a disaster. (Scope)
- Foreign navies – Coalition aspects of maritime Phase Zero operations. (Boundary conditions)
- The World Bank – How accomplishing the maritime Phase Zero mission can enhance regional stability. (Measures of effectiveness)

The United States Southern Command became our primary stakeholder as the study progressed. The research team discovered that over the last 10 years, forces assigned to SOUTHCOM have accomplished only missions that fell within our definition of Phase Zero missions. These were the Anti-smuggling and Civil Support missions. This experience gave SOUTHCOM the most comprehensive library of after action reports from Phase Zero-type engagements in the World.

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II. UNDERSTANDING THE BACKGROUND OF PHASE ZERO

Phase Zero missions cover a wide array of ideas that span governments, military, NGO, and civilian actions. Phase Zero implies not only military actions but also social and economic actions to affect the beliefs and desires of country citizens as well as their leaders. The historical view of the Phase Zero concept dealt with the shaping of the battle space. Joint Pub 5 defines shaping as:

> The shape phase will contain military security cooperation activities to be coordinated with other interagency activities. When contingency and crisis action planning are conducted in a region with security cooperation activities, both military operational and security cooperation planning must be closely coordinated and linked with interagency plans. In addition, early flexible deterrent activities by all instruments of national power may begin during this phase. [5]

Historical Shaping:

The Foreign Assistance and Arms Export Act of 1961 (FAA) is a continuation of the Marshall Plan that expired in 1951. The Kennedy administration recognized the need for both military and civilian aid to help the developing world and to guarantee stability. In 1961, President Kennedy said the collapse of developing countries "would be disastrous to our national security, harmful to our comparative prosperity, and offensive to our conscience." [6] The FAA evolved out of this idea as a method to provide material support governments and non-governmental organizations. The FAA states that:

> "In enacting this legislation, it is therefore the intention of the Congress to promote the peace of the world and the foreign policy, security, and general welfare of the United States by fostering an improved climate of political independence and individual liberty, improving the ability of friendly countries

[5] By Peter Pace General, United States Marine Corps, Chairman of the Joint Chiefs of Staff, "Joint Publication 5-0, December 2006, Joint Operation Planning", page II-8, http://www.dtic.mil/doctrine/jel/new_pubs/jp5_0.pdf Accessed on 26 May 2009

[6] USAID History http://www.usaid.gov/about_usaid/usaidhist.html, Accessed on 30 Apr 2009

> and international organizations to deter or, if necessary, defeat aggression, facilitating arrangements for individual and collective security, assisting friendly countries to maintain internal security, and creating an environment of security and stability in the developing friendly countries essential to their more rapid social, economic, and political progress." [7]

The stated goal of the FAA is "to promote peace and security". Section 545.777 states:

> "Training in Maritime Skills The President is encouraged to allocate a portion of the funds made available each fiscal year to carry out this chapter for use in providing education and training in maritime search and rescue, operation and maintenance of aids to navigation, port security, at-sea law enforcement, international maritime law, and general maritime skills." [8]

The Naval Operations Concept 2006 (NOC 2006) exemplifies a major change in US strategies. The NOC 2006 recognizes the changes in the world structure. Instead of focusing solely on power projection the NOC identifies new strategic goals of securing the United States from direct attack, securing strategic access, retaining global freedom of action, strengthening existing and emerging alliances and partnerships, and establishing favorable security conditions.

The NOC 2006 maintains the traditional Navy missions of forward naval presence, sea control, air and missile defense, counter proliferation, and deterrence. However, it introduces a host of new missions including maritime security operations, security cooperation, civil-military operations, counterinsurgency, counter terrorism, information operations, and crisis response. The identification of the new missions was a response to the rise of irregular challenges from both state and none state actors.

The missions identified in NOC 2006 represent operations that affect day to day operations by the U.S. Navy. The goal of these operations is to promote stability and peace by preventing or limiting conflicts. The general idea is to build relationships with governments and

[7] Legislation on Foreign Relations Through 2002 , JULY 2003, VOLUME I–AOF VOLUMES I–A AND I–B, Page 236, http://www.usaid.gov/policy/ads/faa.pdf, Accessed on 26 May 2009
[8] Legislation on Foreign Relations Through 2002 , JULY 2003, VOLUME I–AOF VOLUMES I–A AND I–B, Page 268, http://www.usaid.gov/policy/ads/faa.pdf, Accessed on 26 May 2009

people through the provision of training, medical support, disaster relief, and infrastructure repair to foreign nations. The intent is to avoid conflict by building stable governments with good will towards the United States and its coalition partners.

A. NEWLY DEFINED MISSIONS BY NOC 06

In NOC 2006, a host of missions were included in the core mission capabilities of the Navy in response to the evolving threats in the 21st century. These missions include **maritime security operations**, **security cooperation**, **civil-military operations**, **counterinsurgency**, **counter terrorism**, i**nformation operations**, and **crisis response**. These missions are explained in more detail in Appendix C. The mission that correlates most closely to Phase Zero is Civil Military Operation.

Civil Military Operations (CMO):

Organizationally, Phase Zero missions might benefit from the structure and activities of the CMO and Information Operations IO.

> "[CMO are] activities of a commander that establish collaborative relationships among military forces, governmental and nongovernmental civilian organizations and authorities, and the civilian populace in a friendly, neutral, or hostile operational area in order to facilitate military operations are nested in support of the overall US objectives. CMO may include performance by military forces of activities and functions normally the responsibility of local, regional, or national government." [9]

Civil Military Operations (in Joint terms), also known as Civil Affairs (CA) operations in the Army, or generally categorized as Civil Military Relations (CMR), is anything that is done by the military, with any non-military organization in the effort to support stability, counterinsurgency and operations dealing with threats. A typical CMO sees people from military (e.g. medical, engineer corp, military police, legal and civil affairs department) and non-military organizations. Non-military organizations can include government or non government entities such as the local government, law enforcement agencies, indigenous populations and

[9] "Joint Publication 3-57- Civil Military Operations", 8 July 2008.

institutions, intergovernmental agencies, nongovernmental agencies, host nations, foreign nations and even private sectors providing a specific service.

CMO is considered holistic, cumulative, integrative, and synergistic, working in the seams of power and gaps in organizations, phases, and processes. CMO need to take into consideration the culture of the indigenous population since engaging the population and building relationships with the local populace involves joint, interagency, and multinational affairs. At all levels, CMO use political bargaining, collaboration, consensus, and relationship-building to create favorable situations for success. [10]

B. EXAMPLES OF PHASE ZERO ENGAGEMENTS

The U.S. Navy frequently deploys and operates with coalition partners. The following examples of recent engagements can be construed as "Phase Zero" deployments.

1. Cooperation Afloat Readiness and Training (CARAT)

Cooperation Afloat Readiness and Training (CARAT) is an annual series of bilateral military exercises between the United States and various Southeast Asia nations. Participants historically include the navies of Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The exercises include at-sea maneuvering; command, control, and communications; naval gunnery; diving and salvage; visit, board, search and seizure drills; airborne maritime patrol; force protection/anti-terrorism; and medical and community projects.

While the focus of the each bilateral exercise depends on the goals of the participating countries, the general focus of the exercise is on interoperability of the various navies in areas such as operational planning, command and control, tactics, logistics support and community service projects. The purpose of the exercise series is to improve military readiness and interoperability with each CARAT partner in a variety of mission areas of mutual benefit.

2. Southeast Asia Cooperation Against Terrorism (SEACAT)

SEACAT is a weeklong at-sea exercise designed to highlight the value of information sharing, cooperation and multi-national coordination within a scenario that gives participating navies practical maritime interception training opportunities. Participants include the navies of

[10] "Joint Publication 3-57- Civil Military Operations", 8 July 2008.

Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The first SEACAT exercise was held in 2002.

These multifaceted exercises present participants with realistic situations involving criminal and terrorist threats requiring international coordination, communication and decision-making. SEACAT also provides participants with practical maritime interception training opportunities to enhance the maritime security and interoperability of the participating forces.

Commander Logistics Group Western Pacific/Commander Task Force 73, who operates from Singapore, is the U.S. Navy's executive agent for both CARAT and SEACAT.

3. Africa Partnership Station (APS)

The Africa Partnership Station (APS) is a collaborative strategy designed to work cooperatively with U.S. and international partners to improve maritime safety and security in West and Central Africa to achieve safety and security in the Gulf of Guinea as part of United States Africa Command's (USAFRICOM or AFRICOM) Security Cooperation program. The strategy of the U.S. Navy is to keep out undesirables by deploying a rotation of ships tasked with assisting West Africa's maritime forces to take control. The United States Africa Command (USAFRICOM or AFRICOM) is a Unified Combatant Command of the United States Department of Defense that is responsible for U.S. military operations and military relations with fifty-three African nations - an area of responsibility covering all of Africa except Egypt. Africa Command was established October 1, 2007 as a temporary sub-unified command under U.S. European Command, which for more than two decades was responsible for U.S. military relations with more than forty African nations. Africa Command was formally activated October 1, 2008, during a public ceremony at the Pentagon attended by representatives of African nations posted in Washington, D.C.

C. A LATIN AMERICAN FOCUS

In order to develop a force that was constructed to combat threats to regional stability in the year 2020, the integrated study team needed to scope the problem to one region to narrow the possibilities of different missions in which the force would have to partake. The team chose Latin America for two reasons. First, the primary military engagements that occur in Latin America can be characterized as Phase Zero. Secondly, the United States Southern Command

has amassed an immense library of plans and after action reports on Phase Zero operations that the integrated study team found to be helpful in their analysis.

D. SEA 15 PHASE ZERO GOALS

For the purpose of this project, SEA-15 reviewed the over arching military guidance that has been promulgated throughout the fleet. The documents of particular interest are the National Security Strategy 2005, National Defense Strategy 2008, the Quadrennial Defense Review 2006, the Naval Operations Concept 2006, Joint Publications 1, and Joint Publication 3. None of these documents defined what Phase Zero is in explicit terms. Reviewing and consolidating the above guidance SEA-15 developed a mission statement for a Phase Zero force:

> *A Phase Zero force will work closely with multinational, interagency and other partners to maintain or enhance stability, prevent or mitigate crises and set the conditions for access and responsive crisis intervention.*

The goals of the SEA-15 Phase Zero force are:

- To enhance the stability of a region
- To save resources and funding
- To reduce the loss of lives and equipment
- To build coalitions
- To increase probability of interdiction of drug trafficking from South America to U.S.

The SEA integrated project team performed a functional decomposition of "Perform Phase Zero" to identify the types of missions that contribute to accomplishing Phase Zero goals. While the list of possible missions is not all encompassing, it develops a well rounded force that meets the integrated study team's definition of Phase Zero operations. The missions which comprise Phase Zero operations are:

- Civil Support
- Train the local defense force
- Equip the local defense force
- Build relations with foreign nations
- Restore critical infrastructure
- Anti-smuggling operations

- Anti-terrorism operations
- Anti-illegal fishing operations
- Force protection against threats
- Anti-piracy operations
- Information sharing
- Freedom of navigation
- Non-combatant evacuation operations (NEO)

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III. MISSIONS OF PHASE ZERO

After examining the history and background of the Integrated Study group conducted a functional decomposition to identify the missions that can be considered Phase Zero operations that will need to be addressed by a Phase Zero force.

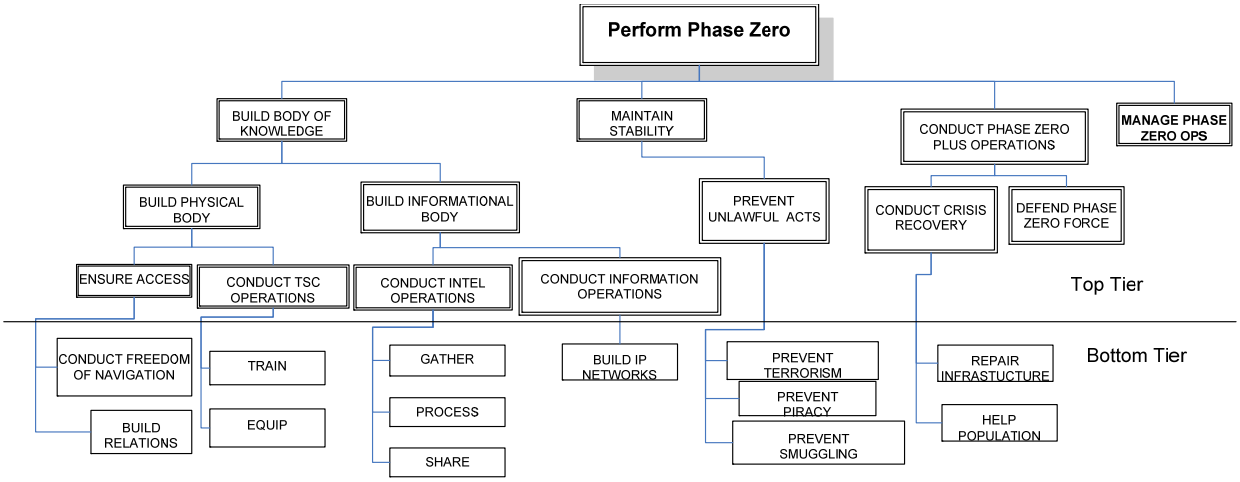

Figure 4: Functional Decomposition of Phase Zero Mission

The integrated project team used the bottom tier of the functional decomposition to generate thirteen missions that a Phase Zero force would need to accomplish. These missions are:

- Civil Support
- Train the local defense force
- Equip the local defense force
- Build relations with foreign nations
- Restore critical infrastructure
- Anti-smuggling operations
- Anti-terrorism operations
- Anti-illegal fishing operations
- Force protection against threats
- Anti-piracy operations
- Information sharing
- Freedom of navigation
- Non-combatant evacuation operations (NEO)

A. PERCEPTION MAPPING

1. Multidimensional Scaling

Problem:

In the early stages of the project, the sheer number of distinct missions posed a problem in completing an in-depth analysis of each of the thirteen missions. In addition, modeling of each of these missions was also unrealistic given resources and time constraints. Therefore, a method to narrow the scope of work without minimizing the intent of or requirement to support these missions was sought. Initially a non-analytical qualitative approach was used. Civil Support, Anti-smuggling, and Noncombatant Evacuation Operations were identified based on their dissimilarity to each other. If the three selected missions were drastically different then they should span the entire range of the thirteen missions. While this reasoning was sound, it was appropriate to pursue a more analytical approach.

Approach:

Since the nature and breadth of the thirteen missions are extensive, they do not lend themselves to numerical comparison. After discussing the issue with several faculty members including Professor Gary Langford, multidimensional scaling was identified as a viable method for comparing the missions. If similarities exist between missions resulting in groupings then multidimensional scaling is able to identify those groupings.

Background on Multidimensional Scaling

One output of multidimensional scaling is a perception map. These are also known as product maps, sociograms, sociometric maps, psychometric maps, stimulus-response diagrams, relationship maps or concept maps. [11] Perceptual maps convey information about perceived relationships between objects. The multidimensional scaling algorithm uses object proximities to build the perception map. Proximities are some measure of likeness between objects. For example, if a group of people were surveyed as to the similarity between tangerines, oranges, and broccoli then the perception map should show tangerines and oranges closer to one another than broccoli. The perception map itself can take on any number of dimensions although dimensions greater than three become difficult to visualize. Since the goal of the perception map is to convey information inherent in the data set, the number of dimensions was chosen appropriate to the data

[11] Heady, Ronald B., Lucas, Jennifer L., PERMAP 11.6 Operation Manual, University of Louisiana at Lafayette, 2007, p. 6.

set. In the tangerine-orange-broccoli example, one dimension (a line) is probably sufficient to convey the similarity information. More complex relationships or sets comprised of numerous objects may be represented in larger dimensional spaces.

PERMAP Model:

PERMAP is a multidimensional scaling computer program. It was developed in its original DOS version in 1993 by Professor Ronald Heady at the University of Louisiana's Department of Business Systems Analysis and Technology. The current version (v.11.7) is a free Windows based real time interactive program for creating perception maps. This particular program was chosen for its ease of use and more importantly, its price point. PERMAP takes a matrix of data as input and generates the perception map. To evaluate the viability of the PERMAP model a simple test was used. A matrix of airport distances throughout the United States (sourced from various websites) was input to the program. The output was a normalized map of those airport locations throughout the United States. The figures below show the input matrix (Figure 7), PERMAP output (Figure 8), and the PERMAP output overlaid on a map of the United States (Figure 9).

	SEA	LAX	PHL	MIA	HOU	DEN	MSP	ATL	TUS	CLE
SEA	0									
LAX	961	0								
PHL	2384	2409	0							
MIA	2738	2352	1021	0						
HOU	1903	1394	1341	961	0					
DEN	1028	865	1562	1718	888	0				
MSP	1403	1541	983	1511	1064	683	0			
ATL	2189	1938	669	600	698	1203	912	0		
TUS	1224	453	2062	1908	948	643	1304	1546	0	
CLE	2026	2059	364	1089	1113	1204	624	559	1733	0

Figure 5: Airport Distances Input

	SEA	LAX	PHL	MIA	HOU	DEN	MSP	ATL	TUC	CLE
X	-0.43	-0.46	0.409	0.359	0.016	-0.16	0.061	0.246	-0.32	0.277
Y	0.321	-0.03	0.084	-0.29	-0.21	0.062	0.176	-0.1	-0.11	0.103

Figure 6: PERMAP Output

Figure 7: Overlaid PERMAP Output

PERMAP was able to regenerate the physical locations of airports based only on their relative distance. The slight difference in actual locations resulted from manually scaling the map to fit the scale of the PERMAP output and also from slightly questionable internet source data for airport distance. However, the utility of perception mapping and the ability of the PERMAP program to implement the multidimensional scaling algorithm were apparent. It was noted that since the goal of the program was to generate the relative distances between objects, the output could be flipped or rotated arbitrarily, since the program does not have any data from which to anchor the locations. Also note that only one half of the matrix is populated. This was because it is assumed that the distance between Atlanta and Houston is the same as the distance between Houston and Atlanta.

Project Application of PERMAP:

In order to gather information for PERMAP related to the project, individuals across the Naval Postgraduate School were surveyed. These included members of the Operations Research and Systems Engineering Departments as well as the Naval War College. The team leads within

the project were also polled. Subjects were asked to rate the similarity or dissimilarity of each of the thirteen missions. Each pair was rated for a total of seventy eight pairs. The survey that was distributed is shown in Appendix C. Several tools were used to make the survey robust in terms of data precision.

First, rather than providing respondents with numbers to circle, as is familiar with surveys, subjects were asked to mark on a line between the pairs. Providing an undifferentiated line scale rather than a series of boxes or numbers does not force discrete comparisons, but instead offers a sliding scale. [12] For example, on a number scale from 1 to 5, subjects may believe that there is a significant difference between a 3 and a 4.

Second, the two ends of the line were labeled "exact same" and "most different". Providing concrete terms to the extremities on the line preclude subjects attaching different meanings to words like "fairly" or "somewhat".[13] Once collected, the marks were measured and input to a spreadsheet taking the mean of all subject data. The matrix was then input to the PERMAP program. The figures below show the output based on the survey data.

[12] Shiffman, Susan S., Reynolds, M. Lance, Young, Forrest W., Introduction to Multidimensional Scaling: Theory, Methods, and Applications, Academic Press, New York, NY, 1981. p.22

[13] Shiffman, Susan S., Reynolds, M. Lance, Young, Forrest W., Introduction to Multidimensional Scaling: Theory, Methods, and Applications, Academic Press, New York, NY, 1981. p.23

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**0**												
2	56.3	**0**											
3	61.1	32.1	**0**										
4	53.2	17.9	31.8	**0**									
5	63.6	45.4	62.1	67.7	**0**								
6	60.5	22.9	46.9	36.0	75.3	**0**							
7	46.8	32.1	31.9	46.4	71.0	44.6	**0**						
8	37.5	37.1	35.9	59.6	71.3	64.4	23.4	**0**					
9	59.6	19.4	54.6	23.1	70.7	43.9	48.3	57.4	**0**				
10	76.4	19.6	62.4	45.6	63.89	73.4	66.1	75.6	52.9	**0**			
11	81.22	18.9	59.9	49.1	44.3	56.4	65.0	67.5	48.9	21.4	**0**		
12	37.4	62.8	26.5	39.1	69.3	50.6	10.4	19.6	47.4	64.5	68.0	**0**	
13	40.6	46.4	38.3	37.2	72.5	49.0	51.2	49.9	35.1	57.8	59.3	48.3	**0**

Figure 8: Phase Zero Mission Input Data

	FON	BuildRel	ATO	TrainLcl	NEO	ShIntel	Smug	Fish	EquipLcl	Infra	Civil	Piracy	SelfDef
X	-0.18	0.04	-0.10	-0.22	0.60	-0.26	0.18	0.21	-0.27	0.09	0.25	0.07	-0.42
Y	-0.53	0.19	-0.23	0.11	0.03	0.27	-0.20	-0.36	0.20	0.52	0.43	-0.32	-0.12

Civil: Provide Civil Suppport
ShIntel: Share Intelligence with Partners
EquipLcl: Support Equipping of Local Defense Forces
TrainLcl: Train Local Defense Forces
BuildRel: Build Relations with Local Governments
ATO: Conduct Anti-terrorism Operations
NEO: Conduct Non-combatant Evacuation
Infra: Restore Critical Infrastructure
Piracy: Combat Piracy
Fish: Prevent Illegal Fishing
FON: Enforce Freedom of Navigation
Smug: Reduce Smuggling
SelfDef: Provide for Force Self Defense

Figure 9: Phase Zero PERMAP Output

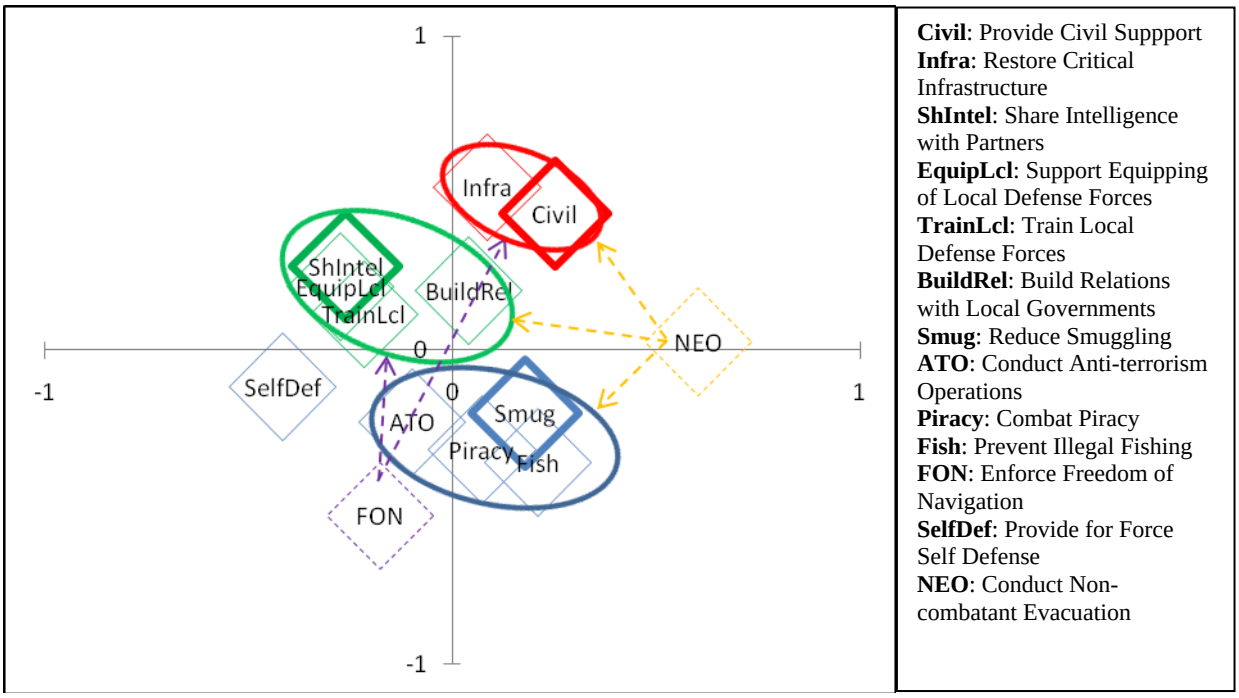

Figure 10: Phase Zero Perception Map

Based on the PERMAP output, three distinct mission groups were identified. The first is comprised of Anti-smuggling (smug), Anti-piracy (piracy), Anti-illegal fishing (fish), and Anti-terrorism (ATO). The second is comprised of Equipping Local Forces, Training Local Forces, Building Relations, and Information Sharing. The third is comprised of Restoring Critical Infrastructure and Civil Support. From these groups a single mission chosen selected as representative of that group. These three missions were termed Civil Support, Anti-smuggling and Information Sharing.

Result Application:

Selecting the three representative missions allowed in-depth analysis of the three missions. The analysis of these missions fed to quantifiable requirements for the shaping of proposed fleet structures to carry out these missions. By grouping the missions and then forming the fleet structures to fit the representative missions, the resultant force should be capable of carrying out all thirteen missions. This enabled an acceptable study result commensurate with the six month period. Several outlying missions can be seen on the perception map. In order to account for these outliers that were not captured by the three major groups, a cursory check was

made to ensure that the proposed fleets also meet the force structure needs of the outlying missions.

Sources of Variability and Mitigation:

As with any multidimensional analysis of this nature there is inherent variability in the results. Since the scoring of each object is based on individual opinions, and those opinions can vary widely, an attempt to reduce this variability was made by gathering as many survey results from knowledgeable respondents as possible. The team sampled a wide breadth of demographics across the Naval Postgraduate School campus providing fifteen responses. Clear, simple directions were provided to those surveyed to minimize incomplete and unreliable responses. Respondents were asked to consider the context of equipment and scope of operations required to complete the given missions. Although PERMAP is able to accept incomplete data sets, full data sets were obtained to further reduce potential variability.

B. PRIMARY MISSIONS

1. Civil Support

The Civil Support mission consisted of two of the key missions identified as: support populace life-sustenance and restore critical infrastructure. The objectives of supporting populace life-sustenance were to save lives and to provide and facilitate humanitarian relief assistance to the victims. The objective of restoring critical infrastructure was to assist in the stabilization of the affected area and restoring it to normalcy so that re-construction and rebuilding could follow. A Phase Zero force must be configured and ready to respond and support any humanitarian assistance and disaster relief (HADR) operation when called on by the political masters. In a way, HADR is an instrument of diplomacy that can be used to enhance interaction and build relationship with allies and friendly countries globally. These missions are an integral component of American foreign policy, and have evolved to become a key role of the military besides its traditional war-fighting role. Since September 11, there has been a "rapid blurring between combat and disaster-relief missions". [14] According to the U.S. military's Quadrennial Defense Review, a strategy document, it states "the War on Terror requires

[14] U.S. Military Humanitarian Efforts Planned for 99 Nations - Forces respond to disasters and deliver longer-term aid overseas. http://www.america.gov/st/washfile-english/2006/July/20060712172520berehellek0.4737207.html#ixzz0Gob2zyPP&B

humanitarian aid. The document ranks "diplomacy and development as tools as important as defense." [15]

The two missions were closely related though they differ in terms of the time-criticality and priority. With respect to time criticality, Civil Support stands out as the primary priority task for the Phase Zero force involved in a HADR mission. In most cases, the first few days and weeks after a major disaster are usually the most critical when it comes to saving lives. Water, food, medical supplies and shelter are needed by the victims during this period. Providing and delivering what is needed challenges external parties. Hence, in order to be effective in delivering the necessary aid and assistance to people in the affected area, the Phase Zero force must possess the requisite capabilities and resources to perform the mission. The next stage that follows in a major disaster is the stabilization stage. Critical infrastructure support needs are restored to return life to normalcy in the affected areas. It is an essential follow-on phase of the overall HADR effort to remain in theatre for an extended period, perhaps an estimated, up to six months. This is important in some situations to prevent a deterioration of the conditions in the affected area, which may result in another human disaster.

It is recognized that both missions can be grouped into a single cluster based on their relatively similar demands. However, the difference in priority between the two missions placed the Civil Support mission as the primary driver and main consideration for the capability requirements in developing the force structure of the Phase Zero Force.

In order to successfully accomplish the HADR mission a Phase Zero Force required ample cargo space to carry relief supplies and short term infrastructure support that would be needed in the event of a disaster. Secondly, that force required an organic means to be able to transfer the necessary goods to the scene of the disaster. When dealing with disasters that occur in littoral regions, it is prudent to place a higher value on the ability to airlift relief supplies and personnel into the region than the ability to transfer goods and personnel by sea. This is due to the possibility that any port infrastructure would be damaged in the event of a natural disaster.

Both mission requirements called for somewhat similar capabilities in the Phase Zero force, in terms of storage capacity, airlift capability and specialized equipment and personnel to support HADR operations. If the Phase Zero Force was configured to support the primary mission of Civil Support, it could easily be modified to support the Restoring Critical

[15] Ibid.

Infrastructure mission without a major change in force structure. In order to respond effectively and timely in times of need, the Phase Zero force must be ready to be in theater at a moments' notice with the necessary resources and capability to move the critical supplies to the affected population in a timely manner.

The increasing importance of humanitarian assistance mission to the military placed a premium on the ability of a Phase Zero to accomplish the Civil Support mission. " In 2006, U.S. military commands planned 556 humanitarian projects in 99 countries. U.S. forces are improving water supplies in Ecuador, flood barriers in Bangladesh, a medical clinic in Uganda and schools in Kyrgyzstan. Military experts train local residents to remove land mines in Nicaragua and Vietnam. By year-end, the U.S. military will have delivered 300,000 daily-rations packages overseas. Soldiers will have dug wells, built schools, and transported hospital equipment to villages from Croatia to Colombia. The Army will have trained officials from 11 African countries – Kenya, Ethiopia, Egypt, Eritrea, Djibouti, Seychelles, Burundi, Congo, Uganda, Rwanda and Tanzania – to respond to disasters and deliver medical care." [16]

"The U.S. military has the capability to help after natural disasters and can promote the health and economic well-being of suffering populations. That capability and that commitment are fueling military humanitarian aid in places where U.S. forces have had no historic role." [17] On 8 October 2005, an earthquake near Muzaffarabad, Pakistan killed 87,000 people and caused thousands to be stranded in the region's remote mountainous areas. The US Army was called to support the rescue mission with its Chinook helicopters. They stayed there for five months and flew some 3,000 flight hours, moved 5,000 refugees and delivered 18 million pounds of supplies. With its capabilities, the military was also called to move equipment and supplies quickly. Examples were during the 2004 Boxing Day tsunami in South East Asia and the devastating mudslide in Guatemala that occurred in 2005 killing over fourteen hundred people. According to the Defense Security Cooperation Agency, "the Pentagon spends roughly $58 million a year on humanitarian aid overseas; in 2005, it spent an additional $117 million." [18]

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[16] U.S. Military Humanitarian Efforts Planned for 99 Nations - Forces respond to disasters and deliver longer-term aid overseas. http://www.america.gov/st/washfile-english/2006/July/20060712172520berehellek0.4737207.html#ixzz0Gob2zyPP&B

[17] Ibid.

[18] Ibid.

Since September 11, 2001, the U.S. military has looked for ways to minimize the spread of extremist ideologies. The U.S. Government is beginning to recognize the benefits of providing humanitarian efforts overseas. Developed by the Joint Chiefs of Staff, the National Military Strategic Plan for the war on terrorism lists humanitarian assistance as a key method for helping to establish conditions that counter ideological support for terrorism. "The considerable capabilities of the armed forces of the United States to alleviate suffering in times of hardship provide opportunities to influence the way people perceive their situation and their environment," says the Strategic Plan. "These efforts are often key to demonstrating benevolence and good will abroad, reinforcing support for local governments and mitigating problems that extremists exploit to gain support for their cause." [19]

These basic necessities for rendering Civil Support are outlined in the following list:

- Water
- Food
- Clothing
- Medical supplies
- Shelter

However, the list of can evolve beyond the basic necessities. In Nicaragua and Vietnam, the U.S military had deployed military experts to train local residents to remove land mines, and in Bangladesh, the U.S. military helped build flood barriers in an attempt to keep the flooding waters from taking more lives. Hence, the U.S military should be adequately equipped for many different types of humanitarian aid missions.

a. Restore Critical Infrastructure

The mission of restoring critical infrastructure is to help local government or populace to restore essential assets in times of need, such as after any natural or man-made disaster. At the onset of any disaster, as part of Phase Zero operations, it is of paramount importance to bring normalcy and in turn, stability to the area. The U.S. Government may authorize U.S. forces in the region to help put in place a system that would assist the local government in the restoration of critical infrastructure, specifically: shelter, power, and sanitation. The U.S. Government

[19] http://www.america.gov/st/washfile-english/2007/March/20070306101755MVyelwarC0.5818292.html (dated March 6, 2007)

defines critical infrastructure with a comprehensive picture including: agriculture and food, water (potable and waste), public health, emergency services, government, defense industrial base, information and telecommunications, energy (production, transmission, and distribution), transportation, banking and finance, chemical industry, post, national monuments, and critical manufacturing. [20] It is also important to note that permanent shelter is omitted as planning since the building of permanent shelter is a long term project that should be the responsibility of the local government once it has been established.

In addition to bringing immediate aides such as food, water, blankets and medical supplies, U.S. forces can also provide two other kinds of assistance: security and planning assistance.

Security:

This could mean security for own troops, security for people in need, or security for key installations such as government buildings or any critical infrastructure. It means deploying armed troops in the area of concern to instill order and prevent any unlawful outbreaks (such as looting or riots). U.S. forces would help plan the actual security plan or physically standing guard.

Planning assistance:

Since there are limited U.S. troops and capabilities, there are really only two main assets that the military brings: firepower and manpower. The objective is to help the local government establish their basic needs (ensuring that the local government can do what they need to do). A general method was outlined in the following steps: identifying the critical infrastructure, establishing a security perimeter, ensuring smooth operation of the facility, ensuring that external assistance was being contacted, ensuring supplies were distributed properly, and ensuring these same supplies were safe and have not been corrupted.

To rebuild the remainder of the critical infrastructure, the key was to encourage government and business cooperation. The government did not hold all the resources, manpower, and skills necessary to do all the restoration. Thus, the only way was to work with the local businesses. U.S. forces could help by ensuring that no further damage was done to the existing infrastructure and bringing in U.S. experts if needed.

[20] http://en.wikipedia.org/wiki/Critical_infrastructure

While completing the mission to restore critical infrastructure, U.S. troops were also indirectly involved in Civil Support. By assisting the local population, U.S. troops could win the hearts of the local populace and earn the trust of the local governing body. At the very least, U.S. troops could begin to understand the local people and government better, which could prove useful for operations planning and future strategies. By exchanging information with local governments, the U.S. troops could provide manpower and expertise on how to perform security routines and city planning. Both have been are extremely important for the stability of a region as shown in section VII of this report.

2. Anti Smuggling Mission Group

Maritime crime poses a threat to regional and global security and potentially could impede international trade. Transnational criminals and terrorist groups frequently use the seas to operate out of the reach of land-bound law enforcement and military authorities. The Eastern Pacific presents an inviting opportunity to both criminals and terrorists for several reasons. Important international shipping lanes pass through the territorial waters of several states in the Latin American region. Other problems such as border discrepancies, enforcement failures such as lack of capacity or resources and poor levels of governance often encourage maritime criminals to exploit the cracks in the integrity and operations of the various states' national security apparatuses. Hence, understanding the modus operandi of maritime crime, together with international cooperation, will be crucial for restoring and maintaining maritime security in the region.

The prevalence of maritime crime is attributed to interlinked factors such as failures of governance, poor social-economic conditions, and technological and geographical factors. Technological and geographical factors, in particular, have increased opportunities for smugglers, pirates, and sea robbers in recent years. Maritime criminals have access to high-speed boats, satellite navigation, cell phones and the internet, as well as to automatic and heavier weapons. At the same time, geographical features such as narrow waterways, small islets, shallow littoral regions, and riverine access provide smugglers and pirates with a fertile environment in which to exploit these technological capabilities. [21]

[21] Securing Southeast Asia's Sea Lanes: A Work in Progress, Ian Storey

Maritime operations by the United States in the constabulary role, which is to prevent unauthorized incursions and maintenance of good order, target maritime crime such as smuggling (illegal immigration, weapon and drug smuggling), illegal fishing, piracy and maritime terrorism. These maritime organized crimes had many similarities in terms of their modus operandi. Hence, tactics for combating these maritime crimes would be similar since the anticipated type of threat faced was similar but of varying levels. Narcotics smuggling poses the greatest single threat to Latin America in terms of frequency, scale of serious organized criminal involvement, the illegal proceeds secured, and the overall harm caused. Moreover, the varied methods employed by drug smugglers pose great challenges to counter drug activities. As a result, counter smuggling was perceived as the representative mission for this cluster of missions: anti-piracy, anti-IUU fishing and anti-terrorism.

Smuggling, also known as trafficking, is the clandestine transportation of goods or persons past a point where prohibited such as across an international border or in violation of the law or other rules. [22] Drugs and human smuggling activities have been prevalent in the Eastern Pacific, particularly in the Gulf of Mexico where the smuggling vessel of choice is the go-fast boat. In recent years, drug smugglers have traded speed for stealth, using semi-submersibles or homemade vessels that travel just below the ocean's surface to move tons of drugs towards the United States. Columbian authorities believe that up to 70 percent of cocaine leaving the country's Pacific coast is packed aboard semi-submersibles. Unlike the go-fast boat which travel up to 80 miles per hour and leave huge wakes, and hence making them easily detectable, the semi-submersible powered by 200 or 300 horsepower diesel motor moves about 10 miles per hour and has a resulting wake so small that detection is possible only within 3,000 yards. [23] Besides having a low profile, these vessels also produce very small radar signature. This emerging sophistication and innovation of drug traffickers poses a challenge to U.S. regional counter drug activities.

a. Anti-terrorism

Terrorism is a criminal act that influences an audience beyond the immediate victim; anti-terrorism is defensive, intended to reduce the chance of an attack using terrorist tactics at

[22] Wikipedia: http://en.wikipedia.org/wiki/Smuggling accessed on 15 June 2009

[23] Drug Traffickers Move Underwater, by John Otis. http://www.globalpost.com/dispatch/the-americas/090408/drug-traffickers-move-underwater accessed on 15 April 2009.

specific points, or to reduce the vulnerability of possible targets to such tactics. [24] Terrorists have traditionally leveraged opportunities to hit and run, rather than to engage in direct conflict.

Terrorism at the sea includes the threats of attacks, and attacks on shipping, the threat of ships being used as weapons, and the threat of ships being used to deliver concealed weapons of mass destruction (in containers or within the ship's superstructure). [25] The overlap between piracy and maritime terrorism was greatest not only because of the level of violence involved. It was also due to the devastating impact these acts can have upon the safety of people and international maritime navigation and trade. However, terrorism was distinct from piracy because maritime terrorism is motivated by political goals beyond the immediate act of attacking or hijacking a maritime target. Terrorist acts also have the potential to cause large scale economic consequences. Piracy on the high seas is a universal crime and can be repressed by any nation while repression of terrorism on the high seas is confined legally to particular nations and circumstances. [26] Unlike pirate networks, maritime terrorism, such as the attack on the USS COLE, is usually carried out by worldwide network of criminals who can be of any gender and are usually well-educated and intelligent, and possess strong will power. Terrorists prefer to hijack passenger crafts to use the passengers as human shields and the planning to hijack a specific ship is done meticulously. Terrorists are generally more fearless as they are ready for suicide missions.

There was some overlap between maritime terrorism and the most serious forms of piracy. Hijacking or permanent seizure of the ship which is at the high end of the spectrum of risk, potential return, violence, and level of organization, is also attractive to terrorists considering similar actions for political purposes. There is currently no clear evidence that piracy is directly linked to international terrorism but it is known that some terrorist groups have resorted to piracy (and arms smuggling) to raise funds for their action. [27] Following September 11, 2001, the issue of piracy has become conflated with terrorism. Security analysts have perceived two of the most popular maritime terrorism scenarios involving terrorists: either conspiring with pirates or adopting piratical tactics to commit politically motivated crimes

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[24] Definition extracted from Edward N. Luttwak, Strategy: The Logic of War and Peace, Cambridge, MA: Belknap, 1987.

[25] Piracy, Maritime Terrorism and Securing the Malacca Straits, edited by Graham Gerard Ong-Webb

[26] Securing Southeast Asia's Sea Lanes: A Work in Progress, Ian Storey

[27] Securing Southeast Asia's Sea Lanes: A Work in Progress, Ian Storey

Although with differing motivating factors, piracy and terrorism did overlap in the tactics of ship seizures and hijacking, and the conditions, which allow them to flourish. Examples of these conditions were poverty, political instability, permeable international boundaries and ineffective enforcement. Hence, the tactics for combating maritime terrorism and piracy in the short term were quite similar but long-term solutions required different approaches.

b. Anti-illegal Fishing

Illegal, Unregulated and Unreported (IUU) fishing on the high seas is a form of transnational organized crime that has many similarities with other transnational crimes such as piracy, arms trafficking, illegal immigration, smuggling and narcotics trafficking. Fishing vessels engaged in illegal fishing are generally larger in size (> 23 meters in length) and travel between 8-17 nautical miles per hour and hence, are more easily detected. [28] However, many drug smugglers have also used commercial fishing vessels to transport illicit drugs to the U.S. These vessels typically have capacities for large shipment and are equipped with sophisticated navigation and communication equipment. [29] Consequently, they do not require refitting that would indicate the vessel's role in smuggling operations. Fishing vessels are also able to stay at sea for weeks at a time and can travel thousands of nautical miles. Additionally, fishing vessels are difficult to monitor and the tight-knit fishing communities made infiltration by drug law enforcement officers difficult. In addition, fishing vessels were able to blend into the local environment. More recently, narcotics traffickers have also explored using fishing vessels to tow submerged torpedoes filled with cocaine. [30] Similar to counter smuggling mission, effective monitoring and surveillance, coupled with enforcement will be the key to the success of combating IUU fishing.

Illegal fishing takes place where vessels operate in violation of the laws of a fishery. This can apply to fisheries that are under the jurisdiction of a coastal state or to high seas fisheries regulated by regional organizations. Unreported fishing is fishing that has been unreported or misreported to the relevant national authority or regional organization, in

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[28] Wikipedia: http://en.wikipedia.org/wiki/Fishing_vessel

[29] Smugglers using fishing boats to transport cocaine, by Dick Russel. http://www.eurocbc.org/page820.html

[30] Torpedo Shells to Replace Self-Propelled Semi-Submersibles for Cocaine Smuggling, http://www.marinebuzz.com/2009/05/14/torpedo-shells-to-replace-self-propelled-semi-submersibles-for-cocaine-smuggling/

contradiction to applicable laws and regulations. Unregulated fishing generally refers to fishing by vessels without nationality, or vessels flying the flag of a country not party to the regional organization governing that fishing area or species. [31] Industry observers think that IUU fishing occurs in most fisheries and accounts for up to 30% of total catches.[32]

The types of IUU fishing include illegal fishing (poaching) in Exclusive Economic Zone (EEZ) waters, unregulated fishing in areas of Regional Fisheries Management Organizations (RFMOs) either by parties to those RFMOs or by non-parties to them, and fishing in high seas areas not subject to RFMOs. Some of the more common reported IUU fishing activities include vessels licensed in another country moving over the border; vessels fishing in closed areas; vessels fishing in high seas waters moving over the 200 nm boundary into EEZ waters; and misreporting or underreporting of catches by licensed vessels.

IUU fishing is a global problem, requiring international cooperation to halt this theft of natural resources. Illegal fishing, together with counter-narcotics and illegal maritime trafficking, continues to be areas of emphasis for U.S. relations with developing countries, particular in the western Pacific and West Africa. The most obvious economic impact of IUU fishing on developing countries is the direct loss of the value of the catches that could be taken by local fishermen if the IUU fishing was not taking place. These losses include not only the loss to GNP, but revenue from landing fees, license fees and taxes payable by legal fishing operators. In addition, there are indirect impacts in terms of loss of income and employment in related industries; any loss in income will also have impacts on the consumer demands of families working in the fishing industry. Besides economic impact, IUU fishing usually has a significant environmental impact on the sustainability of both the targeted species and the ecosystem. Fishing generally has the capacity to damage fragile marine ecosystems and vulnerable species such as coral reefs, turtles and seabirds. In fact, all eight sea turtle species are now endangered, and illegal fishing and hunting are two major reasons for their destruction. Regulating legitimate fisheries is aimed at mitigating such impacts, but IUU fishers rarely comply with regulations. This is likely to reduce productivity and biodiversity and create imbalances in the ecosystem. This in turn may lead to reduced food security in communities heavily dependent on fish as a source of protein.

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[31] http://en.wikipedia.org/wiki/Illegal_fishing

[32] RIIA Illegal Fishing Info website : http://www.illegal-fishing.info/ accessed on 21 May 2009

Similar to many other types of international environmental crime, pirate fishers have a strong economic incentive. Many species of fish, particularly those which have been overexploited and are thus in short supply, are of high value. IUU activities are also particularly prevalent in regions of the world due to failure of governments to regulate adequately or to enforce national and international laws. Analysis has shown a strong relationship between the level of governance of a country and its vulnerability to IUU fishing.[33] Good governance appears to go hand in hand with good Monitoring, Control and Surveillance (MCS) systems and procedures; the political will to enforce regulations; cooperation with neighbors on surveillance; the elimination of possibilities for IUU activity; and active participation in regional and sub-regional fisheries agreements. [33]

Illegal and unreported fishing (2 components of IUU fishing) essentially arise from a failure to adequately enforce existing national and international laws. There are, however, many factors underlying enforcement failure, including lack of capacity or resources and most notably, poor levels of national governance. There are also obvious problems/difficulties with enforcing fisheries regulations on the high seas, including locating and apprehending the pirate ships. However, solutions are available, chiefly through improved monitoring and surveillance systems. The monitoring and surveillance system can be cooperatively used together with offshore patrol and licensing schemes within exclusive economic zones.

The main role of the United States in combating IUU fishing worldwide is to assist developing countries in enforcement of international laws for legitimate fishing activities. Besides using ships and aircraft to perform monitoring and surveillance operations, and interception of pirate fishers, this Phase Zero operation will also include strengthening the local capacity to manage fisheries and combat IUU. Helping local authorities develop institutional, management and technical Monitoring, Control and Surveillance (MCS) capacity to effectively control their own vessels throughout the world and foreign fishing vessels fishing in their waters, including specific cases of targeted offshore patrol facility and effective licensing schemes and providing training programs for local observers and inspectors, are some of the roles that the U.S. can play. Furthermore, the U.S. can leverage on military technology to share information on satellite-based survey activities. The U.S. should continue to build relations with these countries to encourage active and effective participation in international fisheries governance and

[33] RIIA Illegal Fishing Info website: http://www.illegal-fishing.info/ accessed on 21 May 2009

also possibly developing regional management, surveillance cooperation, and organizations to address specific country issues while at the same time attempting to avoid the pushing of the IUU problem elsewhere.

c. Force Protection against Threats

Force protection missions typically describe preventive measures taken to mitigate hostile actions against coalition personnel and their family members, resources, facilities and critical information. [34] Force protection involves measures taken before, during, and after a hostile action to aid in force presentation. Such measures range from personal protection tactics and equipment to perimeter security, area surveillance, and hostile target identification. In Phase Zero operations, Force Protection is relevant in all areas where there are coalition personnel and property involved. As described in our definition of Phase Zero operations, engagements can range from peace-keeping missions up to and including hostile actions against pirates and the force preservation of our troops as they carry out humanitarian missions. The operational theater is becoming complex as threats to coalition personnel become increasingly embedded within the social structure of the local populace. Terrorists, guerillas, and non-uniformed insurgents operate seamlessly among civilians, making threat identification difficult. As such, it is extremely important that there are measures in place to mitigate the potential hostile actions taken against coalition personnel and property should those actions occur. Notwithstanding the threat from the natural environment, such as natural disasters, sound tactics and proper equipment will enable coalition personnel to perform their functions in the safest possible way.

Tactics have evolved to the extent that troops find themselves increasingly operating in relatively small groups over large, dispersed areas with the best equipment available to them to enhance their operational efficiency and effectiveness. This puts the troops at a greater risk, due to the lack of security in numbers as well as being in close proximity to possible threats lurking within the local population. As such, Force Protection is becoming a highly complex, stand-alone mission and is a primary concern of mission planners.

In Phase Zero operations, winning the trust, hearts and minds of the local populace continues to play an important role in protecting troops from possible aggression and hostile actions. Once convinced of the coalition's good intent and purpose, the local populace will be

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[34] http//en.wikipedia.org/wiki/Force_protection accessed on 15 June 2009.

less likely to launch an unprovoked attack against coalition personnel and property but insurgents, terrorists, and guerrillas might. For this reason, the importance of information operations tailored to mold the thinking of the local populace cannot be overlooked. However, it must be kept in mind that, by definition, "Force Protection" are ways to "mitigate" hostile actions, and thus does not involve any defensive measures prior to the occurrence of the hostile act by a threat. Despite the definition, it should be noted that Force Protection is an "end-state" and should encompass all measures to be taken prior, during, and after a hostile action to achieve the end-state of force preservation. It is in this spirit that "Force Protection" missions must be planned and executed.

Technology and material protection remain important factors in enhancing the protection of troops. However, this technology and protection should not be the end-all for protection. [35] It is necessary to continue investing in good training of personnel so they can be better adapted to rapidly changing circumstances and actions of dangerous adversaries who are equally, if not more, adaptable. Good situational awareness on the part of the troops and good decision making on the ground at the tactical level usually determine the difference between the good and bad force protection statistics in relation to a particular mission. This means there is a need for continued focus on leadership development and training, professional military education to enhance small unit effectiveness, troops' cultural awareness, and tactical intelligence.

In Phase Zero operations, the main threats will continue to come from insurgents, terrorists, and guerrillas and small sabotage groups trying to infiltrate sensitive installations, blocking lines of communications, and attacking prime strategic targets. Waging an effective counter-insurgency campaign demands highly developed technologies and combat experienced adaptive tactics at all operational levels.

Force protection is immediately relevant to the three aggregate missions of Phase Zero operations (Civil Support, Information Sharing and Anti-smuggling) because the litmus test is simple; where there are coalition personnel and property involved; there is a need for force protection measures regardless of its form and degree.

In Civil Support and Anti-smuggling operations, where there is usually heavy troop involvement, there is a need to look at the threat environment in totality to include both human as

[35] http//www.acq.osd.mil/dsb/reports/2006-03-Force_Protection_Final.pdf accessed on 15 June 2009

well as the natural environment. Measures should then be put in place to determine the level of protection measures (tactics, size of troops, material, and technology) that should be employed in order for Coalition personnel to perform their missions safely and thus enhance mission success.

Where there is minimal (minimal does not equate to none) troop involvement in an operation, such as information sharing, continued efforts must be made to secure the information resources. As the adversary continues to evolve in sophistication, information assurance measures must continue to evolve as well so they are robust, secure, and responsive to the threat. The demographics of Coalition adversaries have changed. Adversaries are increasingly becoming better educated and more influential in the social strata. They have more financial and intellectual resources than before, and thus pose a larger threat to troops than ever before. As such, Force Protection at Phase Zero levels should encompass all aspects of material, property, and personnel protection and should include both mitigating actions as per conventional definitions as well as priori actions of aligning the population to set the stage for Coalition's operations in unfamiliar territories.

d. Anti-piracy

Maritime piracy or sea robbery, according to the United Nations Convention on the Law of the Sea (UNCLOS) of 1982, consists of any criminal acts of violence, detention, or depredation committed for private ends by the crew or the passengers of a private ship or aircraft that is directed on the high seas against another ship, aircraft, or against persons or property on board a ship or aircraft. [36]

According to Article 101 of the United Nations Convention on the Law of the Sea, piracy consists of any of the following acts:

- any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed:
    - on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;

[36] Violence at Sea: Piracy in the Age of Global Terrorism, edited by Peter Lehr

- against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;

- any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;
- any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b).

And Article 103 defines a pirate ship as ship intended by the persons in dominant control to be used for the purpose of committing one of the acts referred to in Article 101. The same applies if the ship has been used to commit any such act, so long as it remains under the control of the persons guilty of that act. [37]

Piracy must be committed on the high seas or in a place outside the jurisdiction of any state. A criminal attack with weapons on ships within territorial waters is an act of armed robbery and not piracy. Unlike most smuggling and illegal fishing activities, piracy generally involves some form of violence at sea whereby an attack using weapons is conducted. Piracy encompasses a wide spectrum of criminal behavior ranging from in-port pilferage, to hit-and-run attacks, to temporary or long term seizure of the ship. [38] In the most serious form of piracy, permanent seizure or hijacking, the pirates will need to sell its cargo, dispose the ship and its crew. In some cases, the seized ship can be repainted and re-flagged to be used for smuggling. The UN has cited clear links between piracy and illegal maritime activities such as illegal fishing and smuggling in certain regions of the world, example Somalia. [39] Similar to maritime crimes like smuggling and illegal fishing, piracy is a crime often, but not always, motivated by greed and thus predicated on immediate financial gains. The attack boats used by pirates are similar to the go-fast crafts used by drug smugglers. These attack boats are small wood or fiber-glass fishing skiffs of 20-60 feet outfitted with dual engines up to 85 hp and travel at speeds of more than 30 knots. [40] They are often carried and launched by "mother ship", usually fishing trawlers that were commandeered or purchased by the pirates. The "mother ships" use GPS devices,

[37] United Nations Convention on the Law of the Sea 1982.
[38] Piracy, Maritime Terrorism and Securing the Malacca Straits, edited by Graham Gerard Ong-Webb
[39] Agence France-Presse Global News Agency, UN envoy decries illegal fishing, waste dumping off Somalia, 25 July 2008.
[40] East Africa Forum, Rise of Piracy and Other Maritime Insecurity in Somalia
http://www.eastafricaforum.net/2009/04/11/rise-of-piracy-and-other-maritime-insecurity-in-somalia/

satellite phones and some have acquired equipment that enables them to pick up Automatic Identification Signals (AIS) required by commercial vessels. Each attack boat or skiff contains three to seven pirates and attacks are conducted in groups of two or three. The attack boats often fire automatic weapons and RPGs at the vessel and ships that stop are more likely to be captured. The pirates then use grappling hooks and ladders to board. A ransom will then be demanded for the release of the ship and its crew. The crew is generally not harmed. Piracy is usually carried out by local criminals and restricted to certain regions only. Sea pirates are usually poor and less-educated males. Pirates also prefer to capture cargo ships and its valuable cargo because of smaller crews to resist the attack. Attack is carried out starting with the sighting of a ship, usually with little planning. Pirates can be repelled by light arms fire or even non-lethal weapons such as Long Range Acoustic Device (LRAD). However, there is usually little or no intelligence and warnings on pirate attacks. Since armed pirates operate on fast crafts, an effective anti-piracy interception mission would require the use fast patrol crafts or similar class vessels. The vessel used for interception should be equipped with automatic machine guns or non-lethal weapons to fire warning shots as well as for self-defense.

Anti-Piracy is the action and effort to prevent or reduce maritime piracy. On the high seas, or in any other place outside the jurisdiction of any State, every State may seize a pirate ship or aircraft, or a ship or aircraft taken by piracy or under the control of pirates and arrest the persons and seize the property on board. A seizure on account of piracy may be carried out only by warships or military aircraft, or other ships or aircraft clearly marked and identifiable as being on government service an authorized to that effect.

In his 2008 RAND study entitled "The Maritime Dimension of International Security: Terrorism, Piracy and Challenges for the United States", Peter Chalk described the dangers associated with contemporary piracy as complex and multifaceted. As the most basic level, attacks constitute a direct threat to the lives and welfare of the citizens of a variety of flag states. Piracy also has a direct economic impact in terms of fraud, stolen cargos, and delayed trips, and could potentially undermine a maritime state's trading ability. [41]

Politically, piracy can play a pivotal role in undermining and weakening regime legitimacy by encouraging corruption among elected government officials. Finally, attacks have

[41] The Maritime Dimension of International Security: Terrorism, Piracy and Challenges for the United States, Peter Chalk.

the potential to trigger a major environmental disaster, particularly if they take place in crowded sea-lanes traversed by heavily-laden oil tankers.

Chalk also noted a growing speculation that a tactical nexus could emerge between piracy and terrorism. One of the main concerns is that extremist groups will seek to overcome existing operational constraints in sea-based capabilities by working in conjunction with or subcontracting out missions to maritime crime gangs and syndicates.

Anti piracy is important to Phase Zero operations because a critical limiting factor of conducting operations in foreign countries is access to these countries via international waters. With the presence of these pirates, humanitarian aid and non-military organizations traveling to the Phase Zero operation area might be subjected to a piracy attacks where cargo is stolen, trips are delayed, or the crew or passengers of the vessel are subject to murder. Anti piracy efforts also provide security and stability to the surrounding civilian and commercial populations in the area on a day to day basis.

In conclusion, of the following mission areas; Anti-smuggling, anti-piracy, anti-IUU fishing, anti-terrorism, and force protection, the mission of Anti-smuggling is the mission best suited for covering all of the other mission areas. The reason is that the Anti-smuggling mission is the most difficult of all the grouped missions and therefore if the force is designed to engage in Anti-smuggling mission, it would be suitable for all other missions in the perception mapped grouping. For the Anti-smuggling mission we are dealing with a variety of smuggling vessels; go-fast, semi-submersible, and commercial disguised vessels. The semi-submersible and commercial disguised vessels posed the greatest detection challenge, while the go-fast vessels pose the greatest interception challenge.

Since all of the vessels we are interested in intercepting are engaged in the illegal activities of smuggling, piracy, terrorism, and IUU-fishing, and may be opposed to our force intercepting them, there is a good chance they will try to defend their activities. The use of weapons to defend their activities poses a force protection threat to our force, therefore we need to have our force able to complete the mission of force protection. If the vessels used for Anti-smuggling are of the semi-submersible classification, they can be difficult to detect when compared with vessels that are used for piracy and IUU-fishing. Therefore, if our force is designed to detect surface and semi-submersible vessels, it should have more than the capability required to detect vessels used in other illegal activities. On the other hand, the vessels used for

smuggling, piracy, and terrorism operations may be of the go-fast classification, while they may be easier to detect, they will be more difficult to intercept due to their high speeds. However, it is not that likely they would be used in illegal fishing. Therefore, if our force is designed to intercept go-fast vessels smuggling vessels, then it should be capable of intercepting pirate and terrorist vessels, and more than capable of intercepting IUU-fishing vessels.

3. Information Sharing

The "Share Information and Intelligence" mission was grouped, based on the PERMAP tool, with the mission cluster consisting of: "Build Relationships", "Equip Local Forces" and "Train Local Forces". Share Information was selected as the representative mission for that group.

Information and intelligence sharing is a critical Phase Zero task, which is inherent in any Phase Zero mission being conducted. But it is of special importance when forging relationships, building coalitions, or engaging in any work that requires thorough and timely communication. The committee that makes up the National Research Council (NRC) has presented an excellent summary of the art of building Maritime Security Partnerships (MSP) and emphasizes the key role that information and intelligence sharing plays in these partnerships. [42]

According to the NRC committee, information sharing is both a unifying concept and a key enabler for MSP. Many critical maritime enterprises are impeded severely by the lack of adequate information sharing networks. Information sharing is also a vulnerable choke point for those who would wish to disrupt Phase Zero activities and an attack against the free flow of information can disrupt trade and free enterprise, as well as facilitate illicit activities. The establishment of good information sharing systems and the strengthening of those already in use are critical to building effective regional partnerships. Maritime Domain Awareness (MDA) is not possible without these information sharing systems and frameworks. In many cases, the current arrangements for promoting MDA are inefficient and lack broad application. Many excellent capabilities do exist, but do not have the necessary coordination to be used by joint or international coalitions.

The Phase Zero mission environment entails the possibility of being faced with a problem or mission that no personnel on the force have been faced with before. The only way to solve an entirely new problem is through the ability to access correct information quickly either from

[42] The National Research Council, Charles F. Draper, Director; "Maritime Security Partnerships", The National Academies Press, Washington, D.C.,2008

publications or by interfacing with subject matter experts. This requirement placed several constraints on any command and control architecture tailored to the Phase Zero mission. The first constraint was that of flexibility. The c2 architecture would have to be flexible enough to work with different force make-ups and seamlessly with coalition partners. Secondly, the architecture would have to be capable of providing information instantaneously.

Industry is continually making advances in the capabilities of computers, communications links and satellites. Investigation of some of the latest patents on record reveal that nearly half of them relate to advances in communications capabilities, but even the most impressive advances will not bring together a broadly distributed maritime security force without intentional oversight to link the capabilities. Information dissemination may still suffer when there is exceptional infrastructure but poor integration. This explains the role of information sharing as a unifying concept.

As a key enabler of MSP, information sharing is pivotal for building trust and provides the basis for planning, decision-making and action. In essence, global security is improved through information dissemination between partner nations. This improvement extends to regions, sub-regions and beyond, because threats to security usually cross over regional boundaries.

Both the system architecture for sharing intelligence and information and the information itself must share certain key attributes. The first of these is a focus on sharing unclassified information via the use of readily available, commercial, internet based mechanisms. These mechanisms must be affordable to all partners. Strengthened information sharing will enhance coordination between maritime partners.

The effort of creating new MSPs is based on some important assumptions. The first of these is, essentially, that “we can do better”. The current practices and organization of the U.S. government are insufficient to pursue the quality MSP programs it desires. The National Research Council had to allow for the fact that the U.S. is not popular in many places in the world and needs to pay special attention to the needs and sensitivities of those nations with which they wish to partner. Many current and would-be partners believe that the U.S. only desires intelligence for its own purposes and does not have the same transparency with its allies. Finally, many of our partners believe that the U.S. has an unbalanced obsession with terrorism and nuclear proliferation, and is not concerned about local problems in the areas in which it

operates. The Phase Zero force has the unique distinction of being engaged specifically for this type of problem, and may be very instrumental in changing world views about the motives and actions of the United States.

To build successful partnerships and enhance the effectiveness of missions involving information sharing, participating nations must have reasons to participate in the coalition and must perceive that they are considered integral equals in the partnership. Technology barriers must not be emplaced by requiring nations to take part only if they have technology that is out of their reach fiscally or kept from them because of trade or security limitations. Finally, the objective of building trust must be an inherent and continuing facet of every Phase Zero mission, especially that of sharing information and intelligence. Building trust and building relationships should be synonymous, but that is not always a reality. It would be naïve to think that nation partners will ever trust each other completely, because each nation does have the agenda of pursuing their own interests. But the goal in building trust can and should be that of continual improvement. The fact is that even partner nations and allies observe each other and use both open and clandestine means to stay aware of each other. It is also a fact that some nations are more or less trusted by the United States, and vice-versa. Contrast the relationships between the U.S. and Canada to the U.S. and Venezuela, for instance. There is room for improvement in every nation-state relationship, and some more than others; but improvement of every relationship is the goal, and is the hallmark of successful Phase Zero friendships.

Leaders should pursue the objective of information and intelligence sharing, but at the same time, they cannot afford to sacrifice security. Force Protection, another critical Phase Zero mission, could be in direct conflict with the objective of information sharing. But the identification of this quandary is frequently the end of the information sharing effort. That must not be the case for future Phase Zero operations. Leaders and managers must include this problem in their planning effort and look for acceptable solutions and affordable compromises. They must also realize there is not a standard solution for this dilemma, and must consider the local factors and regional differences unique to each operation, decisions and the needs for support vary on a case by case basis. This is where understanding of the real threat is critical.

Recent technology trends have led to more and more networking, and the threat has also become networked. Terrorists, pirates, and insurgents have gradually replaced their hierarchal

command structures by disintermediated command hierarchies. [43] Because the threat can be organized as a network, the organizations that will combat the threat must also be organized as a network to be responsive. Every component and location of the friendly network cannot be simultaneously protected, and so network analysis must be employed in protecting the information sharing networks. It is this strategy of network analysis and protection that will enable more efficient and extensive information sharing between coalition partners.

In his book, "Critical Infrastructure Protection in Homeland Security", Professor Ted Lewis identified seven major challenges: The vast size of networks, overlapping command structures, the hoarding rather than the sharing of information, lack of knowledge as to how to protect information infrastructure, complex network interdependencies, inadequate protective tools, and the nature of asymmetric conflicts. Again, while mitigating the threat, it is important not to look for a "one size fits all" solution. Different connectivity architectures can be employed for different partnerships. Determination of what this architecture should be, as well as determination of whom the partners will be, is a key planning factor. Leaders of a planned Phase Zero operation must be involved up front in the assessment of what to share and what to protect. Because of the importance of planning and pre-selection of adequate systems architecture, the Share Information and Intelligence mission must be system engineered.

The issue of sharing information was selected by the Capstone team as a critical Phase Zero mission. It that it is being viewed as an objective for Phase Zero work, rather than one of the challenges. At the same time, the remaining challenges must be addressed continually, as technology evolves and the threats that disrupt stability adapt to those advances.

Regardless of the scale of an operation, a Common Operating Picture (COP) is invaluable for allowing leaders to see the real time battle space, and react in a timely manner to the changes, attacks or improvements within that battle space. In a Phase Zero environment, awareness of the battle space is replaced by an equally important need to be aware of the Current Operating Environment (COE). Stability and support operations rely heavily on this ability, and the same infrastructure that can provide the COP in times of war can provide the COE during times of peace. For this reason, leveraging advanced technology research is beneficial for both agendas. The same research dollars spent to improve information and intelligence sharing for Phase Zero

[43] Lewis, Ted G., "Critical Infrastructure Protection in Homeland Security", Wiley-Interscience Press, 2006

work, also contrive to improve command and control for war fighters in the event that situations move beyond Phase Zero and into conflict.

The grouping of information sharing with the equipping and training of local forces was a reasonable outcome of the PERMAP process. It is true that every Phase Zero mission must have good information sharing as part of the command and control necessary for action. However, equipping and training our partner forces requires direct interaction, which makes effective information sharing all the more critical. Nothing will alienate and disenfranchise a potential partner force faster than being told they do not have access to the information they need. Doing this also erodes trust, which was why the mission of building relationships was also closely linked to the information sharing mission. To avoid the erosion of trust without compromising security, decision makers must evaluate the information needs prior to offering a national partnership. They must determine what intelligence will be required for the operation, and vet potential partners to determine their trustworthiness for access to that data, before inviting those nations to join the Phase Zero force. Once again, this requires inclusion of the information sharing mission in planning stages, and the treatment of information and intelligence sharing as a mission rather than an obstacle.

a. Train the Local Defense Force

The requirement for the intervention of foreign forces in operations typically assigned to local defense forces implies that the local defense force is deficient in its ability to successfully complete the operation and that the foreign force has some expertise in combating the issues. As the presence of foreign forces is temporary, often subjected to political, social and economic pressures, there is a need to impart skills to the local defense forces for them to be independent and to negate the opportunity of the same issue from once more escalating to a point where foreign intervention is required and requested. Therefore, the key objective in undertaking the training of Local Defense Forces (LDF) would be to equip its members with the necessary skills to be self-sufficient in the prosecution of defense-related missions. The term, local defense forces, encompasses two unique groups each traditionally associated with a particular domain. The Police are mainly involved with domestic threats and the Military is directed toward external threats. While there are differences in the skill sets, there is little difference in the expressed

need of mitigating certain operational gaps; the term LDF is often used to describe both collectively.

For training to be labeled under the auspices of a Phase Zero mission, the personnel involved or the supported country represented must not be involved in a conflict. The ranges of activities are considerable in variety and scope. Training could be divided into basic and advanced types at the tactical, operational, and strategic levels. Training could be conducted in-country, whereby trainers are brought into the region of interest to conduct courses, or additional spaces where courses are conducted in the sponsor's location. Training could be vocational in nature, e.g. trade specific courses, or academic in nature, e.g. higher education courses (FMS for NPS). All these activities are aimed at raising the level of proficiency of the supported forces. There are also secondary benefits influencing the development of foreign military institutions where the roles of individuals in democratic societies are outlined to assist the combating of terrorism, amongst others. [44]

The training mission supports other Phase Zero mission areas. Training would include, but is not limited to general police work. It would involve the preparation of local defense forces, particularly the local coast guard forces, in the prosecution of Anti-smuggling missions. Training would also include internment facility management skills, and interrogation skills for intelligence gathering, amongst others.

The US has been actively engaged in providing training to foreign partners, in fact, "Successive U.S. administrations have long viewed training of and assistance to armed forces around the world as important instruments of U.S. national security policy." [45] Programs such as the International Military Education and Training (IMET) are leveraged to provide this training. Partners can also seek training through the Foreign Military Sales (FMS) program.

b. Equip the Local Defense Force

[44] Foreign Military Training and DOD Engagement Activities of Interest, 2007, US Department of State, http://www.state.gov/t/pm/rls/rpt/fmtrpt/2007/index.htm, viewed 01 May 2009.
[45] U.S. Foreign Military Training, May 2002, Lora Lumpe, International Peace Research Institute, http://www.fpif.org/papers/miltrain/index_body.html, viewed 01 May 2009.

> "We will expand the community of nations that share principles and interests with us, and we will help partners increase their capacity to defend themselves and collectively meet challenges to our common interests." [46]

Building partnerships is one of the five goals established in Defense Security Cooperation Agency (DSCA) Strategic Plan 2006-2011, in support of DoD Security Cooperation Guidance. [47] It is also at the core of Navy international efforts to bring order and stability to the world's ungoverned and under-governed seas as emphasized in Navy's "Cooperative Strategy for 21st Century Seapower" as it acknowledges the prevention of wars is just as important in winning them. [48] There is a new sense of urgency to be able respond to disasters and provide humanitarian assistance, as well as assuring maritime security around the world. Security cooperation activities are an essential means to this end of which DoD has defined the building up of allied and friendly nations' local defense capabilities as one of them. The United States Government has long played its role by supporting the equipping of these nations, along with the other training and cooperative development programs.

The equipping of the local defense forces is primarily done through the Foreign Military Sales (FMS) program, i.e. the government-to-government method for selling U.S. defense equipment, services, and training. Under FMS, the U.S. government procures defense articles and services on behalf of the foreign customer. [49] Countries approved to participate in this program may obtain defense articles and services by paying with their own national funds or with funds provided through U.S. government-sponsored assistance programs. In certain cases, defense articles, services, and training may be obtained on a grant basis. The DSCA administers the FMS program for DoD; while the President designates countries and international organizations eligible to participate in FMS, and the Department of State approves the individual programs. Currently some 160 countries are eligible to participate in FMS, and their entering into a major FMS program represents the beginning of a long-term relationship with the U.S.

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[46] 'National Defense Strategy', March 2005, extracted on 29 April 2009 from http://www.defenselink.mil/news/Mar2005/d20050318nds1.pdf

[47] 'DSCA Strategic Plan 2006-2011', extracted on 29 April 2009 from http://www.dsca.mil/programs/stratplan/DSCA_StratPlan_2006-2011.pdf

[48] 'Good business is good policy', by Edward Lundquist, from Armed Forces Journal, January 2009, extracted on 29 April 2009 from http://www.armedforcesjournal.com/2009/01/3810243

[49] 'The FMS Advantage: Frequently Asked Questions About Foreign Military Sales', extracted on 29 April 2009 from http://www.dsca.mil/PressReleases/fmsadvantagev2.pdf

government and military. This includes access to joint training and doctrine and increased opportunity for interoperability should U.S. and foreign forces need to operate together in military operations.

Equipping could also be supported through direct commercial sales (DCS) where Department of State would grant U.S. companies commercial export licenses that would allow them to negotiate directly with foreign customers. [50] As with FMS, all DCS are subject to the approval of the Department of State, the U.S. Congress, and applicable U.S. export laws and regulations. However, DCS has no direct U.S. military involvement or the related benefits as cited under the FMS arrangement.

As is evident by the rising prominence of security cooperation programs in U.S. theater engagement efforts, the equipping support is especially well suited to growing security relationships, which meets our Phase Zero mission objectives. It does so by building partner capacity, strengthening bilateral defense relations, supporting coalition building, and enhancing interoperability between U.S. forces and the military forces of the cooperating nations. Specifically, equipping coalition forces with common U.S. defense equipment will help to minimize compatibility issues between weapon and communication systems, allowing for better info sharing and integrated system capabilities to be carried out in Anti-smuggling or Civil Support operations. With the buildup capabilities, the local forces will also be more capable of handling domestic/regional issues without foreign aid to prevent or limit situations escalating to a conflict. A prime example is Djibouti, where a small nation strategically located at the straits between the Red Sea and Gulf of Aden is now capable of patrolling that critical choke point in defending the Bab el Mandeb with the two 55-foot boats added to its Navy through the support of the U.S. sponsored programs. [51]

c. Build Relations with Local Governments

Building relations with foreign governments continues to be United States policy and is a primary responsibility of the U.S. State Department, which states:

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[50] 'The FMS Advantage: Frequently Asked Questions About Foreign Military Sales', extracted on 29 April 2009 from http://www.dsca.mil/PressReleases/fmsadvantagev2.pdf

[51] 'Good business is good policy', by Edward Lundquist, from Armed Forces Journal, January 2009, extracted on 29 April 2009 from http://www.armedforcesjournal.com/2009/01/3810243

"There is no country in the world that is not touched by America, and there is no country that does not touch us in some way. American principles of democracy, freedom, tolerance, and opportunity inspire people throughout the world. Increased recognition and understanding of these common values increases trust among nations and peoples and betters the chances of resolving differences and reaching agreements." [52]

Building relations is a part of diplomacy, which is one of the best ways to protect the United States and the American people. The State Department uses diplomacy with other nations of the world to deal successfully with a number of challenges that cross national boundaries and affect us here in the United States, including:

- Terrorism
- The threat of weapons of mass destruction
- HIV/AIDS and other infectious diseases
- Dangers of illegal drug trafficking and crime
- Humanitarian needs of migrants and refugees
- Environmental degradation [53]

While building relations is a prime responsibility of the State Department, the Navy can be considered a critical tool in the relation building process. The use of the Navy as a tool to build relations dates back to the mid-18th century, when President Millard Fillmore turned to the Navy when he charged Commodore Matthew Perry with the mission to carry a letter to the Japanese Emperor, thus resulting in the historic opening of Japan in 1854. [54]

During a Current Strategy Forum at the U.S. Naval War College in 2007, Dr. Donald C. Winter, Secretary of Navy stated:

"We enjoy advantages that the State Department is not designed to possess, and, indeed, the Department of the U.S. Navy, in many aspects, acts as the operational arm of the diplomatic corps. There are a number of reasons why the Navy enjoys advantages in the diplomatic arena that have resulted in its prominent role as an effective instrument of our

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[52] Statement about Gaining International Understanding, from the U.S. State Department website for students and future diplomats, http://future.state.gov/why/understand/index.htm

[53] Statement about Protecting America, from the U.S. State Department website for students and future diplomats, http://future.state.gov/why/protect/

[54] Remarks by Dr. Donald C. Winter, Secretary of Navy Current Strategy Forum, U.S. Naval War College Newport, RI, http://www.navy.mil/navydata/people/secnav/winter/070612_current_strategy_forum.pdf

policy of engagement with other nations. Navies have been naturally inclined to cooperate and communicate with each other throughout history, with the code of the mariner imposing a duty on all the Sailors to help a fellow Sailor in distress, friend or foe. Our history of cooperative ventures with mariners of other nations is combined with a unique international presence that our port visits represent. Together they have resulted in a long track record of successful Naval involvement on the diplomatic front, with many initiatives that continue to bear fruit." [55]

While the Navy can be a critical tool in building relations and an operational arm of the State Department, it must however rely on the State Department to ensure the Navy has access to the countries of interest. Once access for the Navy is granted, the Navy in return can work to build relations with the country to help maintain continued access. Building relations would be important for Phase Zero operations because it would allow for continued access.

As a grim reminder of how important access can be for humanitarian assistance missions consider the relief efforts for tropical cyclone Nargis, where over 10,000 Myanmar citizens perished and several hundred thousand people had been left homeless and without drinking water across a broad swath of the country, the U.S. military along with other foreign nations were prevented initial access by the Myanmar government to provide humanitarian assistance and disaster relief.[56] Even though the U.S. had assets in the vicinity of Myanmar that were fully capable of providing medical support, food, water, and supplies, they were deemed useless at the initial response phase for relief because relations were not built beforehand. Some countries will continue to block relation building attempts by the U.S. no matter how hard the State Department tries, and therefore access by the Phase Zero force may not be possible. However, in the event of a natural disaster or humanitarian crisis, the Phase Zero force must be ready to respond and have the ability to withstand the access delays if they exist.

[55] Remarks by Dr. Donald C. Winter, Secretary of Navy Current Strategy Forum, U.S. Naval War College Newport, RI, http://www.navy.mil/navydata/people/secnav/winter/070612_current_strategy_forum.pdf

[56] AFP news release, Myanmar Says More Than 10,000 Killed In Cyclone, May 5, 2008, http://afp.google.com/article/ALeqM5jtVCQH3wDODan4eevIaSPCFqR5hA

4. Freedom of Navigation

Exercising and securing Freedom of Navigation (FON) continues to be a primary role of the U.S. Navy. Specifically, it is U.S. Policy to:

> "Exercise and assert its navigation and over flight rights and freedoms on a worldwide basis in a manner that is consistent with the balance of interests reflected in the convention. The United States will not, however, acquiesce in unilateral acts of other states designed to restrict the rights and freedoms of the international community in navigation and over flight and other related high seas uses." [57]

Maintaining open sea lanes is vital to national and world economic and defense interests. By challenging excessive claims, the U.S. ensures equal protection under the Sea if the Law Conventions for all parties. Since 1979, the U.S. has maintained a FON program in order to exercise its FON rights in waters claimed in manners inconsistent with the UN Law of the Sea Convention. This program maintains open sea lanes for the benefit of the U.S. and its allies. In response to continued diplomatic protests and to preserve the Law of the Sea, the U.S. must operate regularly in contested waters. This normally involves ships or aircraft transiting claims protested by the U.S. government.

The U.S. protests claims made by governments all over the world ranging from countries such as Canada, China, and Sri Lanka. The U.S. has objected to more than 140 excessive claims by more than 80 costal states since 1948. Historically, every year the U.S. has exercised its navigation rights in contested water of more than 35 countries. [58] Routine actions include specific missions to assert FON claims in addition to routine transits of international passages such as the Straits of Hormuz, Gibraltar and Malacca, and the Indonesian and Philippines archipelagos. [59] In FY2007, specific FON operational assertions were conducted in the waters of

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[57] Statement on United States Oceans Policy, March 10, 1983, International Legal Materials, Vol. 22, p. 464; American Journal of International Law, Vol. 77, p. 619 (1983). See Annex I for the text of this Statement

[58] Limits in the Sea, No 112, United States Responses to excessive National Maritime Claims, March 9, 1992. Office of Ocean Affairs, Bureau of Oceans and International Environmental and Scientific Affairs, US Department of State.

[59] 2000 Annual Defense Review, Appendix H Freedom of Navigation. Office of the Secretary of Defense.

eight countries multiple times.[60] Going forward, FON operations will continue to require that ships and aircraft be available to assert our rights.

The U.S. recognizes territorial sea claims out to 12 miles from the recognized baselines as defined in the Law of the Sea Convention. The U.S. specifically protests claims such as:

- unrecognized historic water claims;
- improperly drawn baselines for measuring maritime claims;
- territorial sea claims greater than 12 miles;
- other claims to jurisdiction over maritime areas in excess of 12 miles, such as security zones, that purport to restrict non-resource related high seas freedoms;
- contiguous zone claims at variance with Article 33 of the LOS Convention;
- exclusive economic zone (EEZ) claims inconsistent with Part V of the LOS Convention;
- continental shelf claims not in conformance with Part VI of the LOS Convention; and
- archipelagic claims inconsistent with Part IV of the LOS Convention. [61]

The U.S. also protests restrictions on operations in territorial seas and EEZs that are not found in the Law of the Sea Convention. Protested restrictions include those which require the advance notice of innocent passage for warships and restrictions on the passage of nuclear-powered warships.

The 2005 Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA) Conference adopted a new article on boarding at Sea. Notable points of the Article include:

- If a State Party that has reasonable grounds to suspect that an offense is being or is about to be committed involving a ship flying its flag, it may request the assistance of other States Parties in preventing or suppressing that offence. The States Parties so requested shall use their best endeavors to render such assistance within the means available to them.

[60]Freedom of Navigation FY 07 Operational Assertions.
http://www.defenselink.mil/policy/sections/policy_offices/gsa/FY_07_FON_Report.pdf
[61] Limits in the Sea, No 112, United States Responses to excessive National Maritime Claims, March 9, 1992. Office of Ocean Affairs, Bureau of Oceans and International Environmental and Scientific Affairs, US Department of State.

- If the ship is flying the flag of another State Party, and there is reasonable grounds to suspect that an offense being committed, a request must be made to the Flag State confirm the claim of nationality.
- If the flag party confirms the claim of nationality, the requesting Party shall ask the flag State for authorization to board and to take appropriate measures with regard to that ship which may include stopping, boarding and searching the ship, its cargo and persons on board, and questioning the persons on board. [62]

Freedom of Navigation would be important for Phase Zero operations because a critical limiting factor of conducting operations in foreign waters would be access to these same foreign waters. It would not only be the access for the U.S. Naval forces but also the access for our allies. Without the ability to access these areas, operations could not be conducted.

5. Non-combatant Evacuation Operations

A non-combatant evacuation operation (NEO) is an operation conducted to evacuate a country's civilians from another country due to a deteriorating security situation. According to United States Military Joint Publication 3-07.5:

> "Noncombatant evacuation operations (NEOs) are conducted to assist the Department of State (DOS) in evacuating noncombatants, nonessential military personnel, selected host-nation citizens, and third country nationals whose lives are in danger from locations in a host foreign nation to an appropriate safe haven and/or the United States." [63]

For more information about past U.S. Non-combatant Evacuation operations, see Appendix D.

[62] Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, 1988 http://www.imo.org/Conventions/mainframe.asp?topic_id=259&doc_id=686 accessed on 19 MAY 2009

[63] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

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IV. A SYSTEMS ENGINEERING APPROACH TO THREAT ANALYSIS

A. DEFINITION OF THE THREAT

The integrated study team defined a threat as an event, process, or action which has the potential to negativity affect the stability of a region or could cause losses within the Phase Zero force itself.

B. APPROACH

The threat exists in several spheres of influence. Threats change over time, and have unique variances from location to location. There are also some specific functions, such as bombings or kidnappings, which are more prevalent in some regions than others. In order to capture all aspects of threat variance, the analysis has been conducted from five distinct angles: Functional, Physical, Chronological, Regional and Organizational.

C. THREAT ANALYSIS METHOD

The integrated study team determined an approach for identifying threats to the Phase Zero force, by looking at the ideology and behavior that might be expected from potential disruptors.

1. Match ideology to acceptable types of force
    - Adhere to acceptable behavior of own tribe, clan, organization
    - Adhere to rules of organization
2. Determine resources needed
    - Determine persons needed
    - Determine materials needed
    - Determine tool needed
    - Determine funding needed
3. Determine act to employ
    - Select target that has relevance to cause
    - Select action that has relevance to cause
4. Determine desired effect
    - Predict possible backlash for action
    - Predict the publicity gained by action
5. Acquire funding
    - Collect funding from state sponsor (if applicable)
    - Collect funding from private sympathetic sponsors
6. Organize for desired effect
    - Organize to carry out threat actions

- Organize to minimize own loss and survive.

1. Functional Threat Analysis

Decomposition of the specific activities carried out by threat agents, each of which were decomposed to gain a thorough understanding of the actions that could be carried out against Phase Zero forces. Some examples of these were smuggling, suicide bombings, piracy or targeting of airplanes and helicopters. This is an extensive list, and would grow as disruptors continued to search for new methods of imposing their ideology as broadly as possible.

2. Physical Threat Analysis

Analysis of the functions employed by threat agents led to a description of the physical medium used to carry out those functions. For example, disruptors wishing to destroy a helicopter (functional) may employ a shoulder-fired anti-aircraft missile (physical). Examples of physical threats, then, are small arms, improvised weapons or backpack bombs.

3. Chronological Threat Analysis

A Phase Zero force launched in 2020, with a typical, average service life of 30 years, would phase out of operation in the year 2050. A study of the threat in the past decades and in the present was useful in projecting threats forward through 2050. Historical trend analysis, open source data-mining and the application of scaling laws were used to conduct a chronological analysis. Some factors that impacted the future threat were world and local economy, population trends, regional stability and global weather.

The chronological threat analysis was a combination of research and analytical trending. There was no standard formula to project uniformly every identified threat forward to 2020 or 2050. There were however, standard scaling laws to assist with this effort. Each threat was considered with its unique factors, and scaled forward using the standard laws.

4. Regional Threat Analysis

A broad analysis of the current regional threat for the area of the 4th Fleet is presented first. Then, country studies for the 39 countries and territories within the 4th Fleet area of responsibility are presented in detail (Appendix F). Each country study is a nested application of the analysis, as it presents the functional and physical threats that dominate that country's culture, and details the key disruptor organizations and historical threat patterns.

5. Organizational Threat Analysis

This analysis describes the major organizations currently carrying out acts of terror, sabotage, unlawful acts and other societal disruptions. This analysis is both broad and specific in nature, and is applicable in general and as described for a specific region.

The 4th Fleet is responsible for the geographical region that includes the Caribbean, Central America and South America, and oversees 31 ports in Florida and throughout Area of Operation (AO).

In the first phase of the Red Team analysis, each country in the 4th Fleet AO was described with background information and basic open source facts, and then characterized according to the five threat categories: Functional, Physical, Organizational, Chronological, and Regional. Regional threat was inherent in the country studies, by definition. In conducting the country studies, direct quotes from single, open sources were avoided. Rather, team members developed a strategy of compiling and studying seven common sources of information, and then reporting the threat based on that research. Although this list is not all-inclusive, the sources that proved most useful for this study and report process were:

- The CIA World Factbook
- U.S. Department of State Travel Advisories
- Online news reporting sites such as BBC and CNN
- The Center for Disease Control (CDC)
- Wikipedia, the online open encyclopedia
- Online weather agencies, such as Weather.com and Wunderground
- National Oceanic and Atmospheric Administration (NOAA)

Phase two of the threat study considered how threats to stability were tied to the thirteen critical Phase Zero operations conducted by the Phase Zero force. The threat influence was quantified using the CARVER model.

CARVER was developed by Homeland Defense to allow peace officers and other agencies responsible for stability and support types of operations to make comparisons between stability disruptor defenses. CARVER is an acronym for the factors that feed into the model, and is a good choice for analyzing Phase Zero threats. The acronym stands for Criticality, Accessibility, Recuperability, Vulnerability, Effect on Population and Recognizability. The individual factors involved in the CARVER tool are fully described in the threat analysis.

E. IMPLICATIONS OF THE THREAT TO A PHASE ZERO FORCE

From the functional decomposition of the tasks and activities that a Phase Zero force would undertake, thirteen tasks were identified as critical missions. These were:

- Civil Support
- Train the local defense force
- Equip the local defense force
- Build relations with foreign nations
- Restore critical infrastructure
- Anti-smuggling operations
- Anti-terrorism operations
- Anti-illegal fishing operations
- Force protection against threats
- Anti-piracy operations
- Information sharing
- Freedom of navigation
- Non-combatant evacuation operations (NEO)

The CARVER model was developed to provide quantitative data to Homeland Defense decision makers. It was useful in streamlining massive volumes of data into a relatively simple and easy to use form.

- C – Criticality:

Scaled 1 to 10, where 1 was least critical and 10 was most critical. Criticality was defined as the importance (to the Phase Zero force) of a system, subsystem, complex, or component. A target is critical when its destruction or damage had a significant, negative impact on the mission of the targeted system, subsystem, complex, or component.

- A – Accessibility:

Scaled from 1 to 10, where 1 was the least accessible and 10 was the most accessible. Accessibility was defined as the ease with which a (Phase Zero) target could be reached, either physically or by fire. A target was deemed accessible when a threat element could physically infiltrate the target, or if the target could be hit by direct or indirect fire. Static platforms such as ports tended to be more accessible unless extreme measures were taken to preclude it. This differed from “vulnerability”. Accessibility focused on the targets properties (location, defenses) and vulnerability depended on the disruptor’s capabilities against the target.

- R – Recuperability:

Scaled 1 to 10, where 1 represented the greatest ease of recuperability and 10 represented the most difficult recuperability. Recuperability was defined as a measure of the time required to replace, repair, or bypass the destruction or damage inflicted on the target by a disruptor.

- V – Vulnerability:

Scaled 1 to 10, where 1 was the least vulnerable and 10 was the most vulnerable. Vulnerability was defined as a measure of the ability of the (specified) threat to damage the (specified) target using available human and material assets. A target was deemed vulnerable if the threat had the means and expertise to successfully attack it. This differed from accessibility primarily because the focus was on the ability of the disruptor to cause damage.

- E - Effect on Population:

Scaled 1 to 10, where 1 was a very positive effect, 5-6 was a range of neutral or minimal effect, and 10 was a very negative effect. The model did not handle negative numbers. Effect on Population was defined as the positive or negative influence on the population as a result of the action taken by the threat. Effect considered public relations in the vicinity of the target, but also considered the domestic and international reactions as well. Another consideration in the effect was whether the response to the threat weakened or strengthened the support for the disruptor organization. Response that caused damaging backlash to a disruptor group by its own stakeholders was considered as a positive effect on the population, since the population was harmed by the actions of the disruptor group.

- R – Recognizability

Scaled 1 to 10, where 1 indicated that the potential Phase Zero target was stealthy or unrecognizable, and 10 indicated that the potential Phase Zero target was the most easily recognizable. Recognizability was defined as the degree to which a target could be recognized under varying weather, light, and seasonal conditions without confusion with other targets or components. Factors which influenced recognizability included the size and complexity of the target, the existence of distinctive target signatures, and the technical sophistication and training of the attackers. [64]

[64] http://www.sarma-wiki.org/index.php?title=CARVER; "CARVER Methodology" by SARMA; May 1, 2009

The CARVER model provided the means to allow the integrated study team to reduce thousands of papers, documents and segments of open source information into numbers that were useful in describing and summarizing the threat for the Phase Zero force decision makers. For this reason, the integrated study team built a CARVER model that served two primary purposes. First, it allowed for the organization and quick retrieval of hundreds of pages of disjointed information. The first portion of the matrix was a book-keeping contrivance. The fully populated model could be sorted in Microsoft Office Excel, to list data by threat, by mission, by country, or ranked by the threat score. Secondly, CARVER was initially developed as a tool to identify risk from threats, which was why it was used for many years by the Department of Homeland Security and a number of other organizations. The matrix tool allowed peace officers and law enforcement agencies to identify and classify the risks from threats prevalent in their operational environment. This made it a good fit for Phase Zero type operations, which have many similarities to peace-keeping efforts.

The model had both advantages and disadvantages. The primary advantage is that it was a simple tool to understand and use. It did not require the users who populated the data to learn a new program, because it was structured in a basic matrix. Another advantage was that a common software tool, Excel, was used to build the matrix, which avoided the cost of buying a dedicated software package. And finally, the tool had a proven track record for aiding law enforcement agencies in classing and ranking threats. The primary disadvantage was that there was room for bias on the part of the analysts. However, this is true of many risk-based models. At some point, raw data had to be converted into some scale or subjected to the metrics established by the builders of the model, and this part of the process was subjective inherently.

In the case of the CARVER model developed for analyzing threats to regional stability, the scales for the six defined factors of criticality, accessibility, recuperability, vulnerability, effect on the populace, and recognizability have already been defined. In order to more closely align the matrix with standard risk ideology, the CARVER portion was made to represent the "consequence" from threat events and actions, and the "likelihood" was determined based on the research effort. The sensitivity of the model sprung from the fact that this likelihood, or prevalence of threat, was scaled for high, medium, and low on a one to three scale. The use of the one-two-three scale resulted in threat scores that fell easily into high, medium and low risk impact, which was more suited for the modeling and force structure team members to apply. If a

one to ten scale had been used, then specific definitions would be needed to define each level of one through ten to keep the matrix standard. Because data was collected for 39 countries, 13 critical Phase Zero missions and for each of the 16 most common threats, the job of defining these scales became larger than the scope of this project. The one to three prevalence scale was thoroughly defined for each of the most common threats that surfaced during the research effort.

As the analysts collected data and began to populate the CARVER matrix, sixteen threats to regional stability were observed to occur most frequently. These most prevalent threats were: Arms Smuggling, Crime (Murder/Assault/Rape/Robbery), Disease (other than AIDS), Drug Smuggling, Environmental Issues/Lack of Resources, HIV/AIDS, Human Smuggling/Trafficking, Illegal, Unregulated, Unreported (IUU) Fishing, Kidnapping, Lack of Communications Infrastructure, Lack of Human Rights/Freedom, Money Laundering, Natural Disasters, Piracy, Social Instability and Terror Organizations.

Metrics for each of these most common threats were thoroughly defined for low, medium and high prevalence. For risk defined as the product of likelihood and consequence, this became the likelihood portion of the threat risk formula. The consequence portion of the threat risk formula, the six-part CARVER section of the matrix, has been used before and the Department of Homeland Security has already published well defined scales for these six threat factors. We adopted their one to ten scale, as defined, and also followed their convention of applying the additive property to the six factors. The highest possible CARVER score, then, was 60, and the highest possible prevalence score was three. The product resulted in an overall threat risk score, and a highest possible raw score, of 180. In order to make the final threat score simple to visualize comparatively, the raw scores were then normalized to produce a final result between zero and 100.

As discussed above, models of this type are always subject to bias in the data generation stage. In an attempt to counter this, each entry to the model was vetted by the other members of the team. Independent work was done, region by region, by the individual analysts. Weekly sessions were held in which the derived CARVER numbers were reviewed and challenged by the rest of the team. The integrated study team also sought a second opinion from NPS instructors associated with the Homeland Defense Department.

Additionally, the integrated study team participated in a joint effort to define clearly the prevalence factors for the major threats. This helped to standardize the use of the model. The "high (3), medium (2), low (1)" justifications for the threats are as follows:

The following table is a summary, by mission, of the CARVER matrix results.

Description of Threat	# of 4th Flt Nations Reporting Threat
Drug Smuggling	27
Natural Disasters	19
Money Laundering	18
Arms Smuggling	6
Human Trafficking	24
HIV/AIDS	21
Crime	13
Disease (other than AIDS)	12
Terror Organizations	12
Environmental Issues	11
Lack of Human Rights	11
IUU Fishing	7
Kidnapping	7
Lack of Comms Infrastructure	3
Social Instability	5
Piracy	2

Table 1: CARVER Summary

Arms Smuggling:

Arms smuggling was difficult to apply metrics to, because the offenders make their best efforts to avoid detection and certainly do not keep records that are readily available. One way of gauging the scope of the problem was to base it subjectively on the number of press reports of drug cache seizures. Although the CIA and other agencies may keep databases, these were not available in the public domain. There were also several annual reports, such as the one published by the Arms Control and Disarmament Agency, which did publish information about exposed black market transactions, but not statistical data. For this reason, the prevalence score for arms smuggling was based on the breadth of press coverage.

SCORE	DESCRIPTION
3	Common reporting of arms smuggling; coverage easy to find; frequent reports about large scale problems and large seizures
2	Fewer reports about arms smuggling incidents; infrequent reports are about large scale problems and large seizures
1	Infrequent reporting of arms smuggling incidents; reports are about small scale operations and small seizures of arms caches

Table 2: Prevalence Score for Arms Smuggling

Crime (Murder/Assault/Rape/Robbery):

The CIA World Fact book was one of seven sources commonly used in developing the country studies. One of the factors commonly reported was various crimes, particulary murder rates, as a ratio per 100,000 of the population[65.] Research from other law enforcement sources and reporting agencies revealed that the average for these types of crimes in Central/South America is a little less than 30 per 100,000. Using this average, a list was compiled to rank the ratios from high to low. The highest score (for the region) was 58 per 100,000, and the lowest score was 14 per 100,000. For comparison, the US reports 16 or 17 occurrences per 100,000, and Singapore has the second lowest crime rate in the world, at 0.4 per 100,000. This range and median were used to provide our scale for this project. Using this metric, below-average rates of crime did not cause a country to list in the CARVER matrix for the threat of "Crime".

SCORE	DESCRIPTION
3	51-60 occurrences per 100,000 of the population
2	41-50 occurrences per 100,000 of the population
1	30-40 occurrences per 100,000 of the population

Table 3: Prevalence Score for Crime

65 https://www.cia.gov/library/publications/the-world-factbook/countrylisting.html; "Country Statistics"; May 7, 2009

Disease (other than AIDS):

The CIA Factbook has already flagged countries for the presence of disease other than AIDS. They used a scale in which any threat from disease that was less than average was considered low and the country under study was not identified for disease health risks. For countries that did pose a moderate to severe threat of disease, they identified three above average levels of threat, which we transposed into the 1-2-3 threat prevalence in our CARVER model.

SCORE	DESCRIPTION
3	Risk is "Very High"
2	Risk is "High"
1	Risk is "Intermediate"

Table 4: Prevalence Score for Disease

Drug Smuggling:

Drug smugglers do not keep publicly available records of the actual movement of illicit drugs. Several sources, such as press agencies, governmental policy agencies and law enforcement agencies have published country by country illustrations of the severity of the drug smuggling problem. There were also some facts available about which nations were the top producers, cultivators and movers of illegal drugs. Without specific, validated statistics or rankings, the integrated study team chose to classify the prevalence of this threat by certain indicators that surfaced in many publications. The highest prevalence applied to countries that produced, processed, and shipped illegal drugs. The next highest ranking applied to nations that did not produce copious amounts of drugs, but were referred to in more than one source as a "major transshipment points". The lowest prevalence applied to nations classed as "minor transshipment points". The drug smuggling problem was identified as one of the most common and severe threats to stability within the 4th Fleet AO, and a large percentage of the 39 countries were scored in the CARVER matrix.

SCORE	DESCRIPTION
3	Large scale production, processing and shipment
2	Major transshipment point
1	Minor transshipment point

Table 5: Prevalence Score for Drug Smuggling

Environmental Issues/Lack of Resources:

There are numerous studies available regarding specific environmental factors. Only one major study, the Environmental Performance Index (EPI), considered an exhaustive list of damaging environmental effects[66]. Integrated study team research indicated that there were threats not only from environmental corruption issues, but also from the scarcity of environmental resources, particularly water and vanishing rainforests. For this reason, the prevalence scaling was based on the number of the following specific issues that a nation was experiencing. These ten factors were: water scarcity, deforestation, overfishing, over-mining, fresh water fouling, lack of waste disposal, soil erosion, reef erosion, lack of agricultural capabilities and lack of resources for livestock. With a few exceptions (like ozone index), the EPI factors were broadly covered. It should be noted that some environmental problems lead to others and so certain issues such as deforestation, soil erosion and water pollution often occur together.

SCORE	DESCRIPTION
3	Seven or more factors present
2	Significant presence of five or six factors
1	Significant presence of three or four factors

Table 6: Prevalence Score for Environmental Issues/Lack of Resources

[66] "Environmental Performance Index - Rankings and Scores", PDF, downloaded May 5, 2009; http://epi.yale.edu/CountryScores

HIV/AIDS:

Because this integrated project focused on the 4th Fleet AO, the AIDS rates that are more generalized for global comparisons were used, non-inclusive of the higher rates for Africa. That would allow these prevalence factors to be used for any other region than Africa. This is inescapable for any model, because AIDS rates in Africa, which can be as high as one in four adults infected, are not comparable to anywhere else in the world.

SCORE	DESCRIPTION
3	Greater than 1% of adult population infected
2	Between 0.75% and 1.0% of the adult population infected
1	Between 0.5% and 0.75% of the adult population infected

Table 7: Prevalence Score for HIV/AIDS

Human Smuggling/Trafficking:

Congress requires annual reports on the status of human trafficking around the globe, to include a three tier listing of the worst offender nations, with Tier 3 being the worst case. The integrated study team used the completed report to Congress for 2007 and 2008, prepared by CRS, to identify these countries. [67] More thorough information about trafficking issues was included in the individual country studies, but the CARVER prevalence assessment was based directly on the tier lists, used by many U.S. government agencies, including the State Department and the Central Intelligence Agency.

[67] "CRS Report for Congress: Trafficking in Persons in Latin America and the Caribbean"; Clare M. Ribando, CRS; Jan 8, 2007

SCORE	DESCRIPTION
3	Tier 3
2	Tier 2
1	Tier 1

Table 8: Prevalence Score for Human Smuggling/Trafficking

Illegal, Unregulated, Unreported (IUU) Fishing:

The very fact that IUU fishing is by definition "unreported" made it difficult to establish a solid metric for determining prevalence. The integrated study team relied on studies already conducted by the Environmental Justice Foundation (EJF). [68] The EJF listed the seven worst offenders for IUU fishing, and identified five countries which further the problem through the practice of Flags of Convenience (FOC). Based on this reporting, the prevalence scale was set as:

SCORE	DESCRIPTION
3	Practices IUU; worst offender and issues FOC
2	Practices IUU; worst offender list
1	Some mention of IUU; not ranked as worst offender by EJF

Table 9: Prevalence Score for Illegal, Unregulated, Unreported (IUU) Fishing

Kidnapping:

The United Nations survey of criminal trends is published annually and is available in the public domain. [69] This report lists rankings among nations of the number of kidnappings that occur each year. This data was used to determine a (global) weighted average, as well as high, median and low values to establish a range for the 4th Fleet AO. As with other range and median

[68] "Pirates and Profiteers: How Pirate Fishing Fleets are Robbing People and Oceans"; EJF Report by Steve Trent, Juliette Williams and Louis Buckley; May 1, 2009

[69] http://danger.mongabay.com/kidnapping_stats.htm; May 13, 2009

scales employed with the CARVER, only above average levels were recorded as threats. From the last reported data set, the low value in the region under study was eight kidnappings, in Uruguay, and the most extreme value for the high range occurred in Peru, with 491 occurrences. The median for South and Central America, then, was 109. Of the six South and Central American nations listed in the global top 30, Peru skewed the average considerably. So, relying on the median rather than the mean, the prevalence rating became:

SCORE	DESCRIPTION
3	More than 50 occurrences
2	Between 25 and 50 occurrences
1	Less than 25 occurrences, but listed in UN "top 30"

Table 10: Prevalence Score for Kidnapping

Lack of Communications Infrastructure:

The United Nations intermittently issues a national ranking of access to communications and technology. Access to communications infrastructure is one of their measures of quality of life, which factors into their overall report on human development.[70] Each nation is given a score between 0 and 1, 1 being the best infrastructure. The integrated study team used the most recent raw scores for nations considered to have low quality infrastructure, to construct a scale for 4th Fleet countries.

SCORE	DESCRIPTION
3	Score of 0.15 or lower
2	Between 0.15 and 2.0
1	Score greater than 0.2, but listed as "low" on UN ranking

Table 11: Prevalence Score for Lack of Communications Infrastructure

[70] United Nations Press Release PI/1522 SAG/180; http://www.un.org/News/Press/docs/2003/pi1522.doc.htm; May 5, 2009

Lack of Human Rights/Freedom:

Human rights abuses are monitored by United Nations committees, national institutions and governments, and by many independent non-governmental organizations, such as Amnesty International or the International Federation of Human Rights. Organizations such as these collect evidence and document alleged human rights abuses. They also apply pressure to enforce human rights laws. There are a wide variety of databases available which attempt to measure exactly what violations governments commit against those within their territorial jurisdiction. One ranking, by country, already in place, with data analysis through 2007, was done by an organization called "Privacy International". Their methodology and rankings could be accessed in the public domain. [71] Countries were given a mean score by the application of 14 criteria, such as constitutional protection, privacy enforcement, surveillance and workplace monitoring. Because the data analysis process was well defined and covered many key performance factors, the integrated study team adopted the scores for use in determining severity of the threat of "Lack of Human Rights". The team also used rankings available in the public domain from the United Nations. [72] Creating a matrix with data from both organizations painted a fair picture of how the nations ranked in terms of human rights and freedoms, because one targeted constitutional protections – the actions a government took to protect citizens, and the other considered what human rights abuses that nations committed. The scores for the applicable 4th Fleet countries were extrapolated from the overall matrix, and scaled by range and median. The median was 6.24 and the maximum (Colombia) scored 16.9. Of the top ranked 100 human rights offenders in the world, 23 are located in the 4th Fleet, AO, and 11 score above median.

SCORE	DESCRIPTION
3	Score greater than 13
2	Score between 10 and 13
1	Score greater than 6.5 and less than 10

Table 12: Prevalence Score for Lack of Human Rights/Freedom

[71] http://www.privacyinternational.org/article.shtml?cmd%5B347%5D=x-347-559597; Dec 28, 2007; accessed Apr 21, 2009

[72] "Human Development Indices; United Nationals Annual Report; http://hdr.undp.org/en/statistics/; accessed April 29, 2009

Money Laundering:

A geographical risk assessment methodology was developed and applied by Promontory Compliance Solutions, and has been used by the State Department to identify risks from money laundering for the purpose of supporting and funding terrorism. [73] This work resulted in an anti-money laundering atlas which has since been published in the public domain. The integrated study team relied on this documentation to create prevalence rankings for money laundering within Latin America.

Natural Disasters:

The Centre for Research on the Epidemiology of Disasters, a non-profit organization based in Brussels, has maintained records of 30 years of natural disasters, tracking both the number of casualties and the number of catastrophic events. [74] Because Phase Zero work focuses on the stability of the population, human casualty records were brought to bear in determining the threat prevalence in the region. Overall numbers of disaster-related deaths and injuries determined the prevalence rating, falling into a high-medium-low scale for above average casualties in the 4th Fleet area. High-casualty events certainly skewed this data, but these are real numbers of real deaths in the region and so are considered relevant. For example, the flooding in Venezuela that killed 30,000 people caused Venezuela to rank in the Top 10 worst disasters over the 30-year study period, and so also placed them high on the prevalence ranking. But since this type of disaster is indigenous to the area, and there is no certain procedure for determining the likelihood of a reoccurrence in the next 50 years, the data stood. Using the high of 48.9 million, a low of 0.003 million and a median of 35 million, the threat prevalence scale for above average occurrence is as shown in table below. For comparison, the US reported 4.6 million for the study period.

[73] www.transparency.org; IMF 2002, accessed May 2, 2009

[74] "Thirty Years of Natural Disasters 1974-2003: The Numbers", D. Guha-Sapir, D. Hargitt, P. Hoyois; ISBN : 2-930344-71-7, Presses universitaires de Louvain, 2004

SCORE	DESCRIPTION
3	36 to 50 million killed or affected
2	21 to 35 million killed or affected
1	5 to 20 million killed or affected

Table 13: Prevalence Score for Natural Disasters

Piracy:

Piracy is a definite, established global threat to security, but the majority of acts of piracy take place in regions other than the Latin America, and the worst pirate problems, which would merit the ranking of three for threat prevalence; do not typically take place in the area of focus for our model. However, each of the 39 Fourth Fleet nations was subjected to an internet search with keywords of "country" and "piracy", and there were two nations that returned search hits with newswire reporting. Using this information, and subjectively based on the volume and severity of news reporting, the CARVER prevalence scores were rated for piracy threat were:

SCORE	DESCRIPTION
3	Ongoing, well-documented problem; extensive press coverage
2	Press coverage indicates more than one-time or sporadic pirate activities
1	Press coverage of isolated or unique pirate attacks

Table 14: Prevalence Score for Piracy

Social Instability:

Social instability and unrest are important threats to overall regional stability. However, the symptoms of social unrest; poverty, racial tension, unemployment and illegal immigration, stem from larger core issues. An unstable economy leads to joblessness. Lack of law enforcement needed to patrol borders leads to immigration issues. In order to rank an issue as subjective and dynamic as social instability, the integrated study team used the three root factors of economic, financial, and political risk to classify the threat prevalence. A risk organization,

AM Best, published their analysis, country by country, for these three risk factors, and further sorted the countries by a three tier scheme. [75] Each country was rated low (1.0), moderate (2.0), high (3.0) and very high (4.0) risk for these indicators. The integrated study team used the average of these factors, to conduct the same range and median analysis that was applied to the other threats. For example, the Dominican Republic was scored as 3.0, 3.0 and 4.0, respectively, for economic, political, and financial risk, which led to an average score of 3.3. After compiling all the country data, this led to a prevalence scale for implementation in the CARVER tool:

SCORE	DESCRIPTION
3	Greater than 3.0
2	Between 2.5 and 3.0
1	Between 2.0 and 2.5

Table 15: Prevalence Score for Social Instability

Terror Organizations:

Terrorism can happen anywhere, and by its very nature, long term predictions of terror incidents are difficult. However, the conditions that allow terrorism to thrive, such as offering safe haven, lack of the rule of law which allows terror groups to perpetuate, or the presence of groups that conduct terror as a form of political or social protest, can be indicators of increased terror threat. The Department of State travel advisories offered clues as to which nations had these conditions. Finally, country background information from the CIA Factbook denoted the presence of internal, domestic terror groups when those groups existed. Using these conditions as a prevalence measure for CARVER, the scale was:

[75] http://www.ambest.com/; accessed May 2, 2009

SCORE	DESCRIPTION
3	Listed as “State Sponsor”; State Department travel advisory
2	Domestic terror groups active in country
1	Reports of terror training cells or recruitment activity

Table 16: Prevalence Score for Terror Organizations

Using CARVER, detailed current threats associated with the thirteen critical missions were determined and are presented below. The three bolded missions were the representative missions used to develop models. The two italicized missions were the outliers.

The first cluster of related missions was comprised of: Share Information and Intelligence, Build Relationships, Equip Local Forces and Train Local Forces. The representative mission for this cluster was Share Intelligence and Information.

The second cluster of related missions was comprised of: Humanitarian Assistance for Disaster Response and Build Infrastructure for Disaster Response. The representative mission for this cluster was Humanitarian Assistance for Disaster Response.

The third cluster of related missions was comprised of: Anti-smuggling, Anti-Piracy, Anti-IUU Fishing, Anti-Terrorism and Force Protection. The representative mission for this cluster was Anti-smuggling.

The two outliers were: Maintain Freedom of Navigation and Non-combatant Evacuation Operations.

D. CURRENT (2009) THREATS ASSOCIATED WITH THE PHASE ZERO CRITICAL MISSIONS

1. Share Information/Intelligence

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the “Share Information/Intelligence” mission. The threats that would affect this particular mission were: arms, drug and human smuggling, crime, AIDS and other diseases, environmental issues and lack of resources, IUU fishing, kidnapping, lack of communications infrastructure, money laundering, natural disasters, piracy and terror organizations.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Drug Smuggling	Argentina, Bolivia, Colombia, Dominican Republic, El Salvador, French Guinea, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Mexico, Puerto Rico
Human Trafficking	Belize, Cuba, Jamaica, Panama, Venezuela
IUU Fishing	Belize, Honduras, Panama
Money Laundering	Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Crime	Colombia
Natural Disasters	Colombia, Haiti, Nicaragua
Terror Organizations	Colombia, Haiti, Venezuela
HIV/AIDS	Bahamas, Dominican Republic
Lack of Communications Infrastructure	Haiti
Natural Disasters	Jamaica

Table 17: Most Likely Threats to the "Share Information/Intelligence" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: crime, disease, and kidnapping. The three 4th Fleet AO nations with the highest consequence scores were: Colombia, El Salvador, and Peru.

THREAT	COUNTRY	CARVER SCORE
Disease	Peru	55
Crime	El Salvador	54
Kidnapping	Colombia	52

Table 18: Threats to the "Share Information/Intelligence" Mission with the Highest CARVER Consequence Score

2. Build Relationships

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the “Build Relationships” mission. The threats that would affect this particular mission were: arms, drug and human smuggling, crime, AIDS and other diseases, environmental issues and lack of resources, IUU fishing, kidnapping, lack of communications infrastructure, lack of human rights and freedoms, natural disasters, piracy, social instability, and terror organizations.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of “3” were tabulated and are shown below:

THREAT	COUNTRY
Drug Smuggling	Argentina, Bolivia, Colombia, Dominican Republic, El Salvador, French Guinea, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Puerto Rico
HIV/AIDS	Bahamas, Barbados, Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, Trinidad
Human Trafficking	Belize, Cuba, Jamaica, Panama, Venezuela
IUU Fishing	Belize, Honduras, Panama
Kidnapping	Chile, Peru
Crime	Colombia, El Salvador, Guatemala, Jamaica, Peru, Haiti
Lack of Human Rights	Colombia, Mexico
Disease other than AIDS	French Guinea, Honduras, Peru
Lack of Communications Infrastructure	Haiti
Natural Disasters	Nicaragua

Table 19: Most Likely Threats to the "Build Relationships" Mission

Consequences of the threat being carried out: The CARVER score is the multiplicative aggregate of the six consequence factors. The three highest consequence scores were for the threats of: crime, disease, and terror organizations. The three 4th Fleet AO nations with the highest consequence scores were: Colombia, El Salvador, and Peru.

THREAT	COUNTRY	CARVER SCORE
Disease	Peru	55
Crime	El Salvador	54
Kidnapping	Cuba	54

Table 20: Threats to the "Build Relationships" Mission with the Highest CARVER Consequence Scores

3. Equip Local Forces

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Equip Local Forces" mission. The threats that would affect this particular mission were: drug smuggling, disease, money laundering, natural disasters and terror organizations.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Money Laundering	Antigua, Bahamas, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Natural Disasters	Colombia, Haiti, Jamaica, Nicaragua
Drug Smuggling	Mexico, Nicaragua, Paraguay, Peru

Table 21: Most Likely Threats to the "Equip Local Forces" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: natural disasters, and money laundering. The three 4th Fleet AO nations with the highest consequence scores were: Nicaragua and Jamaica.

THREAT	COUNTRY	CARVER SCORE
Natural Disasters	Nicaragua	49
Natural Disasters	Jamaica	48
Money Laundering	Jamaica	47

Table 22: Threats to the "Equip Local Forces" Mission with the Highest CARVER Consequence Scores

4. Train Local Forces

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Train Local Forces" mission. The threats that would affect this particular mission were: crime, AIDS and other diseases, drug smuggling, kidnapping, social instability and, terror organizations.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
HIV/AIDS	Bahamas, Barbados, Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, Trinidad
Kidnapping	Chile, Peru
Crime	Colombia, El Salvador, Guatemala, Haiti, Jamaica, Peru
Terror Organizations	Colombia, Haiti, Venezuela
Disease other than AIDS	French Guinea, Honduras, Peru
Drug Smuggling	Mexico, Nicaragua, Paraguay, Peru

Table 23: Most Likely Threats to the "Train Local Forces" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: disease, crime, and kidnapping. The three 4th Fleet AO nations with the highest consequence scores were: Colombia, El Salvador, and Peru.

THREAT	COUNTRY	CARVER SCORE
Disease	Peru	55
Crime	El Salvador	54
Kidnapping	Colombia	52

Table 24: Threats to the "Train Local Forces" Mission with the Highest CARVER Consequence Scores

5. Humanitarian Assistance for Disaster Response

Specific Threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Humanitarian Assistance for Disaster Response" mission. The threats that would affect this particular mission were: crime, AIDS and other diseases, environmental issues or lack of resources, human trafficking, lack of human rights and freedoms, natural disasters, and social instability.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Environmental Issues	Antigua
Human Trafficking	Belize, Cuba, Venezuela
Crime	Colombia, El Salvador, Guatemala, Haiti, Jamaica, Peru
Lack of Human Rights	Colombia, Mexico
Natural Disasters	Colombia, Haiti, Jamaica, Nicaragua
HIV/AIDS	Bahamas, Dominican Republic, Guyana, Panama
Disease other than AIDS	French Guinea, Honduras, Peru

Table 25: Most Likely Threats to the "Humanitarian Assistance for Disaster Response" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: crime, disease, and human trafficking. The three 4th Fleet AO nations with the highest consequence scores were: Cuba, El Salvador and Peru.

THREAT	COUNTRY	CARVER SCORE
Disease	Peru	55
Crime	El Salvador	54
Human Trafficking	Cuba	51

Table 26: Threats to the "Humanitarian Assistance for Disaster Response" Mission with the Highest CARVER Consequence Score

6. Build Infrastructure for Disaster Response

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Build Infrastructure for Disaster Response" mission. The threats that would affect this particular mission were: disease, environmental issues and lack of resources, social instability, and natural disasters.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Environmental Issues	Antigua
Natural Disasters	Colombia, Haiti, Jamaica, Nicaragua
Disease other than AIDS	French Guinea, Honduras, Peru

Table 27: Most Likely Threats to the "Build Infrastructure for Disaster Response" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: disease,

environmental issues and lack of resources, and natural disasters. The three 4th Fleet AO nations with the highest consequence scores were: Peru, Antigua, and Nicaragua.

THREAT	COUNTRY	CARVER SCORE
Disease	Peru	55
Environmental Issues	Antigua	49
Natural Disasters	Nicaragua	49

Table 28: Threats to the "Build Infrastructure for Disaster Response" Mission with the Highest Consequence Scores

7. Prevent Unlawful Acts: Anti-smuggling

Specific threats which would adversely affect the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Prevent Unlawful Acts: Anti-smuggling" mission. The threats that would affect this particular mission were: arms, drug and human smuggling, crime, and money laundering.

Likelihood that these threats would be encountered by the Phase Zero force or would have a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Drug Smuggling	Argentina, Bolivia, Colombia, Dominican Republic, El Salvador, French Guinea, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Puerto Rico
Human Trafficking	Belize, Cuba, Jamaica, Panama, Venezuela
Money Laundering	Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Crime	Colombia, El Salvador, Guatemala, Haiti, Jamaica, Peru

Table 29: Most Likely Threats to the "Prevent Unlawful Acts: Anti-smuggling Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: crime, drug smuggling, and human trafficking. The three 4th Fleet AO nations with the highest consequence scores were: Cuba, El Salvador, and Jamaica.

THREAT	COUNTRY	CARVER SCORE
Crime	El Salvador	54
Drug Smuggling	Jamaica	52
Human Trafficking	Cuba	51

Table 30: Threats to the “Prevent Unlawful Acts: Anti-smuggling” Mission with the Highest CARVER Consequence Scores

8. Force Protection

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the “Force Protection” mission. The threats that would have affected this particular mission were: arms and drug smuggling, crime, AIDS and other diseases, kidnapping, money laundering, natural disasters, piracy, social instability and terror organizations.

Likelihood that these threats would have been employed against the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" are tabulated below:

THREAT	COUNTRY
Money Laundering	Antigua, Bahamas, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Drug Smuggling	Argentina, Bolivia, Colombia, Dominican Republic, El Salvador, French Guinea, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Puerto Rico
HIV/AIDS	Bahamas, Barbados, Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, Trinidad
Kidnapping	Chile, Peru
Crime	Colombia, El Salvador, Guatemala, Haiti, Jamaica, Peru
Terror Organizations	Colombia, Haiti, Venezuela
Disease other than AIDS	French Guinea, Honduras, Peru
Natural Disasters	Jamaica

Table 31: Most Likely Threats to the "Force Protection" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: crime, disease, and terror organizations. The three 4th Fleet AO nations with the highest consequence scores were: Cuba, El Salvador, and Jamaica.

THREAT	COUNTRY	CARVER SCORE
Crime	Peru	54
Drug Smuggling	El Salvador	52
Human Trafficking	Cuba	51

Table 32: Threats to the "Force Protection" Mission with the Highest CARVER Consequence Scores

9. Prevent Unlawful Acts: Anti-terrorism

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Prevent Unlawful Acts: Anti-terrorism" mission. The threats that affected this particular mission are: arms and drug smuggling, disease, money laundering, and terror organizations.

Likelihood that these threats would have been encountered by the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Money Laundering	Antigua, Bahamas, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Puerto Rico
Drug Smuggling	Colombia
Terror Organizations	Colombia, Haiti, Venezuela
Disease other than AIDS	French Guinea, Honduras, Peru

Table 33: Most Likely Threats to the "Prevent Unlawful Acts: Anti-terrorism" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: drug

smuggling, disease, and terror organizations. The three 4th Fleet AO nations with the highest consequence scores were: Cuba, Colombia, and Peru.

THREAT	COUNTRY	CARVER SCORE
Disease other than AIDS	Peru	55
Terror Organizations	Cuba	54
Drug Smuggling	Colombia	48

Table 34: Threats to the "Prevent Unlawful Acts: Anti-terrorism" Mission with the Highest CARVER Consequence Scores

10. Prevent Unlawful Acts: Anti-piracy

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Prevent Unlawful Acts: Anti-piracy" mission. The threats that affected this particular mission are: arms, drug and human smuggling, money laundering, piracy, and terror organizations.

Likelihood that these threats would have been encountered by the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
Money Laundering	Antigua, Bahamas, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Venezuela
Arms Smuggling	Bahamas, Brazil, Costa Rica, Ecuador, Puerto Rico
Human Trafficking	Belize, Cuba, Jamaica, Venezuela

Table 35: Most Likely Threats to the "Prevent Unlawful Acts: Anti-piracy" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: human

smuggling, and terror organizations. The three 4th Fleet AO nations with the highest consequence scores were: Cuba and Bolivia.

THREAT	COUNTRY	CARVER SCORE
Terror Organizations	Cuba	54
Human Trafficking	Cuba	51
Human Trafficking	Bolivia	50

Table 36: Threats to the "Prevent Unlawful Acts: Anti-piracy" Mission with the Highest CARVER Consequence Scores

11. Prevent Unlawful Acts: Anti-IUU Fishing (Illegal, Unregulated and Unreported Fishing)

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Prevent Unlawful Acts: Anti-IUU Fishing" mission. The threats that would have affected this particular mission were: environmental issues and lack of resources and IUU fishing.

Likelihood that these threats would have been encountered by the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
IUU Fishing	Belize, Honduras, Panama

Table 37: Most Likely Threats to the "Prevent Unlawful Acts: Anti-IUU Fishing" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: environmental issues and lack of resources and IUU fishing. The three 4th Fleet AO nations with the highest consequence scores were: Bolivia, the Dominican Republic, and Belize.

THREAT	COUNTRY	CARVER SCORE
Environmental Issues	Bolivia	43
Environmental Issues	Dominican Republic	43
IUU Fishing	Belize	42

Table 38: Threats to the "Prevent Unlawful Acts: Anti-IUU Fishing" Mission with the Highest CARVER Consequence Scores

12. Conduct Non-combatant Evacuation Operations

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Conduct Non-combatant Evacuation Operations" mission. The threats that affected this particular mission were: AIDS and other diseases, human trafficking, kidnapping and natural disasters.

Likelihood that these threats would have been encountered by the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
HIV/AIDS	Bahamas, Barbados, Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, Trinidad
Kidnapping	Chile, Peru
Natural Disasters	Jamaica, Nicaragua

Table 39: Most Likely Threats to the "Conduct Non-combatant Evacuation Operations" Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: AIDS, natural disasters, and kidnapping. The three 4th Fleet AO nations with the highest consequence scores were: the Bahamas, Nicaragua, and El Salvador.

THREAT	COUNTRY	CARVER SCORE
HIV/AIDS	Bahamas	49
Natural Disasters	Nicaragua	49
Kidnapping	El Salvador	48

Table 40: Threats to the "Conduct Non-combatant Evacuation Operations" Mission with the Highest CARVER Consequence Scores

13. Freedom of Navigation

Specific threats which would have adversely affected the mission: The fully populated CARVER matrix was used to filter the threats specific to the "Maintain Freedom of Navigation" mission. The threats that affected this particular mission were: IUU fishing, piracy, and terror organizations.

Likelihood that these threats would have been encountered by the Phase Zero force or would have had a detrimental effect on their ability to conduct stability operations: Threats specific to this mission with the locations having the highest prevalence rating of "3" were tabulated and are shown below:

THREAT	COUNTRY
IUU Fishing	Belize, Honduras, Panama

Table 41: Most Likely Threats to the "Maintain Freedom of Navigation Mission

Consequences of the threat being carried out: The CARVER score is the aggregate of the six consequence factors. The three highest consequence scores were for the threats of: terror organizations and IUU fishing. The three 4th Fleet AO nations with the highest consequence scores were: Cuba, Belize, and Panama.

THREAT	COUNTRY	CARVER SCORE
Terror Organizations	Cuba	54
IUU Fishing	Belize	42

IUU Fishing	Panama	40

Table 42: Threats to the "Maintain Freedom of Navigation" Mission with the Highest CARVER Consequence Scores

E. ANTICIPATED THREATS TO A PHASE ZERO FORCE OPERATING IN 2020-2050

An important consideration for the integrated study team was the threat environment that may be present when the fleet is placed in service, and which threats would endure during the force's lifecycle. While it would have been imprudent to neglect this question, it was also a difficult question to answer. The unexpected does happen. The removal of the Berlin Wall, the fall of the Soviet Republic and the Trade Center tragedy in New York were all events that did not fit neatly into trends and would have been difficult to imagine even a year before they occurred. That said, one must have some basis for planning and preparing for the future, with the understanding that the turn of events could require the need to reassess threat projections at any time. Barring these unique and major happenings, the integrated study team reviewed each of the 16 most common threats in the 4th Fleet Theater of operations now, and used a combination of available statistical information, estimates from defense and security experts and trending techniques to project the status of the 16 threats for the 2020 to 2050 timeframe.

1. Arms Smuggling

Estimates of the number of illegal weapons in South and Central America varied widely. Firearms which are illegally owned today stem from a number of sources. Many of the weapons are purchased or smuggled from the US, and in many cases, nations such as the US, UK, France or Holland sent the weapons for valid purposes. For example, in the 1980s, the US sent 30,000 assault rifles to El Salvador for the civil war. The US government has also shipped an unspecified number of weapons to Colombia to aid in the war against drugs. This led to a second source of illicit weapons transfers, which is corrupt police, military, and government officials who abused their positions to traffic small arms for profit.

One good measure of the number of illegal firearms and the scope of arms smuggling was the prevalence of violent crime.

A leading small arms survey postulated in 2000 that for every legally owned and registered weapon in the region, there were one or two illegally smuggled and sold, and that illegal firearms outnumbered law enforcement weaponry five to one[76.] The UN Office on Drugs and Crime, in 2008, published a ratio of legal to illegal weapons of 1.6 to 1, so the suspected ratio has not changed between 2000 and 2008[77.]

For this reason, the integrated study team estimated that unless other countries take steps to reduce small arms, illegal weaponry will continue to outnumber legally registered weaponry, and small arms sales and smuggling will remain a lucrative and tempting trade for criminals and corrupt officials indefinitely.

2. Crime (Murder/Robbery/Rape/Assault)

Murder rates are the most readily available statistic for gauging violent crime, and were used to establish a trend for violent crime in the 4th Fleet AO. Due to gaps in tabulated information available from the State Department and individual government sites, numerous sources were referenced to populate a table of the murder rates from 2000 to present, for the ten Latin American and Caribbean nations that had the highest murder rates. Murder rates are reported as homicides per 100,000 of the population. The average in the 4th Fleet AO was 30 per year. The nations with the ten worst murder rates in the region had rates between 26.7 and 49.9.

[76] The DISAM Journal, 2008; "Central America and the Merida Initiative", by Thomas A. Shannon; May 8, 2008
[77] http://www.unodc.org/unodc/en/data-and-analysis/Studies-on-Drugs-and-Crime.html; accessed April 22, 2009

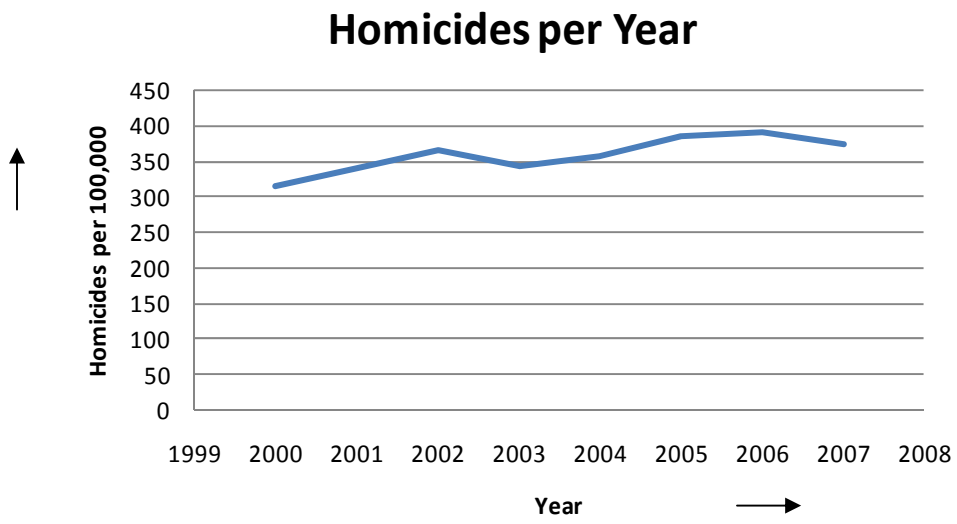

Figure 11: Trend for Ten Highest Homicide Rates in the 4th Fleet AO

The correlation coefficient for this plot was r=+0.85, demonstrating a mostly linear, positive trend. The slope of the best fit line indicated an additional 9 persons (per 100,000) a year could die as a result of homicide. Should that trend continue through the years 2020 and 2050, the ten worst nations may have as many as 500 to 800 murders per 100,000 of the population each year. That would correspond to an increase in the murder rate from the current 0.03% to 0.8%. Most news and government sources that were studied for this project did note that crime in general is increasing in the region, although quantifiable percentages were not given.

3. Disease other than AIDS

The World Health Organization publishes basic health indicators annually. One of their indicators is the number, per 100,000 persons of the population, of persons who die from infectious disease each year. For the Latin America and Caribbean region, the team extracted data from reports for the last five years and graphed the results. In years prior to 2004, the data was not presented for the region in the same manner.

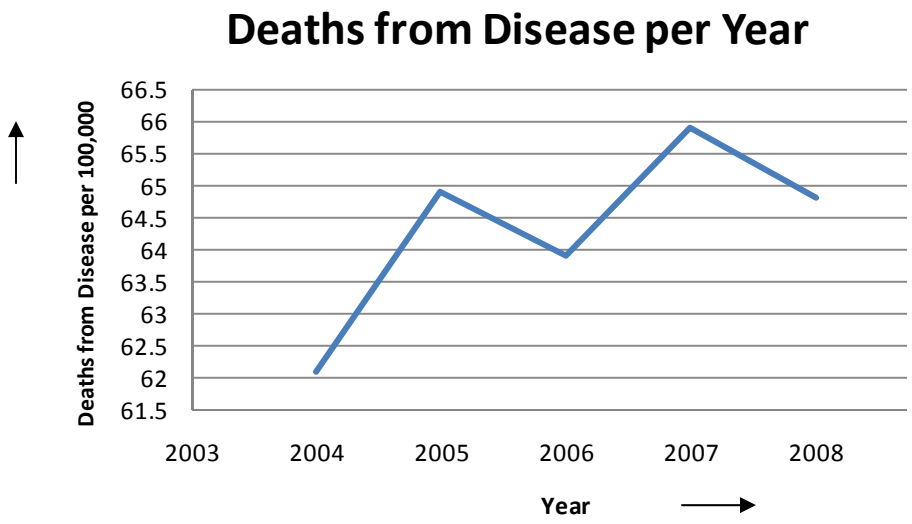

Figure 12: Trend for Deaths from Disease in the 4th Fleet AO

Year by year, the numbers alternatively improved and worsened, most likely because the effort to vaccinate and find cures for new strains of influenza and other communicable diseases lags just behind the emergence of those new strains. For communicable diseases, influenza was identified as the number one killer both in the 4th Fleet region and throughout the world, taking more lives annually than AIDS, malaria, or dengue fever.

The integrated study team was reluctant to offer a long term prediction based on only five years of data points. But in general, new diseases will continue to develop and mutate, and advances in medical cures and practice should also continue to improve. Major pandemics occur sporadically and are not readily predictable from historical data.

4. Drug Smuggling

Volumes of information, statistics and data were found regarding the global drug epidemic. Statistics particular to South America focused primarily on the production of cocaine products and the smuggling of cocaine. Heroin and marijuana are also produced in Latin and South America, but their production and use is dwarfed by the cocaine trade in mass. It was almost unnecessary to plot drug movement, production or seizures to see the scope of the problem. The United States military has been involved aggressively, since the 1980s, in an effort to reduce the transshipment of drugs into the US. A recent GAO report called into question the most current statistics and numbers produced by government agencies, which show a slight

reduction trend for drug seizures, claiming that the numbers were the result of pressure to show indications of progress.

In general, a Phase Zero force operating between 2020 and 2050 can certainly expect to be confronted with the drug trade, and with smuggling operations of all kinds. The slowing of smuggling of contraband into the U.S. has been a difficulty since the nation came into existence, and 30 years of active involvement to counter drugs has done little to stop the demand for drugs or the production and shipment of illicit drugs. Many of the small increases and decreases in the volume of production and seizures during the last three decades have been a result of the destruction of drug fields by fumigation. These actions are followed by the quick replanting of those fields, with full operation resuming within about two years. Other factors such as drought, weather patterns, and natural disasters also cause slight variations in the volume of production.

The plot below shows the non-linearity of the volume of seizures of drugs. The volume of drugs shipped successfully into America is not known, but seizures from the three largest producers of cocaine, since 1990, are shown below.

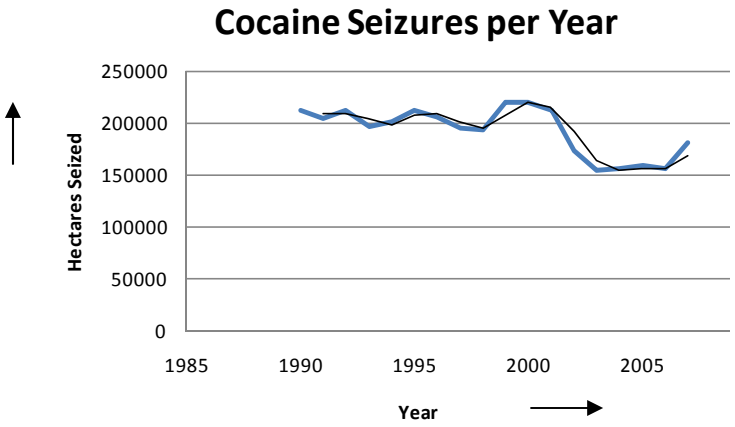

Figure 13: Trend for Cocaine Seizures in the 4th Fleet AO

The correlation coefficient for this plot was only 0.7, so the conclusion of a linear trend was not justified. However, even if the scale of the problem were decreasing slightly, the drug scourge in South America is such an immense problem, that it may take several more decades before clear improvement can be shown. The force being assembled for Phase Zero work through 2050 should be equipped to continue the effort.

5. Environmental Issues/Lack of Resources

Numerous environmental issues could significantly impact a future Phase Zero force. The issues that would likely have the greatest impact on operations in the 4th Fleet AO are atmospheric and oceanic temperature increases, fresh water shortages, and deforestation. The warming pattern around the globe has the potential to threaten littoral regions if water levels rise, and because more than 65% of the Latin American population lives near the coast, this factor should be considered. Water shortages have the potential to lead to increased migration, border and land disputes, mob violence and the domino effect of food shortages. Deforestation impacts both local and global populations as valuable and irreplaceable natural resources are diminished at an alarming rate. Of these three issues, deforestation was the most widely discussed and most often mentioned in the materials used for research, and appears to currently be the most critical environmental issue in the region.

Global temperature patterns are the subject of much study and much debate, and the debate led to a great deal of difference in the analysis. With no attention paid to either extreme, and simply considering the mean surface temperature between 1960 and 2000, there did appear to be a 0.4 degree Celsius increase to the earth's surface. Phase Zero planners should be aware of the possibility of rising ocean levels if the warming trend continues, but the likelihood of extreme changes between 2020 and 2050 is low. However, some studies indicated that severe weather could worsen in that time, as a result of warmer oceans.

Studies have also shown that water fouling is a result of heavy deforestation, and so the remaining factors, water scarcity, and deforestation, are considered together by tracking the trend in deforestation. Between 2000 and 2005, the highest deforestation rates in the region were in Brazil, Venezuela, and Bolivia. In these three countries alone, an average of 4.35 million hectares each year have been deforested, a five year total of 21.75 million hectares. That equates to 84,000 square miles, over two times the total size of the state of Ohio. As for trending, this is expected to turn around. The current rate cannot continue, simply because if it did, the resource would be completely exhausted. A full 50% of the Amazon forest has been lost in only the last 20 years. So between 2020 and 2050, the team anticipates that the results of heavy deforestation rather than deforestation itself will be the prevailing issue.

6. HIV/AIDS

The HIV virus and disease of AIDS were relatively new in the early 1980s and reliable documentation and tracking of new cases prior to 1980 was not available. In 2000, the Joint United Nations Program on AIDS published a chart with the number of new HIV cases each year, broken down by region. Additionally, an estimate of the numbers of cases world-wide and by region was made by an independent agency not affiliated with the UN, which gave a data point for 2000 that was consistent for more than just a single source. Using the estimate for 2000, and the given number of cases per year, the team was able to backfill a trend table to the year 1980. UN regional statistics were also available for year 2003, resulting in another data point.

The Kaiser Family Foundation (KFF) has conducted a risk projection of AIDS prevalence in Latin America for 2015, and came to an estimate of three million cases. This data point was used as a comparison after taking the trend forward as a linear slope from the most current, validated data, for 2003. The values for the KFF projection and the integrated study team calculated trend were within 0.2 million, so the KFF value was used to confirm the trend.

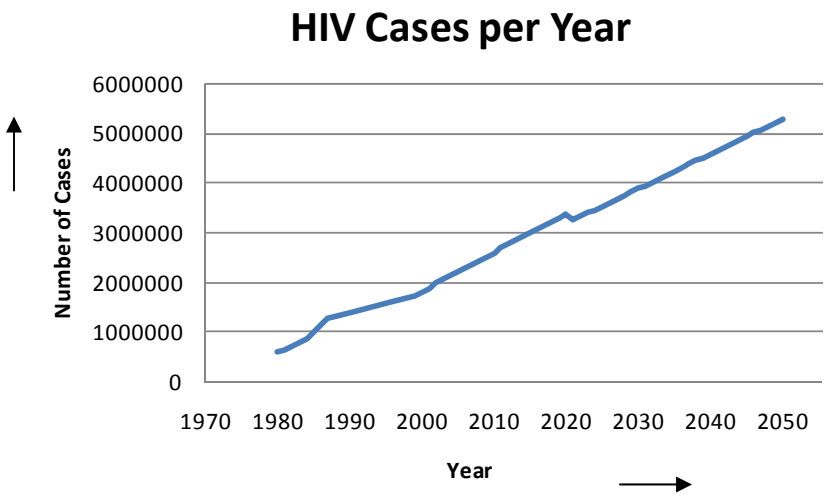

Figure 14: Trend for HIV/AIDS Cases in 4th Fleet AO

Based on this, the number of AIDS infections in the 4th Fleet AO in 2020 should be between 3.2 and 3.4 million, there could be as many as 5.3 million cases in 2050.

This trend considers the continuance of current conditions. If an effective vaccine or cure is produced prior to 2020 or 2050, the data would need to be reassessed. It should also be noted

that the AIDS prevalence rate in the Caribbean is considerably higher than that in Central and South America; this trend analysis was for the combination of both. Also, the global AIDS rate is not equalized, either, with Africa leading the number of new infections at a rate about 20 times greater than the Americas.

7. Human Smuggling/Trafficking

Globally, between 0.6 and 0.8 million persons are trafficked across international borders each year. The majority are destined for enslavement in the sex industry, while the others are placed into forced labor. In South and Central America, a number of nations are making some effort to curtail this atrocity. Because of the illegal nature of the problem, statistics are based on those persons rescued rather than making guesses at how many were not. Despite the efforts these countries are making, the number of persons rescued, and so arguably, the number of persons trafficked, continues to increase. Argentina, Bolivia, Brazil, Chile, Colombia, Paraguay, and Peru have all reported the number of persons rescued, sheltered and taken out of the human trafficking system. The team consolidated and plotted these numbers to look for a trend. The plot did show an increasing trend with a linear correlation coefficient of 0.91.

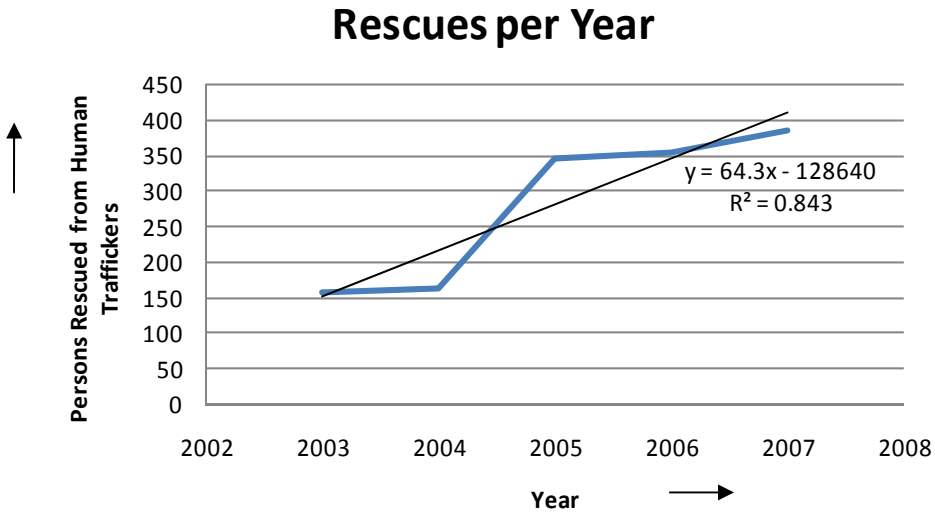

Figure 15: Trend for Human Trafficking in the 4th Fleet AO

If the present trend continues within the region of Latin and Central America, by the year 2050, there could possibly be as many as ten times the present number of persons indentured into forced labor and sexual exploitation. An increase is likely, because few countries are attempting

to end the practice, and those who have made efforts have not been able to diminish the flow of illegally trafficked persons.

8. Illegal, Unregulated, Unreported Fishing

Trending statistics were difficult to come by. Greater attention has been placed on the problem of over-fishing and illegal fishing in recent years, but long term tracking of the scope of the problem could not be found. Organizations who are policing the problem have studied how this trade is conducted. Those who engage in IUU fishing are essentially poachers. Unfortunately, several Central and South American countries contribute to the problem through the issuance of flags of convenience (FOC), whereby they allow poachers to fly their flag and conduct fishing operations. The flying of the flag fraudulently indicates that the operation is regulated and licensed, when in reality they are not, and the catches are not reported. FOCs can bring government officials hundreds or thousands per issuance, depending on the species the poachers are after.

The best recommendation for Phase Zero planners is to assume similar conditions through 2020 and 2050. With no statistical data to form a trend, we must evaluate the problem in light of current conditions. The fact that several nations continue to ignore and contribute to the problem balances with the increase in international attention and pressure to stop the practice of FOCs. Disputes over fishing rights have also been regular occurrences and are likely to continue and grow as fishing stocks become more depleted.

9. Kidnapping

In Latin America, it is important to distinguish between types of kidnapping and the motives. The human sex slave trade is one source of kidnapping, and is addressed as a separate threat. Groups such as FARC use kidnapping of persons as a way to increase revenue. 60% of the FARC income is from the 500 billion dollar a year “kidnapping industry” in Colombia. The kidnapping of wealthy locals and foreigners for large monetary rewards is a more specialized crime, and of the three types, is the best documented. Of the ten countries in the world with the highest reported numbers of kidnapping for ransom, five of them were located in the 4th Fleet AO: Colombia, Mexico, Brazil, Ecuador, and Venezuela. The integrated study team used these

figures to create an aggregate of the five countries and do a decade long trend of the number of kidnappings per year.

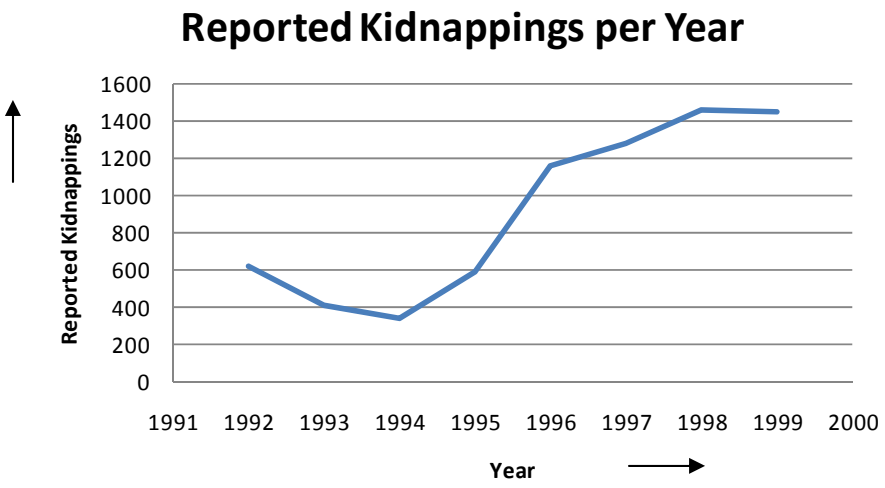

Figure 16: Trend for Kidnapping in the 4th Fleet AO

Reports in more recent years showed other countries to have sharply increasing kidnapping rates, namely Peru, Bolivia, and Paraguay, but did not distinguish between the high profile kidnap-for-ransom cases and the much more numerous human trafficking cases.

The linear correlation coefficient of the plotted data is +0.89, so the assumption of an increasing trend is reasonable. Many factors could contribute to changing this current trend between now and 2020 or 2050, and would require a new analysis. But with no other changing influences, the worst case scenario for the number of persons kidnapped for ransom each year could triple by 2020, and then double again by 2050.

10. Lack of Communications Infrastructure

No specific trend was evident while researching this issue, other than the fact that globally, nations continue to gradually improve their technology and communications networks. More affluent nations make these improvements at a faster rate than developing nations. There are a handful of nations, mostly in Africa, which showed little or no signs of development. In the 4th Fleet AO, the nations with the slowest rate of progress in improving the communications infrastructure were Haiti, Nicaragua, and Honduras. The integrated study team felt it was important for a Phase Zero force to know where these problems exist. However, they would

minimally affect a well-equipped force which has brought its own communications capability with them. But because it affects the quality of life of the population, and contributes to stability, the effects of poor communications infrastructure on overall regional stability should not be overlooked.

11. Lack of Human Rights/Freedom

The UN Human Development Index, which was also used to show the prevalence of human rights abuses in Latin America, did not list any 4th Fleet AO nations in the lowest tier. However, there were a few which ranked in the medium, or "lower than average" tier. Index scores which were based on a number of human rights factors were collected over the period from 1980. The UN does not present trends, but the integrated study team used data from the reports for these years to plot the progress of the medium tier nations in granting human rights.

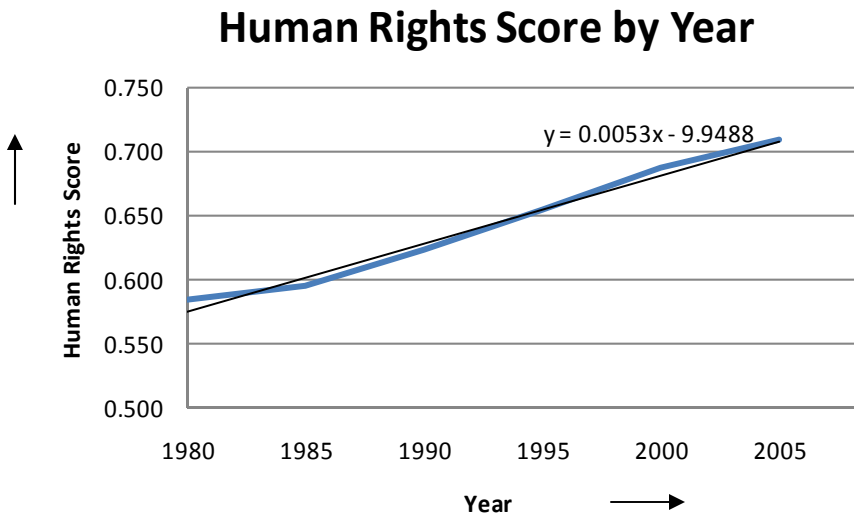

Figure 17: Trend for Human Rights in the 4th Fleet AO

Based on the average scores for the seven nations of Peru, the Dominican Republic, Paraguay, El Salvador, Bolivia, Guatemala, and Haiti, a trend was evident of a very slow but steady improvement in human rights. They were grouped together in the figure above, because when they were plotted in individual series, the plots overlaid each other in an indistinguishable consolidated line, with no outliers.

If the present trend should continue, equivalent scores for 2020 and 2050 would be about 0.72 and 0.75, respectively. While the number itself is only a linear projection, it has some meaning in reflecting that there should be an overall regional improvement. It is not possible, however, to foresee whether any particular nation will encounter unique events that would derail the current progress.

12. Money Laundering

There are several circumstances that made it difficult to find data for money laundering. Obviously, criminal organizations are going to work hard to avoid detection, and so the known incidents of money laundering are likely to be indicators of a much larger problem. Additionally, most traffickers in human smuggling, either for forced labor and prostitution, or as paid illegal migrant facilitators, launder their own money by exploiting the very persons they are smuggling. For example, a person kidnapped to be sold as a prostitute will be forced to open the account that accommodates their own sale.

The Financial Action Task Force has provided an excellent paper about the measures of money laundering, and the best indicator they suggest for estimating the volume of money laundering is something called Alternative Remittance Systems (ARS). These are basically tools used to transfer cash between parties in back to back transfers, and the associated fees and pay-outs can be an indicator of fraudulent exports and imports. Many professional money launderers also front mock insurance agencies as another tool for masking the movement of monies.

Because of the scarcity of available data, the integrated study team had only a 15 year period of ARS reporting for Latin America and the Caribbean, a major remittance corridor for these types of transactions. A plot of billions of US dollars per year yielded a trend line with two distinct slopes. The first decade, 1990 to 2000, was almost perfectly linear, with an average annual uptick of 1.44 billion. The period following 2000 had a much more positive slope of 4.41 billion per year. With no other visible trend, then, the team used the strategy of applying the greater slope to each decade through 2050, as a possible projection of the scope of money laundering in the 4th Fleet AO.

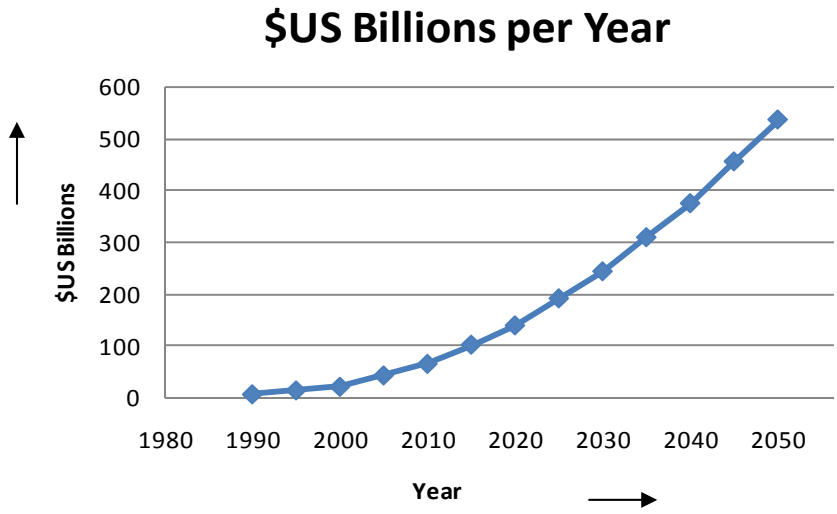

Figure 18: Trend for Money Laundering Activity in the 4th Fleet AO

Based on this estimation scheme, the potential amount of US dollars that will change hands in the Caribbean and Latin American remittance corridor in 2020 is 138 billion. The year 2050, should the trend continue, would be marked by ASR transfers of 535 billion dollars.

13. Natural Disasters

The cause for the increase in natural disasters during the 20th century has been the source of a great deal of political and scholastic debate. However, despite the underlying causes, the trend is real. The integrated study team used the available statistics regarding the number of natural disasters reported annually, back to 1950. Data was available as far back as about 1900, but reporting was more sporadic prior to 1950, and even that data set was sufficient to show a definite increasing trend. The reasons for this change do matter when making a projection, because one must consider whether those conditions are likely to change. There is a global push to turn back the negative effects of carbon emissions, waste disposal, the depletion of the ozone layer and deforestation, all of which may be making a contribution to the global changes happening today. However, there are those who argue that there are also natural causes contributing to global changes, and that these effects have long term cycles which have not yet been proven in even a century of record keeping. In an effort to find middle ground, the integrated study team plotted the current trend, which was a linear slope of about 10 more natural disasters occurring each year than occurred the previous year. Then, realizing both that positive

changes take time, and allowing that there are some natural patterns at play which could possibly exhibit a natural cyclical decline in events, a factor was applied to model a 10% improvement each decade, which would slow but not stop the increase that is evident in the recent numbers.

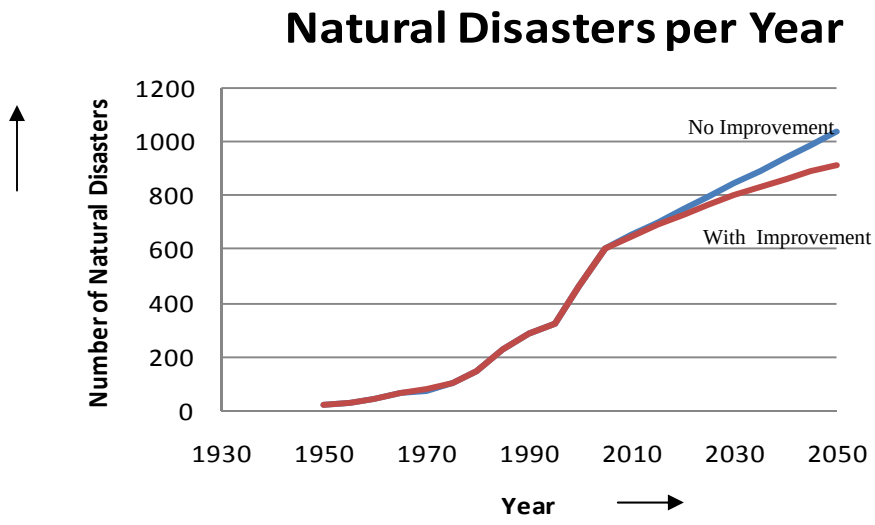

Figure 19: Trend for Natural Disasters in the 4th Fleet AO

Following the current trend with no intervention would lead to about 750 predicted (global) natural disasters in 2020 and 1,040 in the year 2050. Applying a factor for successful intervention, the trend would be for about 730 and 910 natural disasters, respectively, for 2020 and 2050. There are two other useful planning facts. One is that, on average, the region of the 4th Fleet experiences roughly 17% of the global natural disasters in any given year. And the other is that the region of the 7th Fleet is the location where the greatest numbers of casualties per disaster tend to occur.

14. Piracy

Several independent and government data sources were combined to tabulate and then plot the overall number of piracy incidents per year, for the years 1995 through 2008. Comparing multiple sources allowed the team to use several datasets to validate the others, as well as to fill in gaps between what was left out of reporting by individual sources.

Once the data was plotted, a linear trend was not evident, but the data plot showed a cyclical pattern of increasing and decreasing piracy activity.

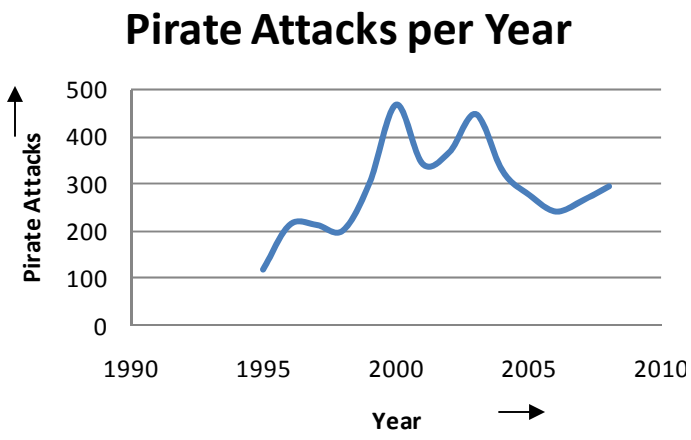

Figure 20: Trend for Piracy in the 4th Fleet AO

Using this method, the anticipated number of piracy incidents in 2020 and 2050 cannot be firmly predicted. This represents the trend only if current conditions were to continue. If international attention causes security forces to bear down on the pirates, the number of incidents would likely fall off, at least temporarily. In the brief data collection period of 15 years, the "peaks" in numbers of pirate attacks appeared at roughly five year cycles, which may be a result of the increase of security followed by periods of decreasing patrols. These ebbs and flows in nation's response to piracy and the impact on pirate activity appeared to follow this generally cyclical pattern. A slight downward trend is obvious in several individual data sources, and if maritime patrols remain vigilant, this trend will likely increase.

15. Social Instability

A calculation of social instability would be characterized by a very complex formula, with dozens of terms and factors. To keep a viable scope for this trending, the team focused first on the global patterns of war and other major catastrophes that displace indigenous people and result in large numbers of refugees. This was then compared to other factors, such as quality of life, access to modern infrastructure for communications and hygiene, and gender equity. For the Latin American and Caribbean arena, these factors have not shown a downward or upward trend for over a decade, and since their inclusion did nothing to change this trend, they were not included in the trend data. The factors with the most significant impact on social stability,

according to the National Intelligence Center (NIC) are internal conflicts stemming from state repression, religious and ethnic grievances, increasing migration pressures and/or indigenous protest movements. Again, these factors were more prevalent in the 4th Fleet AO than in other parts of the world, but have remained steady within the region. So because only the global data reflected a trend, the team used a combination of two factors: the number of occurrences that lead to displaced persons, and the number of refugees to produce a 15 year trend.

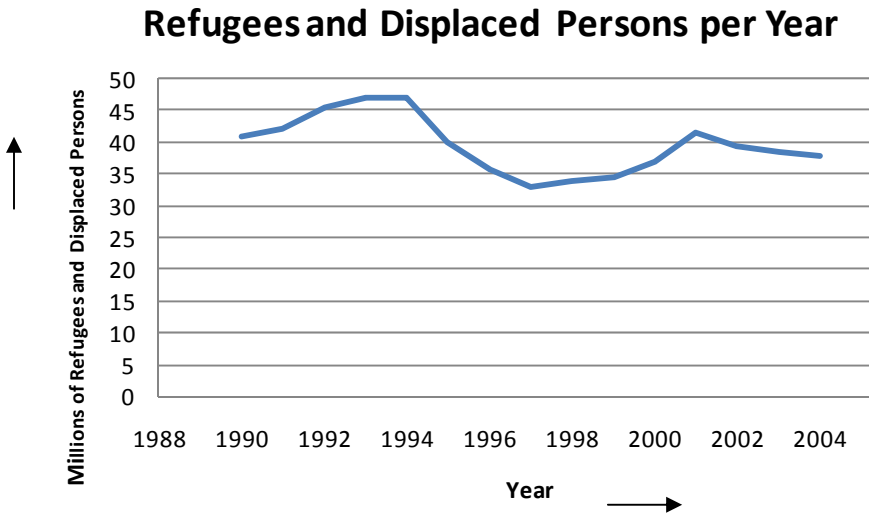

Figure 21: Trend for Global Social Instability

Given current conditions, and the continuance of potentially volatile regions in the 4th Fleet AO where the current peace is tenuous, the integrated study team was not prepared to predict a marked improvement for the region during the lifecycle of the Phase Zero fleet. Another look at the actual data showed a definite bimodal distribution about a mean of 39.6 million refugees. By affiliating this mean with the 1st and 3rd quartiles, we established a range of variance about the mean, which was a possible interpretation of the limited data we had for this evaluation. This yielded a range between 35.64 million and 43.56 million. Optimistically, a small improvement in social stability may be achieved, as there are serious efforts underway by many nations and organizations to effect this, but it is more likely that the current stability levels will endure for some time in Central and South America.

16. Terror Organizations

There were various open source databases and applications that gave some information about terrorism, usually with a lot of prefacing about the uncertainty of the statistics. This uncertainty was also evident when different sources presented widely different numbers. Research indicated that government sources typically published higher numbers of both attacks and casualties, although even government agencies showed some variance in their reporting. Blogs and civil organizations sometimes postulate that numbers provided by government sources are inflated in order to justify what they consider to be exorbitant funding to counter terrorism, and their numbers are consequently much lower. The integrated study team combed through open source information to find numbers of attacks per year and/or number of casualties per year, either globally or in the 4th Fleet region, covering any and all years between 1980 and 2008. In the few cases of conflicting reports, the lowest number provided by a government source was used in order to find the middle ground. After compiling figures from numerous sources into a single spreadsheet, the team only had a full set of numbers for the global number of attacks over the years 1983 to 2008. The plot is shown in figure 24:

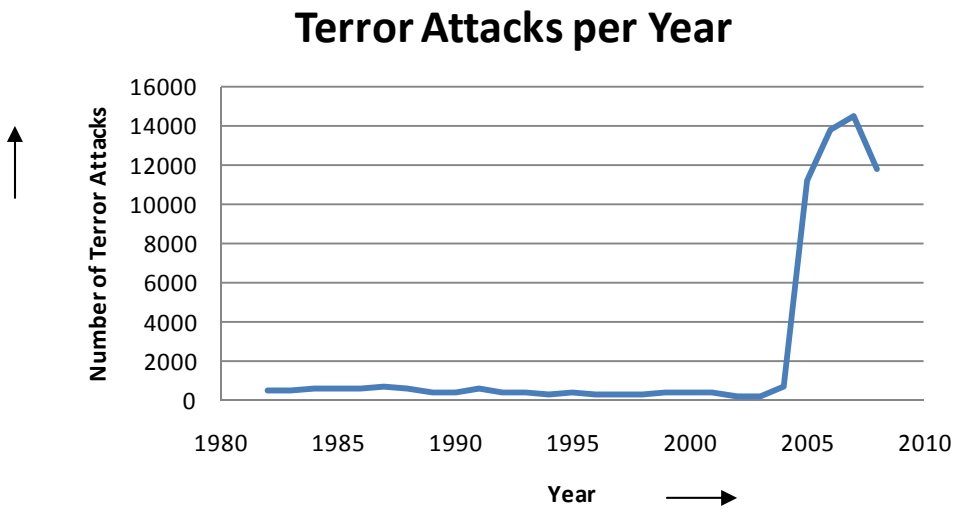

Figure 22: Trend for Global Terror Attacks

It is of note that the increase in global terrorism that coincided with the commitment of troops in Iraq and then Afghanistan, was about tenfold. The trend above cannot predict whether

sleeper cells are in place or are planning more large scale attacks in the future, but that threat cannot be overlooked or discounted.

Additionally, there was a limited amount of information available specifically about the Latin American region, provided by the US State Department. During the years 1998 to 2003, South America had the greatest number of terror attacks, but the fewest casualties. After the US invaded Iraq in 2003, the greatest number of both attacks and casualties shifted to the region of the Middle East, and has remained so. The plot of attacks verses casualties in Latin America, during the time period when that region was the global leader for the number of terror attacks, is shown below.

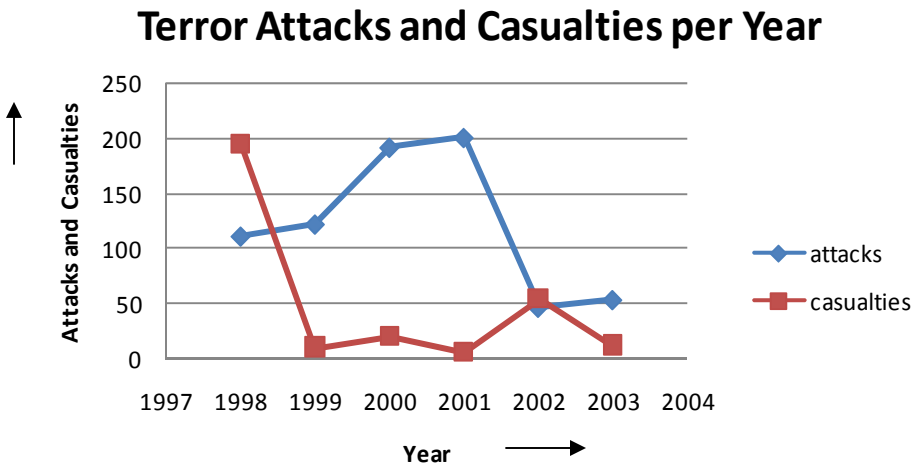

Figure 23: Trend for Terror Attacks and Casualties in 4th Fleet AO

Because of the volatile and changing nature of terrorism, the integrated study team did not attempt to predict the specific number, type or severity of attacks in the 2020 to 2050 timeframe, but rather offered some useful planning facts.

- Terror incidents in developing South American and Caribbean nations are typically unsophisticated and small scale. They are usually directed at local political opponents and their following.
- Terror attacks in developing South American and Caribbean nations are likely to produce a small ratio of casualties to attacks.

- The regional rate of incidents annually tends to remain relatively stable, and spikes in the number of global incidents are seldom caused by terror activity in the 4th Fleet AO.
- Spikes in the number of attacks per year in the 4th Fleet AO usually coincide with other local stability indicators, such as political instability, martial law, and economic uncertainty.
- Anti-American sentiment in Latin America and the Caribbean is low compared to other parts of the world, although there are obvious exceptions such as Venezuela, Cuba, and parts of Mexico. Americans are more likely to be targeted by opportunists than terrorists, as in the case where three American contractors were held for over a decade while their captors demanded ransom.
- Vigilance in employing standard force protection measures, as well as common sense, will generally be sufficient when conducting Phase Zero operations in the 4th Fleet AO. Additional measures, based on the local threat, should be evaluated during individual mission planning.

The integrated study team independently analyzed the 16 threats which have an impact, in one way or another, on our Phase Zero force. Certain threats were correlated with each other, either positively or negatively, but this did not necessarily mean they depended on each other and hence had a causal relationship between them, (known as "regression" in statistical terminology). For example, arms smuggling and money laundering were two distinct threats which the team identified, and they can be seen to be positively correlated in that they both show increasing trends to each other within the time frame being discussed. However, they probably did not have a direct causal relationship, such as the use of smuggled arms to conduct money laundering activities. Further analysis may be possible, which is beyond the scope of this report, to establish casual factors; for example, a relaxation in policing efforts which results to an increasing trend for both. This distinction between correlation, or trending behavior, and regression, cause and effect, should be kept in mind whenever a mission is being affected by a multitude of threats. This allowed the number of threats to be narrowed down into a smaller number, to be addressed in order to facilitate the force structure development and subsequent successful execution of our Phase Zero operations. Nevertheless, it is sufficient to say that although many of the threats discussed here may have been caused by a common set of disfunctionalities; political, social, law enforcement efforts; not all of them will had a regressive relationship to each other.

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V. FORCE STRUCTURE METHODOLOGY

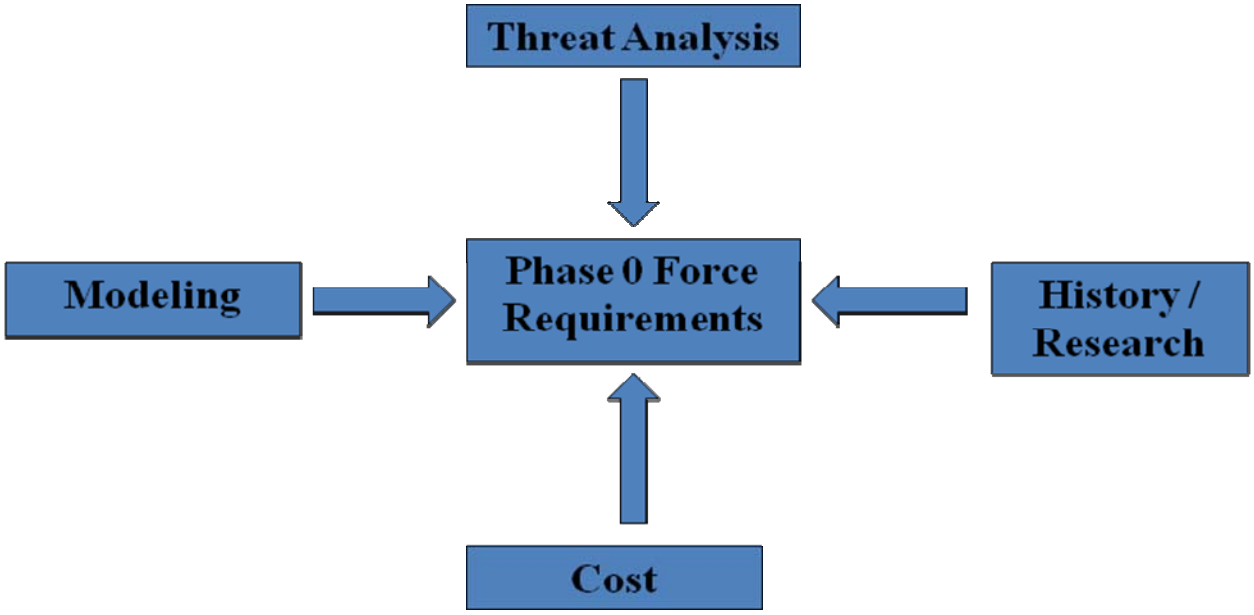


Figure 24: Force Structure Inputs

The figure above illustrates how the Force Structure team took inputs from the Modeling, Threat Analysis, Phase Zero Research and System's engineering teams to develop the Phase Zero force. The selection of the final force structure was based on the comparing of a Current Force using platforms that were in the inventory with a Future Force which could use a mix of both current platforms and future platforms that could be fielded by the year 2020. To develop these forces a method was used that could be broken down into six phases. The phases were:

1. Consolidate Background information required for modeling and force structure. Inputs were combined from the definition of Phase Zero, the requirements derived from the 3 mission groups, the threat study, and the cost estimation group. To do this the current and future platform capabilities were determined. A study was conducted during this phase to determine the most appropriate Unmanned Aerial Vehicle (UAV) that could be utilized by the future force.
2. Develop modelling scenarios and models to determine mission requirements. Perform cost analysis of current and future platforms. Research was conducted to develop a Marine force to be used for security during Civil Support mission to include the special equipment they would require.

3. Perform a gap analysis on forces currently used to execute Phase Zero operations to develop lessons learned that could be applied to the development of an appropriate future force structure.
4. Develop Current and Future Force structures that could meet all requirements of each mission for the lowest cost while taking into account information presented in the threat study.
5. Use modelling to fine tune the Current and Future Force structures, through optimization, to produce the final current and future force structures.
6. Conduct a study to determine the logistical requirements of the finalized force structures. Compare the capabilities and cost of the current force and the future force to establish a recommend regional security force capable of conducting Phase Zero operations for less than $1.5 billion per year procurement and operating cost.

During the first phase of force structure selection information on current platform capabilities (Appendix A) and future platform capabilities (Appendix B) were gathered from numerous sources. The Littoral Combat ship, DD(X) and the High Speed Vessel were considered only as future ships. The LCS 1 was commissioned in November 2008 [78] however, had not yet been fully integrated into the fleet. The DD(X) program was underway with an uncertain future and had not yet produced a ship that was currently serving in the fleet. HSV-2 Swift was serving with the Navy under a lease agreement but was not yet being built for the Navy. The Joint High speed vessel had been contracted out but not yet produced. Because the

The platforms considered in Appendix A were platforms which were currently in the fleet or are under construction. The platforms included were: LHD 1 Wasp Class, LHA 1 Tarawa Class, LPD 4 Austin Class, LPD 17 San Antonio class, LSD 49 Harpers Ferry Class, LSD 41 Whidbey Island Class, CVN 68 Nimitz Class, CG 47 Ticonderoga Class, DDG 51 Arleigh Burke Class (Flight I/II/IIA), FFG 7 Oliver Hazard Perry Class, LCS 1 Freedom Class, LCS 2 Independence Class, DDX Zumwalt Class, MCM 1 Avenger Class, LCC 19 Blue Ridge Class, PC 1 Cyclone Class, T-AKE Lewis and Clark Class, T-Ao 187 Henry J. Kaiser Class, TAOE 6 Supply class, SH-60B, SH-60F, HH-60H, MH-60S, MH-60R and CH-53E. With the exception of LCS 1, LCS 2 and DDX these platforms were considered for the current force.

[78] USS Freedom history, http://www.freedom.navy.mil/site%20pages/history.aspx, accessed on 21 May 2009

The platforms considered in Appendix B were platforms which were not currently being built in the United States for the Navy however, where determined to be producible, capable of being fielded by 2020, and capable of having a positive impact on the Phase Zero mission. The platforms included were: LHA(R) (Based on current LHA 6 America design), HSV(based on HSV 2 Swift characteristics), Visby Class corvette, Green Water patrol craft, M80 Stiletto, Fast Response Cutter, and the CH-53K.

To be considered a future platform, the ship or aircraft had to be capable of being fielded by the year 2020. Ships of other nations were taken into consideration. The procurement costs of these foreign ships were assumed to be the same as the procurement cost paid by the originating nation. Several programs were deemed to have a low probability of being produced and out in the fleet by 2020, thus were not included in the force. A number of these platforms, if considered, would have had an impact on the recommended Future Force. One of these platforms in particular was the Afloat Forward Staging Base concept. It was not considered as a future platform because the ship was only in concept development and no funding for any of its multiple designs had been allocated.

Also during this initial information gathering phase, research was conducted on UAVs to select the most appropriate ones for the future force. This study focused on the capabilities of each UAV option, that could be fielded by 2020, as well as the ability of the aircraft to be supported by the future force. It was assumed that any UAV used would be required to deploy with the force and therefore would not be able to use a land base. The selection of a UAV in this phase allowed a model developed that focused on the use on one UAV type in order to determine the number required.

The second phase of force structure selection was to develop mission scenarios and models to determine the mission requirements. Three missions were selected from the thirteen original Phase Zero mission based on the results of perception mapping. Detailed scenarios were developed for these three missions and the mission requirements were developed through the use of analytical models as well as simulation. Also during this phase, a cost analysis was performed to determine the annualized cost of each platform. This cost consisted of the procurement cost, corrected to 2008 dollars, and the operational and support costs.

With the requirements developed for the three missions, a gap analysis was performed for the historic force. The force looked at was the Partnership of the Americas 2007 (POA 2007)

which deployed to conduct Phase Zero-like operations. This force consisted of one LSD 49 class, one DDG 51 class, and two FFG 7 class ships. From this analysis, capability gaps and excess capabilities were determined to develop lessons learned that could be applied to the force selection process.

The fourth phase of force structure selection was to develop Current and Future Force structures that could meet all mission requirements for the lowest cost, while taking into account the information contained in the future threat study. With the requirements for the Civil Support mission having been broken down into three severities, three possible force configurations were developed for both the force utilizing only current platforms and for the force utilizing current and future platforms. This gave a total of six force structures each of which would be able to completely fulfill all mission requirements for the Civil Support, Anti-smuggling, and Information Sharing missions. The two outlying missions (Non-combatant Evacuation and Freedom of Navigation) were considered and integrated into the requirements. The annualized cost of each of these forces was then determined and compared.

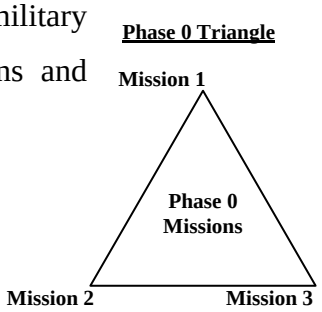
During fifth phase of the force structure selection process, the preliminary force structure developed in phase three was fine tuned by using models. An optimization was developed to attempt to find the optimal mix of platforms that fulfilled all mission requirements. The lessons learned from this optimization were taken into account to develop the final force structure.

The final phase of the force selection was a comparison of the final force using only current platforms and the final force using a mix of current and future platforms. This was performed to determine if the new platforms under development were a beneficial addition to the future Phase Zero force or if the mission could be carried out efficiently using only current platforms. This analysis looked at the cost of each option and the capabilities that each force brought to the Phase Zero mission environment. During this phase logistical requirements for the forces were developed and compared. This information was used to determine the resupply frequency required by the potential forces.

A. MISSIONS, SCENARIOS AND METHODOLOGY

1. Project Methodology and Choice of Missions

Phase Zero missions encompass a wide range of military operations. A preliminary analysis of general Phase 0 missions and



aspects produced 3 representative missions, which together try to span the majority of Phase 0 missions ("Phase 0 Triangle"). This project was then scoped to include only these three prominent and representative missions the force is likely to face in the near future.

As a result of perception mapping, the missions chosen are Anti-smuggling, Civil Support, and Information Sharing. Current force structure will be revised to optimally handle just these 3 missions in order to stay focused and productive, while the final conclusions will extend to the full breadth of Phase 0 missions based on the preliminary missions analysis.

2. Missions and Scenarios construction methodology

In order to make any significant progress and to produce applicative analysis, the chosen 3 missions were defined, and several specific scenarios must be agreed on. We elaborated on each of the 3 missions, to include the general mission description, characteristic parameters of each mission, and possible values each parameter can assume. A number of specific scenarios will then be constructed for each mission by simply assigning a value for each parameter.
The general structure is of the following form:

I. Mission 1 Title
- a. Mission Description
- b. Mission Parameters
  1. **Parameter 1** *(possible assigned values)*
  2. **Parameter 2**
     - *2.1* Parameter 2.1 *(possible assigned values)*
     - *2.2* Parameter 2.2 *(possible assigned values)*
  3. **Parameter 3** *(possible assigned values)*

II. Mission 2 Title
- a. …

B. THE 3 MISSIONS

1. Civil Support

a. The Phase Zero force is required to provide emergent Civil Support in the context of natural disasters. This is not intended as complete civil relief but rather a temporary critical support while a more suitable and substantial force can be formed and dispatched. Examples of critical support are limited food

delivery, limited clean water supply, and limited electrical power (portable generation for hospitals, etc.)

b. Mission Parameters
    1. **MOE**
        1.1 Supplied Delivered [79]
            1.1.1 Food: 2.5lbs per person per day
            1.1.2 Water: ½ gal per person per day
            1.1.3 Shelter: 50% of population affected
        1.2 Personnel [80]
            1.2.1 Affected population assisted: Tri(50k,100k,150k)
            1.2.2 Seriously injured medical assistance: 5% of affected
    2. **MOP**
        2.1 Supplied Delivered
            2.1.1 First supplies delivered within 24 hours
            2.1.2 All supplies delivered within 5 days
        2.2 Personnel [81]
            2.2.1 "Camp" sites provide for 20k displaced personnel
            2.2.2 One doctor and four nurses for every 400 injured
            2.2.3 One surgeon and 2 assistants for every 800 injured in addition to doctors and nurses
            2.2.4 50% of doctors accessed off site via telecommunications
        2.3 Overall [82]
            2.3.1 Five day endurance prior to subsequent force arrival
            2.3.2 50 mile penetration inland from the sea
            2.3.3 Sea based command center with 200nm communications range
            2.3.4 Adequate communications capability to support operations including remote doctor telecom
    3. **Constraints**
        3.1 Food: 25lb 10 meal case occupies 1.02 ft^3, 1237lbs and 58.1 ft^3 per pallet [83]
        3.2 Water: Transported via collapsible bladders. Each bladder has a 1000 gallon capacity, can be collapsed and stored 2 ft^3 , each bladder can be reused 75% of the time. Bladders can be filled less than max capacity for airlift weight restrictions. [84]
        3.3 Water Treatment: All water supplied ashore will be supplied from the ships water treatment system. Since these treatment systems require a minimum standoff from shore to preclude ingestion of

[79] "DOD Humanitarian Daily Ration" www.dsca.mil/programs/HA/2009/HUMANITARIAN%20DAILY%20RATIONS.pdf accessed 18 May 2009
[80] "Em-Database" Disasters in Latin America http://www.emdat.be/ accessed 1 April 2009
[81] Study of historic disaster response
[82] Derived from NOC 2006
[83] "DOD Humanitarian Daily Ration" www.dsca.mil/programs/HA/2009/HUMANITARIAN%20DAILY%20RATIONS.pdf accessed 18 May 2009
[84] http://store.interstateproducts.com/water_bladders.htm?gclid=CICcurnexpoCFRwDagodY3Y9rg

brackish near-shore waters, an acceptable standoff location for ship station location was set at 5Nm. This assumes a worst case situation where portable water purification capability is not available.

3.4 Transportation to shore: All supplies will be transported from Sea to Shore via air assets that are organic to the force during daytime hours only.

3.5 Storage on ship: Storage should be in one of the containers listed in 3.8. Ideally, at least 95 percent of all cargo should be palletized. Care must be exercised to ensure standard 40 inch x 48 inch military pallets be used and should not exceed the height of 52 inches in order to use the conveyor system. [85]

3.6 Storage space Utilization: Assume a combat loading utilization factor of 0.8 for cargo storage.

3.7 Conversion of Vehicle space to Cargo space: The vehicle storage spaces can be utilized for storage of standard Milvan and Conex containers. Assume a maximum of 0.5 deck space utilization factor for conversion of vehicle space due to access requirements. Milvan and Conex containers cannot be stacked in vehicle storage spaces.

3.8 Containers: The Department of Defense has purchased containers to better transport equipment and supplies. There are several types of containers starting from the smallest to the largest. [86]

(1) Insert- 10"x17"x45"
(2) Palcon-40"x48"
(3) Quadcon- 82"x57.5"x96
(4) Halfcon-8'x8'x10
(5) Sixcon -4'x6'
(6) Milvan- 8'x8'x20'
(7) Conex-8'x8'x40'

3.9 Transportation and security on shore: Transportation and security on shore will be provided by Non Government Organizations and Interagency support. If capacity available, the Phase Zero force will support the transportation and security on shore however, this will not be a mission the force will be designed to complete.

3.10 Air assets: Only MV-22, MH-60 and CH-53 will be considered as capable of transporting supplies and will have an availability of 85%.

3.11 MV-22: Has a maximum sling capacity of 10,000 lbs and can transport 24 passengers. Maximum speed with sling load 100 knts, maximum speed without sling load 241 knts. These numbers are as started in Appendix A, Current Force Capabilities.

3.12 SH-60S: Has a maximum sling capacity of 4,500 lbs and can transport 12 passengers. Maximum speed with sling load 80 knts,

[85] United States Marine Corps logistics operation school, Marine Corps combat service support school, "Load cargo on ships student outline"

[86] United States Marine Corps logistics operation school, Marine Corps combat service support school, "Load cargo on ships student outline"

maximum speed without sling load 147 knts. These numbers are as started in Appendix A, Current Force Capabilities.

3.13 CH-53K: Has a maximum sling capacity of 27,000 lbs and can transport 55 passengers. Maximum speed with sling load 80 knts, maximum speed without sling load 170 knts. These numbers are as started in Appendix B, Future Force Capabilities.

3.14 Shelter: "Camp" site requires 150klbs packaged in 6 standard shipping containers

3.15 Doctors/nurses: require 3klbs of supply equipment

3.16 Surgeons/assistants: require 5klbs of supply equipment

4. **Location**

4.1 Region: Any

4.2 Country: Any

4.3 Weather/Tide consideration: Area specific

4.4 Ships position: 5 miles off the cost

4.5 Penetration range: up to 50 miles inland

4.6 Port availability: No port facilities available

4.7 Water depth: Navigable open water with shallow littoral

5. **Resistance**

5.1 Government: Civil instability, no government assistance

5.2 Naval capability: None

c. Desired modeling output

1. Required amount of ship internal storage required to accomplish mission (ft^3)
2. Number and type of aircraft required to transport material and personnel from sea to shore.
3. Number of personnel supported onboard ships.

2. Anti-smuggling

a. Based on reference research, the SEA-15 Anti-smuggling study will focus on the Eastern Pacific vector of cocaine smuggling. The path is from Columbia to numerous points on the western coast of Mexico. The cocaine then travels by several conveyances, primarily land based to the United States. SEA-15 will focus solely on the maritime and air component in the Eastern Pacific.

b. Mission Parameters

1. **MOE**

1.1 50% reduction in cocaine shipments (tonnage)

1.2 Seizure of cocaine is a public relations goal, secondary to reduction

2. **MOP**

2.1 Interdiction to correspond with cocaine reduction goal

2.2 Monthly tactics adaptation based on intelligence collected (steady reduction rather than initial reduction followed by opposition reconfiguration)

2.3 Apprehension of smugglers is secondary to reduction goal

2.4 Acquire equipment for analysis and posturing efforts

3. **Location**
   3.1 Area: Eastern Pacific Vector. Area is 250 miles wide. All targets will travel 90^{o}relative to asset axis.
   3.2 Country: Columbia → Mexico
   3.3 Weather/Tide consideration: all nominal conditions
   3.4 Penetration range: maritime only, assume Mexican cooperation, therefore limit is coastline
   3.5 Port availability: Operation from CONUS with Mexican port support
   3.6 Water depth: IAW with regional parameters
   3.7 Territory: unlimited due to Mexican cooperation
4. **Shipping**
   4.1 Traffic density: nominal
   4.2 Type: commercial and pleasure craft
5. **Opposition**
   5.1 Go Fasters
      5.1.1 Speed: Tria(25,50,80) kts
      5.1.2 Capacity: Tria(1/4,1/2,1) tons
      5.1.3 RCS: 0
      5.1.4 Visual detection by ship: linear decreasing with range up to 14kyds. This detection range is based on visual horizon and average ships height of eye.
      5.1.5 Visual detection by aircraft: Based on Triangular distributed lateral range curve taking into account aircrafts search altitude.
      5.1.6 Range: 400nm
      5.1.7 Acoustic source level: Tria(130,140,150) dB @ 1 yd
      5.1.8 Modus Operandi: Speed Run
      5.1.9 Weapons: Small arms
      5.1.10 Hostility: Evasion, possible on interdiction
      5.1.11 Sensors: Optical, commercial search radar, GPS
      5.1.12 Intelligence: Highly adaptive
      5.1.13 Identification: All contacts will be identified based on contacts actions and characteristics (i.e. speed). All contacts identified as Go Fasts will be intercepted. Identification is 100% accurate.
      5.1.14 Boarding: Boardings were not specifically addressed in the context of this study. Previous studies have been conducted (e.g. SEA-15: MIO in Logistically Barren Environments).
   5.2 Self Propelled Semi-Submersible(SPSS) semi submersible of narco sub
      5.2.1 Speed: Tria(4,10,12) kts Based on information by the Joint Interagency Task Force South fact sheet on SPSS.
      5.2.2 Capacity: Tria(2,4,15) tons. Based on information by the Joint Interagency Task Force South fact sheet on SPSS.

5.2.3 RCS: 0. Based on information by the Joint Interagency Task Force South fact sheet on SPSS.
5.2.4 Visual detection by ship: linear decreasing with range up to 3kyds. This detection range is based on visual horizon and average ships height of eye.
5.2.5 Visual detection by aircraft: Based on Triangular distributed lateral range curve taking into account aircrafts search altitude.
5.2.6 All aircraft (MV-22, SH-60, CH-53K, MQ-8) are equal at detection
5.2.7 Range: 2000nm. Based on information by the Joint Interagency Task Force South fact sheet on SPSS.
5.2.8 Acoustic source level: Tria(130,160,180) dB @1yd
5.2.9 Modus Operandi: Evasion by stealth
5.2.10 Weapons: None, small arms possible
5.2.11 Hostility: Evasion
5.2.12 Sensors: Optical, possible commercial search radar, GPS
5.2.13 Intelligence: Highly adaptive
5.2.14 Identification: Detection equals identification

5.3 Light Aircraft (modeled as Gulfstream G650) [87]
5.3.1 Speed: 488kts
5.3.2 Capacity: Tria(1/4,3/2,3) tons
5.3.3 RCS: Tria(1,10,50) m^2
5.3.4 Range: 7000nm
5.3.5 Altitude: 20,000'
5.3.6 Modus Operandi: Speed
5.3.7 Weapons: None, small arms possible
5.3.8 Hostility: Evasion
5.3.9 Sensors: Optical, Radar, GPS
5.3.10 Intelligence: Highly adaptive
5.3.11 Detection: Based on radar coverage of Area with air contacts being uniformly distributed across the area.
5.3.12 Identification: VHF hail, transponder squawk, local intelligence, filed flight plan, course

5.4 Overall Breakdown
5.4.1 Total cocaine smuggling: 2000 tons. Based on information presented in the National Drug Threat Assessment by the National Drug Intelligence Center the quantity of cocaine smuggled from South America was extrapolated by looking at past trends.
5.4.2 Eastern Pacific vector accounts for 69% [88]
5.4.3 Composition: 10/50/40 split between go fasters/semi-submersibles/light aircraft

[87] Gulfstream company, Gulfstream G650 Technical Specifications http://www.gulfstream.com/gulfstreamg650/ accessed 6 May 2009
[88] U.S. Department of Justice, National Drug Intelligence Center "National Drug Threat Assessment 2009"

5.4.4 Range from coast: Tria(50,250,500) nm

5.5 Constraints

5.5.1 Interdiction: RHIB required if ownship is large (>DDG). Only surface vessels can perform interdiction.

5.5.2 Helo/UAV cannot board

5.5.3 No shots fired

5.5.4 Only track and ID light aircraft. Interdiction will be done by local authorities after a handoff from the Phase Zero force. This handoff is 100% effective.

6. **Local government**

6.1 Status: stable, moderate corruption of authorities

6.2 Stand: active counter-smuggling operations, cooperative with U.S. Navy (USN) and U.S. Coast Guard (USCG), intergovernmental and interagency support

6.3 Capabilities: coastal and naval craft, land based radar

c. Desired modeling output

1. Speed of interceptors desired
2. Radar range desired for detection of Air contacts
3. Number of aircraft required

3. Information Sharing

a. The Phase Zero force is required to share information among USN assets as well as with partner nations and organizations. This information sharing is critical to the successful completion of several other missions such as the handoff required between the Phase Zero force and local authorities in anti smuggling and getting assistance from doctors via video teleconference for Civil Support. To accomplish this capability, hardware and software infrastructure is required. The C2 architecture described in Section VI describes the implementation of C2 objectives.

b. Mission Parameters

1. **MOE**

1.1 100% data handling of critical mission traffic

2.1 Number of critical data packets lost due to poor connectivity

3.1 Secured communications for intelligence sensitive information

4.1 Space available and hardware present on platform for information analysis work center

5.1 100% of reportable events shared

2. **MOP**

1.1 Data bandwidth

2.1.1 Email:

2.1.1.1 Light Exchange: Average message size is 20KB; 10 sent per hour

2.1.1.2 Medium Exchange: Average message size is 50 KB; 30 sent per hour

2.1.1.3 Heavy Exchange: Average message size is 50 KB; 60 sent per hour

2.1.2 Peer to Peer:
2.1.2.1 Light Exchange: Average message size is 200 MB; 2 sent per hour
2.1.2.2 Medium Exchange: Average message size is 500 MB; 5 sent per hour
2.1.2.3 Heavy Exchange: Average message size is 500 MB; 15 sent per hour
2.1.3 UAV
2.1.3.1 Total required per UAV based on situational Awareness senor parameters. Transfer rate will be required from the time the aircraft takes off until it lands and will be the sum of the parameters.
2.1.3.2 Situational Awareness Sensor data transfer information contained in Table 1.

2.2 Information collected
2.2.1 Electronic Sensors
2.2.1.1 RADAR – cover area up to 500 NM^2 and maintain 200 contacts
2.2.1.2 EO/FLIR – process images from 12 sources simultaneously
2.2.1.3 ES – collect information from entire RF band from all ships in the force
2.2.2 Human intelligence – share all applicable reports
2.2.3 Data Fusion – reports from differing sources will be to merged to represent one overall picture

3. **Constraints**

1.1 Data throughput during Anti-smuggling operations: During an intercept there will be light exchange volume, between intercepts medium exchange volume

2.1 Data throughput during Civil Support missions: Medium volume exchange from zero hour to hour 24. Heavy exchange volume from hour 24 until mission complete.

3.1 All communications within the force will principally be line of sight communications.

4.1 SATCOM can be used to communicate between stations out of line of sight and to ground stations.

5.1 UAVs can be used as a communications node for sea to shore communications utilizing UHF/VHF and L-band for data transfer

6.1 As number of connected users increases, possible connections increase at a factorial rate

7.1 Sharing information with allies using adaptable interfaces

8.1 Local storage of information limited to shipboard capabilities

4. **Location**

1.1 All regions

5. **Opposition**

1.1 Regional communications denial technologies

a. Narrowband Jammers
b. Denial of Service type attacks
c. Attempted unauthorized connections

From UAV	ATC voice	ATC Data	Flight Control	System Control	Platform Health Monitoring	Navigation Info	Auto collision avoidance system	Situational Awareness (sensors)	Auto Dependence Surveillance
Sense Data								1.2 kbps	
Flight Control			1.2 kbps						
System Control				1.2 kbps					
Flight Monitoring					1.2 kbps				
Navigation					1.2	kbps			
ATC Voice & Data	2.4 kbps	32 kbp							
Situational Awareness							Y	2.4 kbps	
Auto Dependance Surveillance									80 kbps

Table 43: Situational Awareness Sensor Data Rate [89]

C. UAV TRADE STUDY

Phase Zero missions required that the force have knowledge of its surrounding environment. To gain maritime domain awareness, the Phase Zero force needed airborne surveillance assets to increase its sensor range beyond the horizon viewable from shipboard sensors. Unmanned Aerial Vehicles (UAVs) provided a cost effective method to extend sensor surveillance and maintain awareness. UAVs ranged in complexity from small hand launched devices to the 116 ft wingspan RQ-4 Global Hawk. The inventory of UAVs were broken down into two large general categories: complex long range UAVs and smaller short range tactical UAVs. The larger class of UAVs included the MQ-1 Predator and RQ-4 Global Hawk. These platforms had unrefueled ranges of several hundred to several thousand miles and were capable of performing prolonged surveillance and imagery missions. [90] The MQ-9 Reaper, an updated

[89] http://www.unsysinst.org/html/bandwidth_charts.html accessed on 18 May 2009.
[90] US Air Force Fact File. Available online http://www.af.mil/information/factsheets/index.asp accessed on 19May2009

version of the Predator had weapons delivery capabilities. [91] Small tactical UAVs had similar on station times to their larger brethren, but were generally payload limited to less the 100 pounds.

A specialized subset of UAVs included those that could be operated from ships. Since launching and recovering aboard ship presented unique challenges, most land-based UAVs were not considered modifiable to operate from ships. The larger Predators and Global Hawks required thousands of feet of runway. [92] The smaller tactical UAVs such as Pioneer and Dragon Eye were simple to launch but usually required complex arresting gear to land. Since their payloads were already limited, adding hardware to allow the UAV to track and fly and intercept a moving target would have further reduced their usefulness.

The RQ-8 Fire Scout was designed with shipboard operations in mind. Three folded RQ-8s fit in the folded footprint of one SH-60 which allowed maximal use of current shipboard space. Sensors for the RQ-8 included the BRITE Star II FLIR/EO system, allowing the Fire Scout to locate and identify various targets. Targets could be identified out to 100 NM and detected with classification out to 150NM. This airborne capability greatly extended the sensor reach of the shipboard platform. With the planned addition of a maritime multimode RADAR, the Fire Scout was capable of maintaining awareness over an expansive maritime area. [93]

Because of its unique design features, the Fire scout was chosen as the UAV for the Phase Zero force. The larger Predator and Global Hawk UAVs were capable of performing required detection and identification, but because they could not operate from ships, were excluded from consideration. The small UAVs lacked the payload capacity to carry FLIR and RADAR which is required for our missions.

D. MODELING AND SIMULATION

Of the three missions selected by the multidimensional scaling process, the Civil Support and Anti-smuggling missions lent themselves to more extensive quantitative analysis. The goal of modeling and simulation was to translate the nebulous overarching concepts into quantifiable requirements that could be used by the force structure team to generate force structures capable

[91] US Air Force Fact File MQ-9 Reaper Unmanned Aircraft System. Available online http://www.af.mil/information/factsheets/factsheet.asp?id=6405 accessed on 19 May2009
[92] US Air Force Fact File. Available online http://www.af.mil/information/factsheets/index.asp accessed on 19May2009
[93] RQ-8 Firescout February 2009. USN Multi-Mission Tactical Air Systems Program Office. Available onlinehttp://www.navair.navy.mil/pma266/brief/FINAL%20Fire%20Scout%20Public%20Release%20Brief%20020409.pdf accessed on 19May2009

of completing Phase Zero. The first task in this process was to assign quantitative values onto the mission specifications. These parameters are outlined in Missions, Scenarios, and Methodology (Section V.A).

1. Civil Support

Since the Civil Support parameters were based on linear relationships and multiplicative factors there was no need to use a complex simulation based approach to extract requirements. This lent it to simple spreadsheet based computation. The basis for the three mission severities were the varying numbers of affected population. Also of note is that the penetration distance also varied among the three mission severities with the most severe mission having the greatest penetration distance. From these parameters physical characteristics about potential forces were extrapolated.

Concept of Operations and Lift Assumptions:

Civil Support provisions are stored aboard ship and transported to the relief site via air transport. Although the Navy possessed assets capable of transporting supplies over water the relief site (e.g. LCU, LCAC, etc.), these platforms were not used since we took a worst case scenario approach to all assumptions. Water provided was to be produced aboard ship by either organic or specially equipped water purification equipment and then transported by aircraft to the relief site. All supplies were required to be delivered as under slung loads below the air asset. This was the standard modus operandi for U.S. Navy VERTREP (vertical replenishment) operations. This method allowed more rapid sortie turnover since the air asset was not required to land, chock, and chain to the supporting platform deck. The force was required to deliver the first supplies after twenty-four hours notice. Since it was be expected that the Phase Zero force is able to sustain 100% capacity instantaneously, the assumption was made that supply rates would ramp up to full capacity over a five day period. The total amount of supplies delivered was then simply the integral of the rate curve over the total of five days. While this ramp up period made logistical and operational sense, it also reduced the total quantity delivered and thus the stress on shipboard storage requirements.

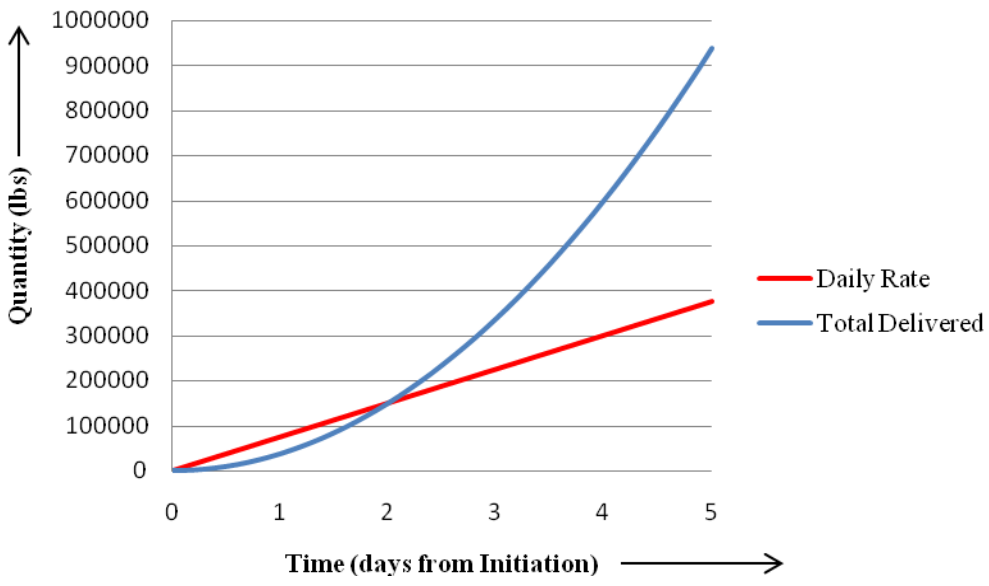


Figure 26: Daily Rate Schedule

The factors detailing the specifications to breakdown food into storage and weight requirements are described in Missions, Scenarios, and Methodology (Section V.A.). These specifications were used to generate ship storage and transportation requirements. Since all water was generated aboard ship, the only storage requirement for water was from the storage required for collapsible water bladders used to transport the water ashore. Weight requirements for water were based on eight pounds per gallon nominal fresh water density.

The number of medical personnel were based on ratios related to the total number of expected injured population outlined in the Missions, Scenarios, and Methodology section (V.A.). Transporting of personnel did require landing of the air asset resulting in a longer loading and unloading time requirement on personnel sorties.

Equipment sorties were also under slung loads. Many references were made in source documents to "standard" shipping containers. The "standard" shipping container was taken to be 8' x 8' x 20'[94]. Military Quadcons were used for transporting Marine support equipment and were based on one quarter (hence Quadcon) of a standard 20' shipping container. High Mobility Multipurpose Wheeled Vehicles (HMMWVs), floodlights, and generator sets were also deemed necessary for shore support. For airlift purposes, we determined that two pieces of these

[94] http://www.srinternational.com/standard_containers.htm, accessed May 01, 2009

equipment could be under slung from either the Super Stallion Multipurpose Helicopter (MH-53K) or the Multipurpose Tilt-Rotor Osprey aircraft (MV-22). This was based on the lift capacity of the platforms but more importantly the bulk that must be netted, chained or otherwise gathered in order to sling the load. For example, the MH-53K had a significant lift capacity that could carry up to six HMMWVs. However, it was not practical to expect such a bulk load to be carried. Suggestions toward these limitations were presented and evaluated by experienced surface warfare officers and aviators within the project. The SH-60 was also assumed to carry no HMMWVs. Although a light weight HMMWV variant was used and that weight was slightly under the SH-60 rated capacity, subject matter expert input caused this option to be dismissed.

Sortie Parameters and Assumptions:

Return speeds from the relief site back to the naval platform were assumed to be the nominal cruise speed of the aircraft. Cargo delivery speeds with under slung loads were estimated by subject matter expert input taking into account aerodynamic factors and platform flight characteristics. For passenger sorties, the cruise speeds were used for both legs of the trip since there was no under slung load. Availability was estimated to be 0.85 for all aircraft. Much debate surrounded this availability estimate though overall it was accepted, most importantly by officers with flight experience. In the absence of detailed aircraft maintenance data this estimate was determined to be sufficient for analysis purposes. To determine total flying hours per day, the assumption was made that aircraft would only fly during daylight hours (approximately 12 hours). This was for three reasons. First, since the VERTREP process is inherently dangerous we determined that adding the dark of night as a further obscurant to operations was an undue risk. Second, the flight crews require rest time. To force a 24 hour schedule would require additional personnel to rotate through the aircraft as well as maintenance and shipboard support personnel. Third, the aircraft would be rapidly taking supplies off of the ship's deck therefore new provisions for transport would have to be brought up from storage areas and prepared. This preparation would benefit from having the night between flight operations to prepare for the next day and ensure that the throughput was limited by the organic helicopter assets and not by shipboard logistics. Three hours were set aside for helicopter platforms to account for refueling and other non-mission operations. Two hours were set aside for the MV-22 rather than three due to its lower fuel consumption in aircraft mode.

Civil Support Results:

Using all of the above assumptions and relationships, cargo sortie, personnel sortie and equipment sortie numbers were extrapolated. From these sortie numbers, flying hours, and availability the total number of each type of aircraft for each mission severity were derived. The numbers presented on the bottom line of each aircraft type were rounded up to the nearest whole integer. In the table below, the SH-60 is shown to carry the HMMWV. This was for illustration and comparison purposes only and was not factored into force structure formation. From purely a heavy lift perspective, the MH-53K was the clear choice for this specific scenario. However, all three options across the three mission severities were presented to the force structure team for consideration.

Parameters	Scenario Severity	Low	Mean	High
Number affected:		50,000	100,000	150,000
Number injured:		2,500	5,000	7,500
Number of "camp" sites:		3	5	8
Number of "camp" sites containers		15	30	45
Penetration:		0	25	50
Time to full capacity (days):		5	5	5

Total Delivered	Scenario Severity	Low	Mean	High
Food (lbs):		312,500	625,000	937,500
Food (ft^3):		12,750	25,500	38,250
Food (pallets):		219	439	658
Water (gal):		62,500	125,000	187,500
Bladders:		84	167	250

Maximum rate	Scenario Severity	Low	Mean	High
Food (lbs/day):		125,000	250,000	375,000
Water (gal/day):		25,000	50,000	75,000
Water (lbs/day):		207,500	415,000	622,500
Other (Medical, Camp sites lbs/day):		81,100	160,900	240,700
Total (lbs/day):		**413,600**	**825,900**	**1,238,200**

Medical	Scenario Severity	Low	Mean	High
Doctors:		7	13	19
Nurses:		25	50	75
Surgeons:		4	7	10
Assistants:		7	13	19
Total Medical Personnel:		**43**	**83**	**123**

Marines	Scenario Severity	Low	Mean	High
Devil Dogs:		127	209	383
Quadcons:		8	10	12
HMMWVs:		11	18	31
Floodlight Sets:		6	10	16

Generator Sets:	6	10	16

Storage	Scenario Severity	Low	Mean	High
Food (lbs):		312,500	625,000	937,500
Camp sites (lbs):		375,000	750,000	1,125,000
Doctors/nurses (lbs)*:		10,500	19,500	28,500
Surgeons/assistants (lbs):		20,000	35,000	50,000
Total (lbs):		**718,000**	**1,429,500**	**2,141,000**
Food (ft^3):		12,750	25,500	38,250
Camp sites (ft^3)**:		19,200	38,400	57,600
Doctors/nurses (ft^3):		428	796	1,163
Surgeons/assistants (ft^3):		816	1,428	2,040
Water Bladders (ft^3):		168	334	500
Total (ft^3):		**33,362**	**66,458**	**99,553**

"Vehicle" Storage	Scenario Severity	Low	Mean	High
Marine Quadcon (ft^2):		320	400	480
HMMWVs (ft^2):		1,540	2,520	4,340
Floodlight Sets (ft^2):		180	300	480
Generator Sets (ft^2):		180	300	480
Total (ft^2):		**2,220**	**3,520**	**5,780**

Asset Parameters	SH-60S	MV-22	MH-53K
Slung Lift Capacity (lbs):	4,500[95]	10,000[96]	27,000[97]
Delivery Speed (kts):	80	100	100
Return Speed (kts):	146[98]	241[99]	170[100]
Hookup/Dropoff Time (mins):	1	1	1
PAX capacity:	12[101]	24[102]	55[103]

[95] http://www.globalsecurity.org/military/systems/aircraft/sh-60b-specs.htm, accessed May 01, 2009.
[96] http://www.globalsecurity.org/military/systems/aircraft/v-22-specs.htm, accessed May 01, 2009.
[97] http://www.globalsecurity.org/military/systems/aircraft/h-53-specs.htm, accessed May 01, 2009.
[98] http://www.globalsecurity.org/military/systems/aircraft/sh-60b-specs.htm, accessed May 01, 2009.
[99] http://www.globalsecurity.org/military/systems/aircraft/v-22-specs.htm, accessed May 01, 2009.
[100] http://www.globalsecurity.org/military/systems/aircraft/h-53-specs.htm, accessed May 01, 2009.
[101] http://www.globalsecurity.org/military/systems/aircraft/sh-60b-specs.htm, accessed May 01, 2009.

PAX Pickup/Dropoff Time (mins):	5	5	5
Availability:	0.85	0.85	0.85
Total flying hours/day:	9	10	9

SH-60S **Scenario Severity**	**Low**	**Mean**	**High**
Cargo Trip Time (hrs):	0.13	0.61	1.10
Cargo Sorties/day:	92	184	276
Personnel Trip Time (hrs):	0.24	0.58	0.92
Personnel Sorties/day:	3	5	9
Equipment Trip Time (hrs):	0.13	0.61	1.10
Equipment Sorties/day***:	7	10	15
Number required:	**2**	**16**	**43**
MV-22			
Cargo Trip Time (hrs):	0.10	0.46	0.81
Cargo Sorties/day:	42	83	124
Personnel Trip Time (hrs):	0.21	0.42	0.62
Personnel Sorties/day:	2	3	5
Equipment Trip Time (hrs):	0.10	0.46	0.81
Equipment Sorties/day***:	4	5	8
Number required:	**1**	**5**	**13**
MH-53K			
Cargo Trip Time (hrs):	0.11	0.51	0.91
Cargo Sorties/day:	16	31	46
Personnel Trip Time (hrs):	0.23	0.52	0.81
Personnel Sorties/day:	1	2	2
Equipment Trip Time (hrs):	0.11	0.51	0.91
Equipment Sorties/day***:	4	5	8
Number required:	**1**	**3**	**7**

Table 44: Civil Support Mission Requirements

Sources of Error for Civil Support Requirements:

Several major sources of error existed in the initial input to the Civil Support mission. The greatest sources of error in the analysis above were in the rate schedule and aircraft availability. Changes in the assumed rate schedule would drastically affect the storage requirements of the fleet. For instance, if the maximum rate were assumed to be achieved on day one then the total storage requirement would be doubled. Aircraft availability changes would have a drastic impact on the total number of aircraft required.

[102] http://www.globalsecurity.org/military/systems/aircraft/v-22-specs.htm, accessed May 01, 2009.
[103] http://www.globalsecurity.org/military/systems/aircraft/h-53-specs.htm, accessed May 01, 2009.

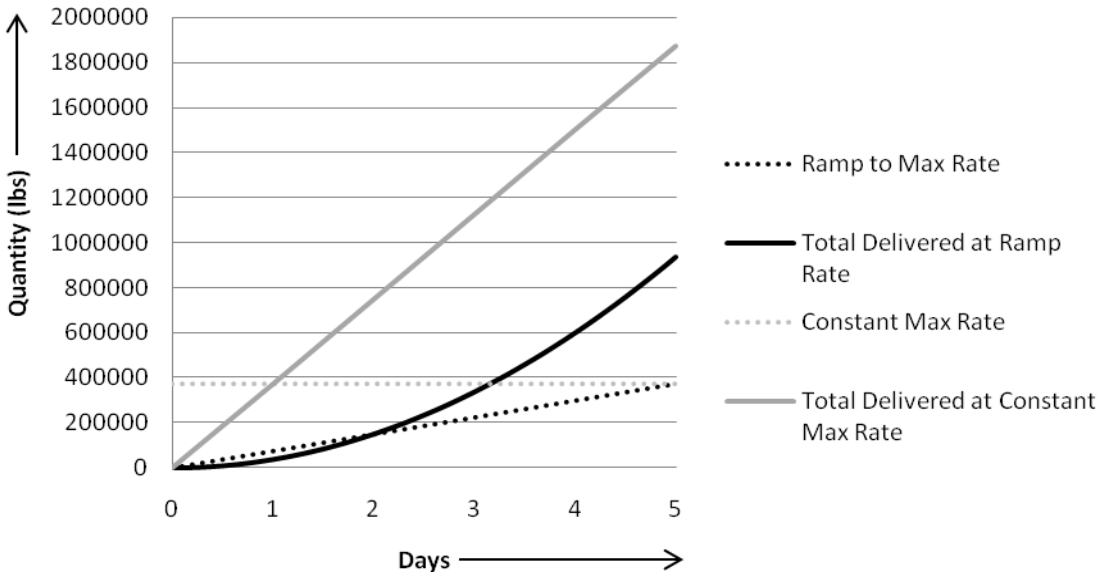


Table 45: Comparison of Total Goods Delivered at a Constant vs. Ramp Rate

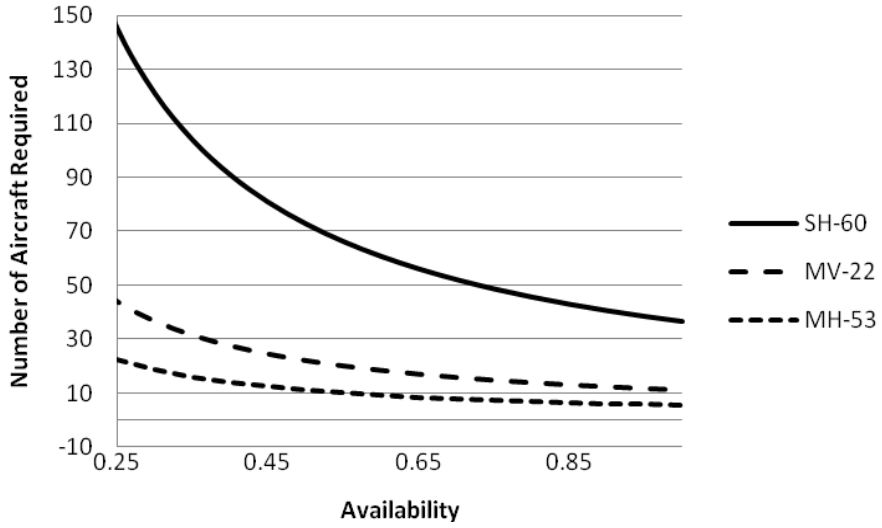


Table 46: Effect of Aircraft Availability on Number Required

2. Anti-smuggling

The general approach for determining the Anti-smuggling fleet requirements was based on creating a barrier to identify smugglers and a second barrier to intercept those smugglers. After some rudimentary calculations it was easy to determine that aircraft rather than ships were best suited for the identification barrier. This was due greatly to their increased height of eye compared to a surface asset. Two types of smuggling vessels were considered. They were the

conventional “go-faster” cigarette boat and the increasingly prevalent and difficult to detect semi-submersible low profile vessel (SSLPV).

Assumptions:

Several key assumptions were used to build an Anti-smuggling simulation model. Aircraft were used only to detect and identify possible smugglers. All intercepts were to be carried out by surface vessels. In the past the Mexican government has utilized manned aircraft to disable smuggling vessels by direct fire. Since this project is constrained to the Phase Zero realm, direct fire actions were considered escalation beyond Phase Zero and were not used. The intercept vessel had to be of sufficient speed and size to intercept the smuggler or have organic rigid high speed inflatable boat (RHIB) capability. Intercept was defined as closing with the target. Maritime intercept operations (MIO) and boardings were not the focus of this study. Specifics into MIO methods have already been discussed and analyzed in depth by other SEA projects (e.g. SEA-13: MIO in Logistically Barren Environments). This is not to say that the Phase Zero force does not conduct boardings. However, the boarding process was not included in the model. A barrier distance between aircraft identifiers and surface intercept assets was established. This barrier enabled time for the intercept asset to travel tangent to the targets path and thus reduce the maximum speed requirement of the surface intercept asset.

The targets were assumed to travel at right angles to the identification and intercept barriers. Targets were randomly and uniformly distributed across the barriers. Targets did not alter course as they transited the barrier. Identifiers moved back and forth across the section of the barrier that they were responsible for. The length of the responsible section was determined by the length of the barrier and number of identifiers. For example, for a barrier of length 250nm and two detectors, each detector was responsible for a 125nm length of the barrier. Once identified, the information was relayed from the identifier to the interceptor and the interceptor began to move instantaneously.

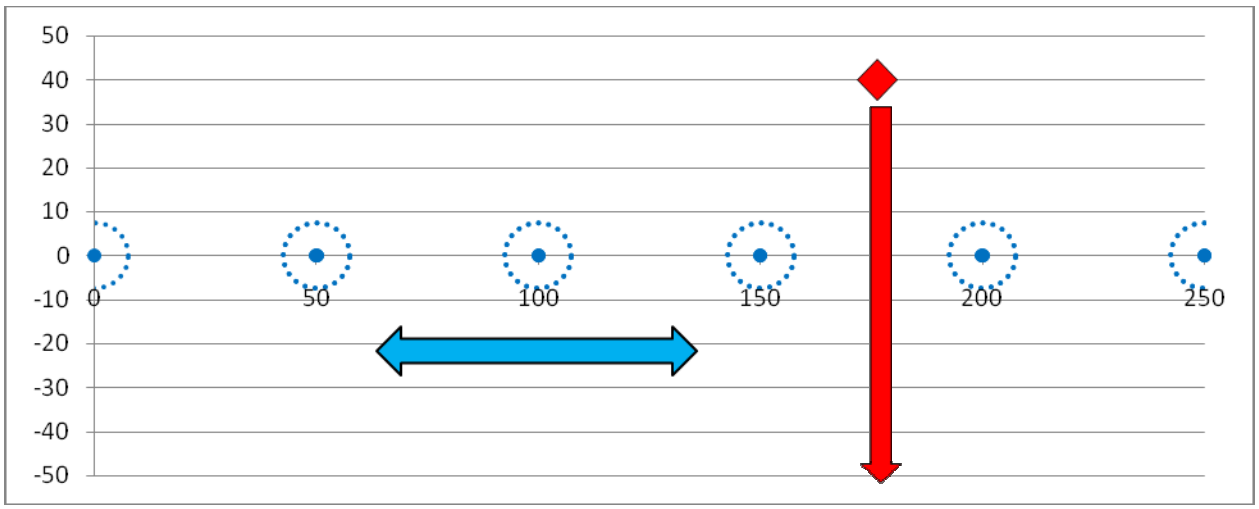


Figure 27: Barrier Identification

Since manned platforms and unmanned platforms were considered, the distance from the identifier to the interceptor barrier was chosen as the nominal mission radius of the RQ-8 Fire Scout, 110nm.[104] Identifier sweep widths were divided into manned and unmanned platforms as well as target type. SSLPVs have extremely low radar cross section (RCS). In this scenario they were assumed to have zero RCS. Therefore, identification of SSLPVs was limited to optical, electro-optical (EO), or infra-red (IR) methods. The target speed of the SSLPV was assumed to be 12kts.

For the unmanned platforms, the aircraft were assumed to operate at an identification altitude of 11 thousand feet mean sea level (MSL), a speed of 92kts, and with an electro-optical/infrared (EO/IR) sensor utilizing a 30 degree field of view (FOV).[105] These parameters were used to define the maximum ranges (rm) of a triangular lateral range curve. The lateral range curve was converted into a "cookie cutter" sweep width. This was done by integrating from –rm to rm and dividing by two times rm. Since the lateral range curve was triangular the overall result is a sweep width equal to the max range. This resulted in an EO/IR UAV sweep width of 5nm.

[104] MQ-8B Fire Scout Public Release Brief, February 2009. http://www.navair.navy.mil/pma266/international/briefs/FSPressConfSAS.pdf, accessed May 01, 2009.
[105] MQ-8B Fire Scout Public Release Brief, February 2009. http://www.navair.navy.mil/pma266/international/briefs/FSPressConfSAS.pdf, accessed May 01, 2009.

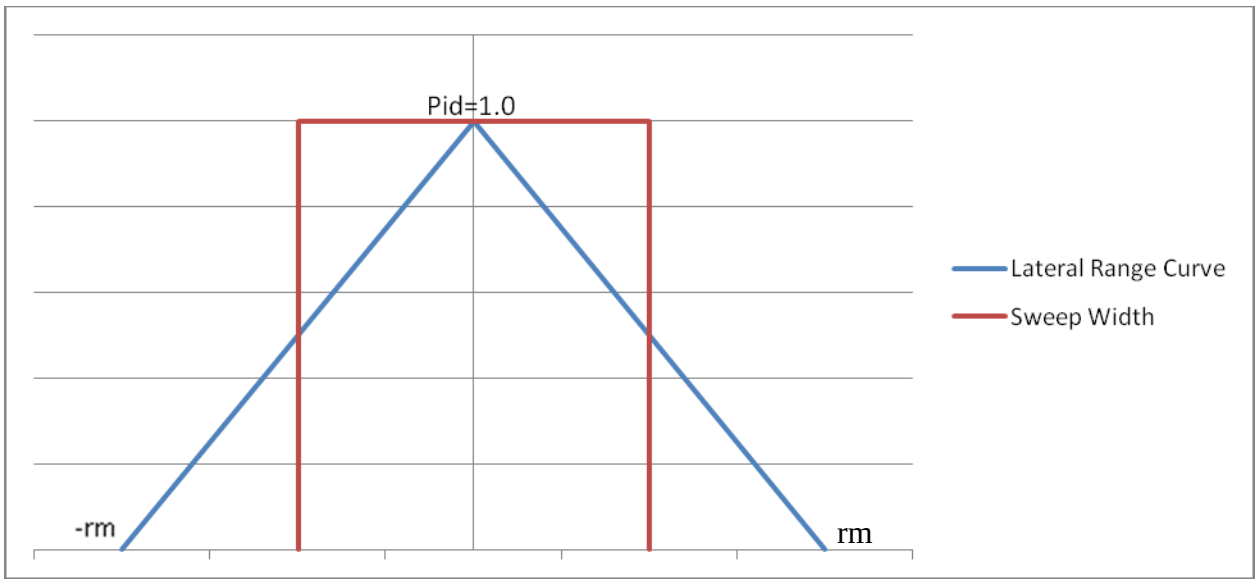


Figure 28: Translating Lateral Range Curve to Sweep Width

Manned aircraft search was based on standard SAR practices provided by subject matter experts. The parameters used were an altitude of 500' MSL, a speed of 60kts, and four personnel (2 pilots and 2 air crew) scanning the horizon. Each person scanned a 90 degree sector dividing the total horizon as follows; starboard pilot 0-90 degrees relative, starboard crew 45-135 degrees relative, port crew 225-315 degrees relative, and port pilot 270 to 0 degrees relative. As some of these fields overlap, they combined for a total viewable arc of 270 degrees.

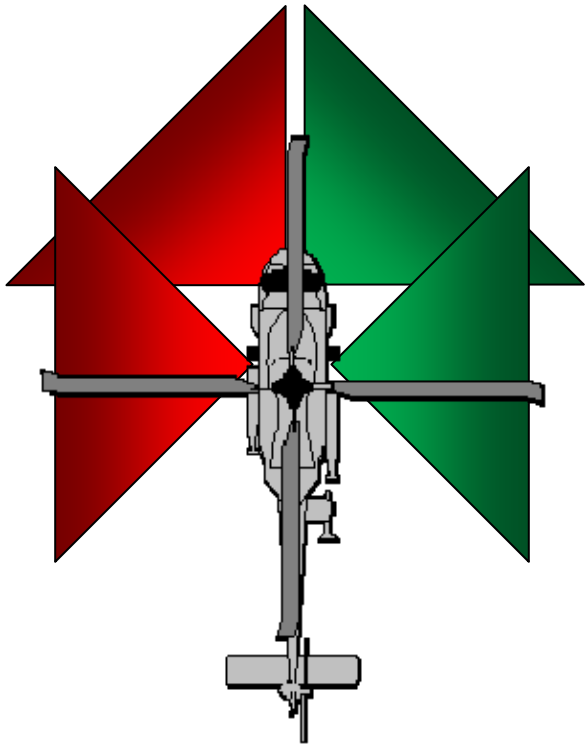


Figure 29: Manned Aircraft SAR FOV Arcs

The sweep width for manned aircraft was determined in the same manner as unmanned aircraft with a triangular lateral range curve. This yielded a manned optical sweep width of 9.6nm.

Detection of "go-fast" smugglers was not limited to EO/IR sensors. For "go-fast" targets it was determined that radar was an acceptable detection mechanism. Radar performance for the manned and unmanned platforms was taken to be equivalent. This performance was based on the air to surface maritime radar carried by the RQ-8 Fire Scout. Since identification required more information than detection, the triangular lateral range curve was once again employed so as to penalize the maximum range of the radar for identification considerations. This led to a radar sweep width of 37.5nm [106] for both the manned and unmanned aircraft. The target speed of the "go-fast" vessel was assumed to be 80kts. Although this was an extremely high speed, the worst case scenario was sought.

[106] MQ-8B Fire Scout Public Release Brief, February 2009. http://www.navair.navy.mil/pma266/international/briefs/FSPressConfSAS.pdf, accessed May 01, 2009.

Analytical Methods for Anti-smuggling:

The Simulation was a fairly straight-forward time-based MATLAB simulation, describing a 2D scenario with the Blue force barrier as the horizontal X-Axis (bottom of the screen). The Blue single detector moved along the X-axis, starting at (0,0) moving right with a determined speed V_d, going back in the reverse direction once hitting the edge of the barrier (0,250). The Red smuggler, named "The target", started at a random position in the domain, when instances of 2 independent uniformly distributed random variables were being used to characterize the random nature of the smugglers choice of time and location of attempting to outrun the blue force. The red target moved at a constant speed and heading towards the barrier until it managed to successfully cross the barrier without being detected or until the Blue detector managed to detect it. The Detection model was a "Cookie-Cutter" model with given detection radius (depending on the scenario and the choice of aircraft & detection method). The simulation was not a "Real-time" loop implementation of a time-based model but a set of fully analytical closed-form matrices calculations to calculate the geometrical location of each entity at a given time-step vector and the distance between the two (with a small enough chosen time-step to insure accuracy and avoiding the case where the target "skips" the barrier and the detector between 2 consecutive time steps). The scenario was then run for ten thousand trials in order to gather statistics for identification probabilities. The main output of this simulation was a vector of estimated identification probabilities given the number of detectors spread on the full width of the barrier.

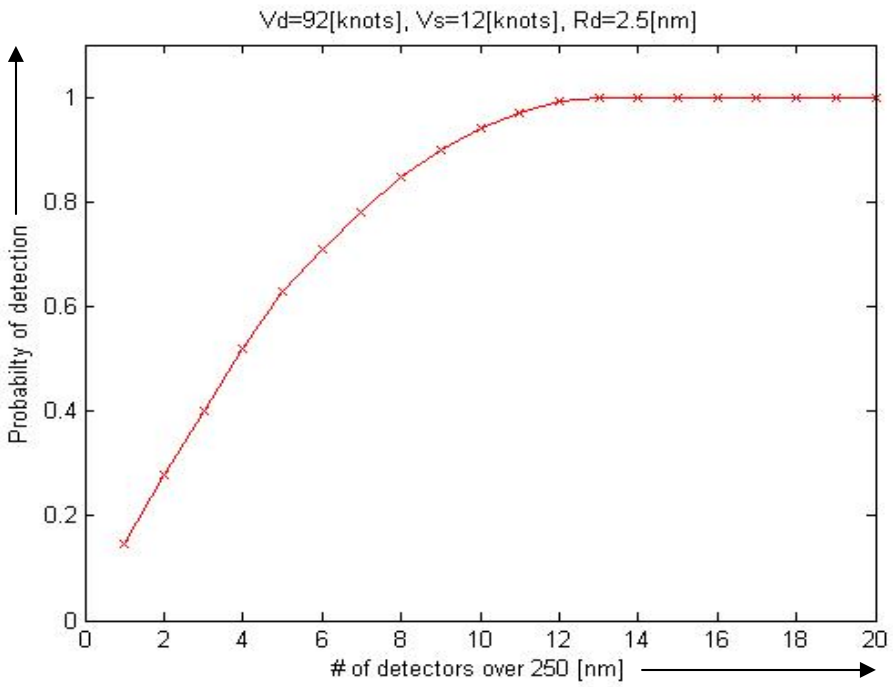


Figure 30: Example MATLAB Output

Anti-smuggling Results:

Each of the three scenarios was analyzed using the methodology above. Upon examination of the output, an 80% probability of identification still seemed acceptable in terms of diminishing returns for additional air platforms.

Scenario		UAV vs. SS w/EO	Manned vs. SS w/EO	Aircraft vs. Go-Fast w/Radar
Number of Detectors	**1**	0.14	0.19	0.22
	2	0.29	0.35	0.40
	3	0.41	0.51	0.57
	4	0.52	0.64	0.71
	5	0.62	0.74	**0.82**
	6	0.70	**0.83**	0.91
	7	**0.80**	0.90	0.96
	8	0.85	0.95	0.99
	9	0.91	0.98	1.00
	10	0.94	0.99	
	11	0.98	1.00	
	12	0.99		
	13	1.00		

Table 47: Anti-smuggling Identification Results

From the model results it can be seen that the most limiting case was identification of SSLPVs for both manned and unmanned aircraft. This required either seven UAVs or six manned aircraft platforms on station continuously. A threshold probability of identification of 80% was chosen for the simple reason that NAVAIR used this metric for its test and evaluation of the RQ-8B Fire Scout.

Refueling Considerations:

Since the air assets identified in the results section above were required to be on station continuously and had to traverse an 110nm barrier stand-off, it was clear that additional aircraft would be required in order to keep those aircraft on station. Before an aircraft reached the end of its on station endurance, another aircraft had to be launched in order to relieve the on-station aircraft and maintain the barrier. Initially it was thought that only one additional aircraft would be required to be en route so long as the aircraft initially on station staggered their arrival times. In order to validate this assumption, a manual discrete event-based simulation was used. Each of

the aircraft initially on station were staggered according to their total on-station endurance and relief aircraft were dispatched with sufficient time to arrive in time to relieve the on station aircraft at the expiration of their endurance. The simulation ended when the first aircraft on-station was able to return to the launching platform, refuel and then return to the barrier. Mission endurance for the SH-60 and refueling time was input from subject matter experts. On-station times were generated by subtracting off transit times to and from the barrier from the total mission endurance.

SH-60

Mission Endurance (hrs):	3.5
Cruise Speed (kts):	120
Barrier Range (nm):	110
Refuel time (hrs):	0.25
Number of aircraft on station:	6
Onstation Time (hrs):	1.67
Trip Time (hrs):	0.92

Time	Event
0.00	#1 on station
0.28	#2 on station
0.56	#3 on station
0.83	#4 on station
1.11	#5 on station
1.39	#6 on station
1.67	#1 off station, #7 relieves #1
1.94	#2 off station, #8 relieves #2
2.22	#3 off station, #9 relieves #3
2.50	#4 off station, #10 relieves #4
2.58	#1 lands
2.78	#5 off station, #11 relieves #5
2.83	#1 launches
2.86	#2 lands
3.06	#6 off station, #12 relieves #6
3.11	#2 launches

Firescout

Mission Endurance (hrs):	
Cruise Speed (kts):	92
Barrier Range (nm):	110
Refuel time (hrs):	0.25
Number of aircraft on station:	7
Onstation Time (hrs):	5.21[107]
Trip Time (hrs):	1.20

Time	Event
0.00	#1 on station
0.74	#2 on station
1.49	#3 on station
2.23	#4 on station
2.98	#5 on station
3.72	#6 on station
4.47	#7 on station
5.21	#1 off station, #8 relieves #1
5.96	#2 off station, #9 relieves #2
6.41	#1 lands
6.66	#1 launches
6.70	#3 off station, #10 relieves #3
7.15	#2 lands
7.40	#2 launches
7.44	#4 off station, #11 relieves #4
7.85	#1 earliest on station

[107] MQ-8B Fire Scout Public Release Brief, February 2009. http://www.navair.navy.mil/pma266/international/briefs/FSPressConfSAS.pdf, accessed May 01, 2009.

3.14	#3 lands
3.33	#7 off station, #13 relieves #7
3.39	#3 launches
3.42	#4 lands
3.61	#8 off station, #14 relieves #8
3.67	#4 launches
3.70	#5 lands
3.75	#1 earliest on station
3.89	#9 off station, #1 relieves #9
3.94	#5 launches
4.03	#2 earliest on station
4.17	#10 off station, #2 relieves #10
4.31	#3 earliest on station
4.44	#11 off station, #3 relieves #11
4.58	#4 earliest on station
4.72	#12 off station, #4 relieves #12
4.86	#5 earliest on station
5.00	#13 off station, #5 relieves #13
Number required (85% avail):	**17**

7.89	#3 lands
8.14	#3 launches
8.19	#5 off station, #1 relieves #5
8.60	#2 earliest on station
8.64	#4 lands
8.89	#4 launches
8.93	#6 off station, #2 relieves #6
9.34	#3 earliest on station
9.38	#5 lands
9.63	#5 launches
9.67	#7 off station, #3 relieves #7
10.08	#4 earliest on station
10.42	#8 off station, #4 relieves #8
10.83	#5 earliest on station
11.16	#9 off station, #5 relieves #9
Number required (85% avail):	**12**

Table 48: Aircraft Barrier Relief Schedule

As can be seen from the above simulation, the initial assumption of one additional aircraft was not correct. A significant number of additional aircraft were required in order to maintain the given number of aircraft on-station continuously. An availability factor of 85% was also added similar to the Civil Support mission. Although only six manned aircraft platforms were initially required to support the barrier, a total of seventeen SH-60s were required to keep that barrier in place. In the case of UAVs, seven were required to support the barrier extending out to a total of thirteen in order to maintain the barrier. The difference in the two results was a function of the on-station time. Since the UAV was considerably lighter than the manned aircraft, this enabled it to stay on-station for a considerably longer time than manned aircraft and thus make it more suitable for the barrier mission.

Surface Intercept Barrier:

The number of surface assets required for intercept was a factor of the barrier distance, target speed and intercept speed. The barrier distance combined with the target speed dictated the amount of time available for the intercept platform to interdict the target once identified at the identification barrier. Since the intercept platforms moved tangent to the target path, this yielded

a linear relationship for intercept probability. These relationships were analyzed in a spreadsheet. The chart below shows the interceptor speed and number comparison for the worst case 80kts target speed.

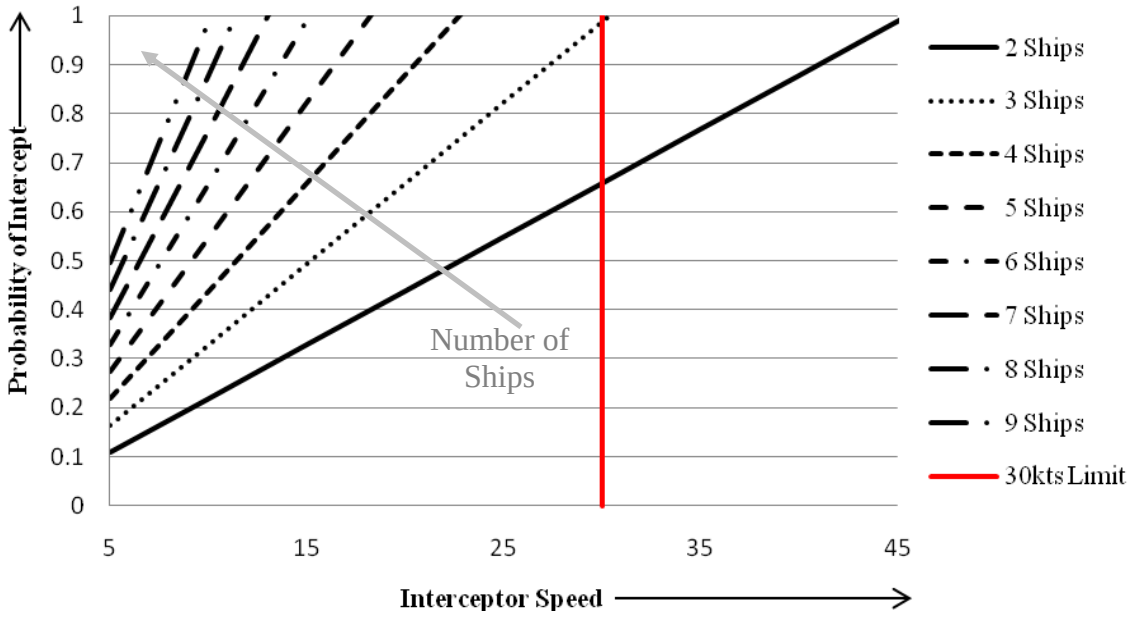


Figure 31: Probability of Intercept for Number and Speed of Assets

As the chart shows, increasing the number of interceptor or increasing the speed of the interceptors increased the probability of intercepting the target platform. Of particular note is the 30kts limit shown on the chart. Typical maximum speed of a surface asset that could potentially serve as an interceptor was around this figure. The curve for three ships nearly intersects with the 30kts limit. Although by inspection this configuration of three ships capable of 30kts seemed to be an optimal selection, all of the data was available to the force structure group for platform selection.

E. MARINE SUPPORT FOR CIVIL SUPPORT OPERATIONS

1. Need for Marine

When natural disasters occur, the Phase Zero force will be required to provide emergent Civil Support to the local populace before a more suitable and substantial support force can be formed and dispatched. The intensity of the Phase Zero operations was categorized into low, medium, and high, based on the number of populace affected. The Phase Zero force would focus

mainly on providing limited supplies (food, water and shelter) and medical aid to the affected population. During the course of conducting Civil Support operations, the safety of the Phase Zero force could be threatened by unsatisfied local populace or even terrorists. Marines would be required to provide security for the Phase Zero force operating on land during Civil Support operations.

2. Phase Zero Force Operating on Land

During the conduct of Civil Support operations, the Phase Zero force ground component would be dispersed and concentrated mainly at the landing sites, supply distribution centers and medical centers. Ideally all three of these would be co-located at a camp site to minimize the ground transportation requirement. The medical teams consisting of doctors and nurses would man the various distribution/medical centers to provide medical support to the injured populace. Logistic teams would also be at the centers to distribute water, food and shelters to the populace. Another group of logisticians would have to transport supplies from the landing site to the distribution/medical centers whenever required. Supplies to be transported to the distribution/medical centers would be temporarily stored at the landing site after they were unloaded from the ship. The main bulk of the supplies that would not be ready for distribution would continue to be stored in the ship.

3. Marine Force Area of Operations

The Marine force would set up its Headquarters (HQ) at the landing site for efficient command and control of its soldiers. A Marine force would be assigned to secure a perimeter of at least 500m x 500m, so that the personnel were away from small arms' firing range. It would also offer protection to the temporary storage area that houses the supplies unloaded from the ship. Marines would deploy to the various distribution/medical centers to protect the medical and logistic teams operating there. Mobile Marine forces would escort the transportation of supplies from the storage area to the distribution/medical centers. When they were not escorting the supplies, they would act as the mobile reserve force to reinforce the Marine force at the distribution/medical centers during emergency.

4. Marine Force Breakdown and Job Description

For low intensity Civil Support operations, a Company of Marines (127 soldiers) would be required to protect the Phase Zero force operating on land. [108] At the landing site, a platoon (41 soldiers) would secure the Company HQ, and protect the logisticians and supplies in the temporary storage area. The platoon would rotate shifts to set up the perimeter (with barb wire if necessary), perform sentry duties, and patrol the landing site. There were 3 distribution/medical centers, and 1 squad of Marines (13 soldiers) that were required to protect the medical and logistic teams operating in each center in shifts. Thus, a total of 3 squads (or 1 platoon) was required to secure the distribution/medical centers. Another platoon would be responsible for escorting the transportation of supplies from the landing site to the various centers. Only 2 of the 3 squads would perform escort duties at any one time, so that the 3 squads would rotate shifts. The squad(s) not performing escort duty would be the reserve force to reinforce the Marine force at the distribution/medical centre(s) in the event of emergency.

Scaling up the requirements up for medium intensity Civil Support operations, a company(++) of Marine (209 soldiers) would be required to protect the Phase Zero force operating on land. There would be 5 distribution/medical centers, and the number of squads escorting transportation of supplies would be increased from 3 to 6. Similarly, for high intensity operations with 8 distribution/medical centers, a Battalion(-) of Marine (~383 soldiers) were required to protect the Phase Zero force operating on land.

5. Logistic Requirements

As a rule of thumb, 200 Marines in a 5-day operation would require 8 Quadcon Type I containers' worth of equipment. 2 Quadcon Type I containers could be connected together to create a 10' ISO container. [109] The M998 HMMWV (High Mobility Multipurpose Wheeled Vehicle) [110] was proposed to transport the Marines and their equipment.

For low intensity operations, the Company HQ would be equipped with 2 HMMWVs. The platoon escorting transportation of supplies would have 3 HMMWVs, two for escort duties and the third HMMWV would be used for reinforcing a centre during emergency. Therefore, a total of 10 HMMWVs were required. Similarly for medium intensity operations, the Battalion

[108] http://www.marines.cc/content/view/82/56/, accessed 17 May 2009
[109] http://www.cmci-containers.com/CMCI/Products/Military/Quadcons/Quadcon1.htm, accessed 29 April 2009
[110] http://www.globalsecurity.org/military/systems/ground/m998.htm, accessed 29 April 2009

HQ and 3 Company HQs would have to be allocated 2 HMMWVs each to provide command presence and emphasis. Thus, a total of 20 HMMWVs were required. Similarly for high intensity operations, a total of 32 HMMWVs were required to provide mobility to the Marines.

6. Summary

In order to safeguard the Phase Zero force conducting Civil Support operations on land, a Marine force would be required to secure the landing site and distribution/medical centers. It would also be required to escort the logistic teams transporting supplies from the landing site to the various centers. The size of the force and logistic requirements of the Marine Force would vary with the intensity of operations, and are summarized in the table below:

Parameters	Low	Medium	High
No of populace affected	50,000	100,000	150,000
No of distribution/medical centers	3	5	8
No of Marine required	Company (127)	Company (++) (209)	Battalion(-) (383)
Logistic capacity for 5 days operation	8 x Quadcon	10 x Quadcon	12 x Quadcon
No. of HMMWV required	6 for centers + 3 for escorts + 2 for HQ = 11	10 for centers + 6 for escorts + 2 for HQ = 18	16 for centers + 9 for escorts + 6 for HQs =31

Table 49: Force and Logistics Requirements of the Marine Force

F. COST ESTIMATION OF FORCES

1. Project Tasking Interpretation

The project tasking statement is the source guidance for cost analysis. The tasking states, "…using total procurement and operating costs of $1.5B (FY08 constant dollars) per annum…"

Many key aspects of the cost analysis portion of the project can be extrapolated from this statement.

2. Procurement Cost

The Defense Acquisition University (DAU) defined procurement cost as, "Equal to the sum of the procurement cost for prime mission equipment, the procurement cost for support items, and the procurement cost for initial spares."[111] By contrast, the DAU defined acquisition cost as, "Equal to the sum of the development cost for prime mission equipment and support items; the procurement cost for prime mission equipment, support items and initial spares; and the system specific facilities cost."[112] Attempting to find accurate procurement cost data was perhaps the most difficult task in the cost analysis. Many sources cited cost differently. For example they may have stated "at a cost of", "unit replacement cost", "total program cost", or "awarded at" among many others. The point is that many sources of cost data did not qualify the statement by declaring what type of cost data was provided. In many cases the meaning of non-specific terms had to be inferred based on judgment. The best source of cost data was found to be General Accounting office (GAO) reports. These provided detailed breakdowns of program cost including items for research and development, procurement, initial spares, etc. GAO reports were also taken to be a most reputable source of data as contractor estimates and service branch estimates were often found to be skewed in one direction or another. For those reasons, GAO reports were the chosen source above others. However, detailed GAO reports were only begun around 2004. Older GAO reports provided good insight but detailed cost breakdowns were sometimes absent.

3. Operating Cost

Extensive use of the Navy Visibility and Management of Operating and Support Cost (VAMOSC) management information system was used for obtaining operating cost data. There were two methods to gather data from VAMOSC, either an e-mail query or database access. Due

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[111] Defense Acquisition University, Department of Defense, "Glossary of Defense Acquisition Acronyms and Terms", Defense Acquisition University Press, July 2005, http://www.dau.mil/pubs/glossary/12th_Glossary_2005.pdf, accessed May 01, 2009.

[112] Defense Acquisition University, Department of Defense, "Glossary of Defense Acquisition Acronyms and Terms", Defense Acquisition University Press, July 2005, http://www.dau.mil/pubs/glossary/12th_Glossary_2005.pdf, accessed May 01, 2009.

to the large amount of data collected, the access method proved invaluable. The data could also be selected to output in constant FY2008 dollars. Operating and support cost data was obtained for each of the ships currently in the U.S. fleet. When possible, the operating cost selected from VAMOSC was for the fleet average. Many of the future ships considered were either not currently in the fleet or of foreign origin. Consequently, these ships did not have operating cost data available from VAMOSC. In order to fill this gap, a linear regression based on current ship operating cost was constructed to estimate the operating cost of these future ships. Several physical aspects of ships were considered to form the basis of the regression such as length, displacement, personnel, beam, draft, and speed. The strongest correlations for operating cost predictor were found to be displacement and personnel with an adjusted R square value of 0.976. The coefficients yielded the following expression for operating cost:

$$\$4{,}342{,}012 + \$81{,}318 * (Personnel\ Assigned) + \$757 * (Displacement\ in\ tons)$$

4. FY2008 Corrections

The predominance of sources did not use FY2008 as their base year for cost estimates. In these cases costs were converted from then-year dollars to FY2008. In order to do this, inflation rates were computed from the consumer price index (CPI) back to 1950. A factor was then derived to correct then-year dollars to FY2008 dollars. These factors were then applied to all costs not associated with FY2008. An example is shown below.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate[113]	3.38	2.83	1.59	2.27	2.68	3.39	3.24	2.85	3.85
	0.0338	0.0283	0.0159	0.0227	0.0268	0.0339	0.0324	0.0285	0.0385
Factor	**1.24501**	**1.2043**	**1.17116**	**1.15283**	**1.12724**	**1.09782**	**1.06182**	**1.0285**	**1**

Table 50: CPI Then-Year to FY2009 Conversion

5. Platform Cost Results

The following table shows the consolidated cost information for the platforms of interest. The final amortized procurement, operating and support cost (PO&S) was used when considering forces.

[113] Historical Consumer Price Index Data 1913 to Present, http://inflationdata.com/inflation/Consumer_Price_Index/HistoricalCPI.aspx, accessed May 01, 2009.

Platform Cost

	Class	Then Year Procurement	FY [114]	Inflation Factor [115]	FY2008 Dollar: Procurement	FY2008 Dollar: Annual O&S[116]	FY2008 Dollar: Service Life[117]	FY2008 Dollar: Overall PO&S	FY2008 Dollar: Amortized PO&S
Current Forces	CG-47 Ticonderoga	$1,000,000,000[118]	1999	1.27	$1,272,274,042	$59,068,119	40	$3,634,998,802	**$90,874,970**
	DDG-51 Burke	$1,031,667,188[119]	2001	1.20	$1,242,439,806	$41,951,110	40	$2,920,484,206	**$73,012,105**
	FFG-7 Perry	$194,230,769[120]	1978	3.42	$665,102,975	$26,929,123	20	$1,203,685,435	**$60,184,272**
	LCC-19 Blue Ridge	$341,818,182[121]	1965	6.69	$2,287,780,267	$81,404,132	45	$5,950,966,207	**$132,243,693**
	LHA-1 Tarawa	$223,380,000[122]	1973	4.97	$1,108,840,343	$126,899,444	42	$6,438,616,991	**$153,300,405**
	LHD-1 Wasp	$319,933,333[123]	1991	1.59	$507,973,217	$134,722,405	45	$4,549,645,367	**$101,103,230**
	LPD-17 San Antonio	$1,750,000,000[124]	2009	0.96	$1,685,833,333	$35,246,107	40	$2,743,216,543	**$68,580,414**
	LPD-4 Austin	$235,000,000[125]	1961	7.02	$1,649,550,515	$51,564,840	41	$3,196,495,715	**$77,963,310**
	LSD-41 Whidbey Island	$339,000,000[126]	1981	2.52	$467,326,853	$42,878,731	30	$1,753,688,783	**$58,456,293**
	LSD-49 Harpers Ferry	$157,000,000[127]	1988	1.83	$276,724,361	$43,810,291	30	$1,591,033,091	**$53,034,436**
	MCM-1 Avenger	$113,833,333[128]	1989	1.75	$199,680,551	$10,764,864	30	$522,626,471	**$17,420,882**

[114] In the absence of better information, based on year ordered.

[115] Based on inflation rate derived from the consumer price index back to year 1950.

[116] O&S Information obtained from Navy VAMOSC online query, http://www.navyvamosc.com/, accessed May 01, 2009. Future ship O&S based on linear regression of VAMOSC available O&S. Miscellaneous equipment O&S cost approximated as 5% of procurement cost

[117] In the absence of better information, 30 and 20 years assumed for ships and aircraft respectively.

[118] http://www.globalsecurity.org/military/systems/ship/cg-47-mod.htm, accessed May 01, 2009.

[119] http://www.globalsecurity.org/military/systems/ship/ddg-51-build.htm, accessed May 01, 2009.

[120] http://www.globalsecurity.org/military/systems/ship/ffg-7.htm, accessed May 01, 2009.

[121] Substituted Austin Class procurement in 1965.

[122] http://archive.gao.gov/f0302/096128.pdf, accessed May 01, 2009.

[123] http://archive.gao.gov/d23t8/142320.pdf, accessed May 01, 2009.

[124] http://www.fas.org/sgp/crs/weapons/RL34476.pdf, accessed May 01, 2009.

[125] http://warfare.ru/?compare=true&linkid2=2542&linkid=1752&catid=272, accessed May 01, 2009.

[126] http://www.globalsecurity.org/military/systems/ship/lsd-41-unit.htm, accessed May 01, 2009.

[127] http://www.globalsecurity.org/military/systems/ship/lsd-49-unit.htm, accessed May 01, 2009.

[128] www.forecastinternational.com/archive/ws/ws0257.doc, accessed May 01, 2009.

	Platform Cost				FY2008 Dollar				
	Class	Then Year Procurement	FY [114]	Inflation Factor [115]	Procurement	Annual O&S[116]	Service Life[117]	Overall PO&S	Amortized PO&S
	PC-1 Cyclone	$19,400,000[129]	2004	1.13	$21,868,471	$2,227,924	10	$44,147,711	**$4,414,771**
	AOE-6 Supply	$684,000,000[130]	1998	1.29	$883,724,094	$18,511,977	40	$1,624,203,184	**$40,605,080**
	MV-22 Osprey	$93,020,742[131]	2009	0.96	$89,609,982	$3,020,957	20	$150,029,119	**$7,501,456**
	MH-53K Super Stallion	$76,055,128[132]	2009	0.96	$73,266,440	$6,079,570 [133]	20	$194,857,839	**$9,742,892**
	SH-60 Seahawk	$30,810,000[134]	1994	1.46	$44,234,867	$3,753,531	20	$119,305,491	**$5,965,275**
Future Forces	USCG FRC	$41,600,000[135]	2007	1.03	$42,785,600	$6,282,408	40	$294,081,920	**$7,352,048**
	LCS-1 Freedom	$253,428,571[136]	2009	0.96	$244,136,190	$17,009,404	30	$754,418,310	**$25,147,277**
	JHSV	$177,625,000[137]	2009	0.96	$171,112,083	$8,387,630	30	$422,740,983	**$14,091,366**
	LHA-6 America	$3,069,600,000[138]	2009	0.96	$2,957,048,000	$124,500,821	45	$8,559,584,945	**$190,212,999**
	HMS Invincible	$259,055,000[139]	1982	2.28	$591,306,644	$78,664,662	30	$2,951,246,504	**$98,374,883**
	JMSDF DDH Hyuga	$1,060,000,000[140]	2004	1.13	$1,194,875,214	$47,943,312	35	$2,872,891,134	**$82,082,604**
	M-80 Stiletto	$12,500,000[141]	2004	1.13	$14,090,510	$4,631,386	10	$60,404,370	**$6,040,437**
	HMS Visby Class	$184,000,000[142]	2006	1.06	$195,375,506	$8,292,886	30	$444,162,086	**$14,805,403**

[129] http://www.gao.gov/htext/d0510.html, accessed May 01, 2009.
[130] https://www.rand.org/pubs/monograph_reports/MR1030/mr1030.appc.pdf, accessed May 01, 2009
[131] http://www.gao.gov/new.items/d09326sp.pdf, accessed May 01, 2009.
[132] http://www.gao.gov/new.items/d09326sp.pdf, accessed May 01, 2009.
[133] MH-53K annual operating and support cost approximated by MH-53E
[134] http://www.defencetalk.com/forums/showthread.php?t=952, accessed May 01, 2009.
[135] http://www.gao.gov/new.items/d06764.pdf, accessed May 01, 2009.
[136] http://www.gao.gov/new.items/d09326sp.pdf, accessed May 01, 2009.
[137] http://www.gao.gov/new.items/d08467sp.pdf, accessed May 01, 2009.
[138] http://www.gao.gov/new.items/d09326sp.pdf, accessed May 01, 2009.
[139] Procurement cost is the proposed sale price to the Australian Government in 1982.
[140] http://www.globalsecurity.org/military/world/japan/ddh-x.htm, accessed May 01, 2009.
[141] http://www.military.com/NewsContent/0,13319,128418,00.html, accessed May 01, 2009. http://www.gizmag.com/go/5151/, accessed May 01, 2009.
[142] http://www.globalsecurity.org/military/world/europe/visby-specs.htm, accessed May 01, 2009. http://news.bbc.co.uk/2/hi/technology/3724219.stm, accessed May 01, 2009.

Platform Cost					FY2008 Dollar				
	Class	Then Year Procurement	FY [114]	Inflation Factor [115]	Procurement	Annual O&S[116]	Service Life[117]	Overall PO&S	Amortized PO&S
	RQ-8 Firescout	$12,193,785[143]	2008	1.00	$12,193,785	$2,167,944 [144]	20	$55,552,661	**$2,777,633**
Misc Equipment	M996 HMMWV	$50,000[145]	2009	0.96	$48,167	$2,408	10	$72,250	**$7,225**
	B0640 Floodlight Set	$13,650[146]	2007	1.03	$14,039	$702	5	$17,549	**$3,510**
	MEP806A Generator Set	$25,063[147]	2008	1.00	$25,063	$1,253	5	$31,329	**$6,266**

Table 51: Platform Procurement, Operating and Support Cost Data

6. Sources of Error for Platform Cost Data

The greatest source of procurement cost error was from poor description in source documents as described above. These documents also failed to qualify with which fiscal year dollars the costs were associated. In the absence of fiscal year data, the lead ship year ordered was used. Since procurement cost was amortized across the lifecycle of the ship, the second greatest source of error was the estimated life of the ship. In the absence of data for ship lifecycle, thirty years was used. In the absence of aircraft lifecycle, twenty years was used. Many ships were also undergoing lifespan extension programs that involved additional investments to extend that lifespan. These costs were not included in the procurement estimate while the extended lifespan was used. VAMOSC operating cost data did capture depot modernization periods, overhauls and availabilities but lifecycle program upgrades were not specifically included. Operating costs also varied with the age of the ship. For example, the FFG-7 class had a slightly higher amortized cost than a LPD-17 class due to the age of the FFG-7 class.

After the initial force structures were formed, several other items were considered that required cost data. Security for provision distribution on land was deemed necessary requiring, a

[143] http://www.acq.osd.mil/ara/am/sar/2008-SEP-SARSUMTAB.pdf, accessed May 01, 2009.
[144] RQ-8 O&S cost approximated by program goal of ½ F/A-18C/D O&S Cost obtained from Navy VAMOSC
[145] http://www.globalsecurity.org/military/systems/ground/m998.htm, accessed May 01, 2009.
[146] http://www.generatorjoe.net/product.asp?0=0&1=0&3=2644, accessed May 01, 2009.
[147] http://nsc.natick.army.mil/media/print/Smartbook_Web.pdf, accessed May 01, 2009.

complement of Marines. VAMOSC was called upon once again to obtain operating and support costs for these forces. The online VAMOSC query yielded operating and support cost across each pay grade and specialty for the entire Marine Corps. The assumption was made that the composition in terms of pay grade breakdown within our security forces would follow the general demographic of the Marine Corps. Consider the following example; the entire Marine Corps is comprised of 100 personnel with 50 E3s, 30 O1s, and 20 O3s; our force is comprised of a total of 10 personnel; therefore in our force there would be 5 E3s, 3 O1s and 2 O3s. This method was used to scale each of the three scenario forces and provide associated cost data. Our force also made use of doctors, surgeons, nurses and assistants. For these medical personnel, AQD (additional qualification designator) numbers were selected representative of these specialties. Field Medicine Marine Corps Medical Officer (AQD 6FA) O3-O8, Trauma Surgeon (AQD 6CM), general E5, and Field Medical Marine Corps Medical Officer (AQD 6FA) O1-O2 were selected for doctors, surgeons, nurses, and assistants respectively. Costs for food, medical supplies and tents commensurate with the scenario severity were also factored into the scenario cost. The resultant total additional personnel cost is shown in the figure below.

				Low		Medium		High	
Paygrade	**Number**	**Annual Cost**	**Fraction Total**	**Number**	**Annual Cost**	**Number**	**Annual Cost**	**Number**	**Annual Cost**
E1	13909	$21,820	0.06405	8.13384	$177,481	17.67669	$385,706	24.52961	$535,237
E2	24141	$27,805	0.11116	14.11726	$392,532	30.68003	$853,062	42.57411	$1,183,778
E3	49494	$30,516	0.22790	28.94368	$883,248	62.90122	$1,919,499	87.28684	$2,663,653
E4	41826	$39,063	0.19260	24.45971	$955,464	53.15653	$2,076,441	73.76431	$2,881,438
E5	33237	$50,191	0.15304	19.43666	$975,546	42.24029	$2,120,085	58.61606	$2,942,002
E6	16647	$63,832	0.07665	9.73504	$621,408	21.15647	$1,350,461	29.35844	$1,874,010
E7	9157	$74,613	0.04216	5.35492	$399,545	11.63746	$868,303	16.14909	$1,204,928
E8	4088	$84,924	0.01883	2.39086	$203,043	5.19589	$441,258	7.21024	$612,325
E9	1744	$104,912	0.00803	1.02002	$107,012	2.21674	$232,562	3.07612	$322,722
Subtotal	**194244**								

				Low		Medium		High	
Paygrade	**Number**	**Annual Cost**	**Fraction Total**						
O1	3116	$57,259	0.01435	1.82225	$104,341	3.96017	$226,756	5.49546	$314,666
O2	3118	$79,777	0.01436	1.82352	$145,475	3.96293	$316,150	5.49928	$438,715
O3	5998	$98,425	0.02762	3.50733	$345,207	7.62222	$750,214	10.5772	$1,041,058
O4	4520	$113,455	0.02081	2.64305	$299,868	5.74396	$651,681	7.97079	$904,325
O5	2824	$122,975	0.01300	1.65140	$203,080	3.58886	$441,340	4.98020	$612,439
O6	1111	$147,917	0.00512	0.64995	$96,138	1.41248	$208,930	1.96007	$289,928
O7	46	$188,084	0.00021	0.02685	$5,050	0.05835	$10,976	0.08098	$15,231
O8	27	$208,314	0.00012	0.01569	$3,269	0.03410	$7,104	0.04732	$9,858

O9	16	$230,035	0.00007	0.00911	$2,096	0.01980	$4,556	0.02748	$6,322
O10	4	$240,551	0.00002	0.00239	$574	0.00519	$1,248	0.00720	$1,732
W1	348	$76,992	0.00160	0.20370	$15,683	0.44269	$34,084	0.61431	$47,297
W2	795	$80,990	0.00366	0.46486	$37,649	1.01024	$81,820	1.40190	$113,540
W3	598	$93,507	0.00275	0.34985	$32,713	0.76030	$71,094	1.05506	$98,655
W4	311	$108,480	0.00143	0.18167	$19,708	0.39482	$42,830	0.54789	$59,434
W5	96	$126,632	0.00044	0.05638	$7,140	0.12253	$15,517	0.17004	$21,532
Subtotal	**22928**								
USMC Total	217172	Scenario Marine Subtotal		127	$6,033,272	276	$13,111,677	383	$18,194,827
O/E Ratio	**8.472**								

		Low		Medium		High	
Doctors	$156,616	7	$1,096,311	13	$2,036,006	19	$2,975,701
Surgeons	$159,331	4	$637,325	7	$1,115,319	10	$1,593,313
Nurses	$50,191	25	$1,254,776	50	$2,509,553	75	$3,764,329
Assistants	$96,276	7	$673,932	13	$1,251,589	19	$1,829,245
	Scenario Medical Subtotal	43	$3,662,345	83	$6,912,466	123	$10,162,588

		Low		Medium		High	
Food Packs[148]	$4.50	125,000	$562,500	250,000	$1,125,000	375,000	$1,687,500
Medical Supplies[149]	$3.77	50,000	$188,692	100,000	$377,384	150,000	$566,076
Tents[150]	$4,027	480	$1,932,806	960	$3,865,613	1,440	$5,798,419
	Scenario Supplies Subtotal		$2,683,998		$5,367,997		$8,051,995

	Low	Medium	High
Scenario Total	**$12,379,615**	**$25,392,140**	**$36,409,410**

Table 52: Additional Personnel and Supplies Cost

7. Sources of Error for Additional Personnel

By taking the entire Marine Corps as a demographic of our mission force, the integrated study team included certain personnel that may not actually be in the force. For example it is clear that the Commandant of the Marine Corps would not be stationed on the Phase Zero force however, the high side mission includes 0.0072 O10 pay. This can be dismissed if one considers

[148] World Food Programme, "Emergency Field Operations Pocketbook", http://www.unicef.org/emerg/files/WFP_manual.pdf, accessed May 01, 2009.

[149] Based on $7,000,000 worth of pharmaceutical and medical supplies delivered to Aceh Province, Indonesia assisting 1,854,876 people, http://www.projecthope.org/media/pdf/BestPracticesIndonesia.pdf, accessed May 01, 2009.

[150] Based on 24sqft per person housed in 50ft square "solar system" tents, http://nsc.natick.army.mil/media/print/Smartbook_Web.pdf, accessed May 01, 2009.

that a fraction of the Commandant's day may be spent dealing with the Phase Zero mission, however small that fraction may be. This rationale could also be extended to the rest of the ranks that may or may not be present in the force. The use of military doctors also was a point of contention. The doctors and surgeons were initially idealized as civilian and may have incurred larger costs as a result. Conversely, the doctors responding to the 2004 Indonesian tsunami were all volunteers.[151] Overall, this method of additional personnel cost estimation seemed reasonable.

G. HISTORIC GAP ANALYSIS

Partnership of the Americas 2007 (POA 2007) was a multi-month mission throughout Latin America and the Caribbean, which focused on enhancing relationships with regional partner nations through a variety of exercises and events at sea and on shore. [152] POA 2007 was commanded by Commander Destroyer Squadron 40 and consisted of the USS Pearl Harbor (LSD 52) with embarked units of the 24th Marine Regiment and Assault Craft Unit 1, USS Mitscher (DDG 57), USS Samuel B Roberts (FFG 58) with Helicopter Anti-Submarine Squadron Light (HSL) 48 detachment 7, and Chilean frigate Almirante Latorre (FFG 14) with one SH-32 "Super Puma". [153]

Units Assigned to Partnership of the Americas 2007 focused on operating in the multi-national environment while preparing to deal with unconventional threats such as illicit trafficking, and improving training levels in a variety of mission areas. [154] Participating ships also made a variety of port visits designed to promote goodwill and friendship with nations in the region distributing Project Handclasp materials to the citizens. [155] Project Handclasp received

[151] Project Hope, "Humanitarian Assistance and Beyond-Indonesia", http://www.projecthope.org/media/pdf/BestPracticesIndonesia.pdf, accessed May 01, 2009.
[152] United States Southern Command, Destroyer Squadron Four Zero, "Chilean Frigate Joins Partnership of the Americas" Press Release 16 Mar. 2007. http://www.southcom.mil/AppsSC/news.php?storyId=167 accessed on 30 Apr. 2009
[153] United States Southern Command, USS Pearl Harbor Public Affairs, "USS Pearl Harbor Joins Partnership of the Americas" Press Release 29 Mar. 2007. http://www.southcom.mil/AppsSC/news.php?storyId=192 accessed on 30 Apr. 2009
[154] United States Southern Command, Partnership of the America's 2007, http://www.southcom.mil/AppsSC/factFiles.php?id=7 accessed on 30 Apr. 2009
[155] United States Southern Command, Destroyer Squadron Four Zero, "U.S. Navy ship completes goodwill visit to El Salvador" Press Release 9 Aug. 2007. http://www.southcom.mil/AppsSC/news.php?storyId=622 accessed on 30 Apr. 2009

support from donors around the United States. Contributions include supplies such as medical kits, toys, hygiene products, sewing machines, and food items. [156]

The deployment had three stages: [157]

- **Stage 1** consisted of the participation in the Atlantic and Pacific phases of exercise UNITAS, and the Chilean exercise Teamwork South. Both series of exercises were designed to train participating navies in a variety of maritime scenarios, with each operating as a component of a multinational force to provide the maximum opportunity to improve interoperability.
- **Stage 2** involved a variety of Theater Security Cooperation (TSC) events in the Caribbean and Central America. TSC encompasses military-to-military cooperation, humanitarian assistance, disaster relief, combined training, exercises and operations, intelligence sharing and maritime security assistance within the region to achieve common goals.
- **Stage 3** concluded the deployment with participation in FA PANAMAX 2007, which is an annual exercise designed to assist the government of Panama in protecting the sovereignty and security of the Panama Canal.

The force put together under Task Force 40 for Partnership of the Americas 2007 was designed to conduct many of the Phase Zero missions identified in this report. By taking a closer look at the force's ability to carry out these missions we gained valuable insights into the compositions and capabilities required by a future force.

Civil Support:

The first of the missions that was explored was Civil Support. As part of this mission it was determined that a force would need to be able to perform in a humanitarian assistance role following a disaster. A full list of the requirements for this mission can be found in the Civil Support mission scenario. These requirements, such as being able to perform the mission for 5 days unsupported were combined with the assumed severity of the disaster. The disaster severity was determined by the number of personnel affected with 50,000 affected being the low severity, 100,000 affected being the mean severity and 150,000 affected being the high severity. This produced the requirements in the tables below. The available capacity was determined from the capabilities for the ships as listed in the current force capabilities appendix. From this it was

[156] United States Southern Command, Destroyer Squadron Four Zero, "U.S. Navy ship completes goodwill visit to El Salvador" Press Release 9 Aug. 2007. http://www.southcom.mil/AppsSC/news.php?storyId=622 accessed on 30 Apr. 2009

[157] United States Southern Command, Partnership of the America's 2007, http://www.southcom.mil/AppsSC/factFiles.php?id=7 accessed on 30 Apr. 2009

possible to determine how well the POA 2007 force would have fulfilled the mission requirements.

	Required	Available	Deficit	Requirement Met
Cargo Capacity	99,553 ft^3	40,560 ft^3	58,993 ft^3	40.74%
Aircraft Lift Capacity	1,238,200 lbs/day	622,694 lbs/day	615,506 lbs/day	50.29%
Water Production capacity	75,000 gal	61,388 gal	13,612 gal	81.85%

Table 53: POA 2007 High Severity Civil Support Mission Requirement Gap

	Required	Available	Deficit	Requirement Met
Cargo Capacity	66,458 ft^3	40,560 ft^3	25,898 ft^3	61.03%
Aircraft Lift Capacity	825,900 lbs/day	622,694 lbs/day	203,206 lbs/day	75.40%
Water Production capacity	50,000 gal	61,388 gal	-11,388 gal	122.78%

Table 54: POA 2007 Mean Severity Civil Support Mission Requirement Gap

	Required	Available	Deficit	Requirement Met
Cargo Capacity	33,362 ft^3	40,560 ft^3	-7,198 ft^3	121.57%
Aircraft Lift Capacity	413,600 lbs/day	622,694 lbs/day	-209,094 lbs/day	150.55%
Water Production capacity	25,000 gal	61,388 gal	-36,388 gal	245.55%

Table 55: POA 2007 Low Severity Civil Support Mission Requirement Gap

As shown in the above tables the Partnership of the America's 2007 force would have been able to complete the low severity Civil Support mission however, it would have been ill equipped to carry out the mean and high severity missions. The main gap in this force's capabilities would have been in the airlift requirement. Through modeling and analysis, the required number of each type of helicopters required for each mission severity was determined, as shown in the table below.

Scenario Severity	Low	Mean	High
SH-60's required:	2	17	43
MV-22's required:	1	5	13
CH-53's required:	1	3	7

Table 56: Number of Air Assets Required for Civil Support Mission

Table 56 shows the number of aircraft required to completely meet the air lift mission assuming a 85% availability. For example the aircraft required for the Low severity Civil Support mission was 2 SH-60, or 1 MV-22, or 1 CH-53. POA 2007 deployed with 2 SH-60 and one SH-32, meeting only the number of aircraft required for the low severity mission. The force deployed with one SH-32 "Super Puma" onboard the Chilean frigate Almirante Latorre. The SH-32 gave the force a relatively heavy lift capability of 7500 lbs. This would have allowed the force to under sling one HMMWV or other equipment such as generators or flood lights. This was a critical capability that the SH-60 alone could not meet. The low severity mission requires 115 Marines with 11 HMMWVs and therefore requires some heavy lift capability.

Anti-smuggling:

As shown in Modeling and Simulation (Section V.D.), 17 SH-60 helicopters were required to meet the Anti-smuggling requirement of 80% identification. In addition to this helicopter requirement, three intercept ships were also required. POA 2007 deployed with two Frigates and one Destroyer which met the number of intercept ship requirement however, it fell well short of the number of SH-60's required for 80% identification along the assumed 250 nm barrier width.

The POA forces deployed with some capabilities that would be of limited usefulness during Phase Zero operations. One of these was the Aegis weapons system. This system provided the force with a powerful air defense system however, in a Phase Zero atmosphere, this would be of little use. Instead the extra cost associated with an Aegis equipped destroyer could be saved by replacing the destroyer with another frigate. The frigate offered near equal speed and equal aircraft storage capability for approximately $13 million less per year.

The key lessons learned through this gap analysis were:

- The number of aircraft required for airlift was the limiting capability in the Civil Support mission area.

- The number of SH-60's required was the limiting capability in the Anti-smuggling mission area
- In Phase Zero there was little additional capability an Aegis destroyer or cruiser brought to the force over a frigate therefore it was more cost effective to substitute the more expensive destroyer or cruiser for a frigate.

H. OPTIMIZATION MODEL

The project team constructed a mixed-integer linear program for the Civil Support and Anti-smuggling missions to recommend an optimal force structure that fulfils the mission requirements while minimizing cost. In the first section, we discussed the formulation of an optimization model for the Civil Support mission and present the results of the model. In the second section, we discussed the formulation of an optimization model that combines both the requirements of the Civil Support and Anti-smuggling mission. The Anti-smuggling mission force structure components were outputs from a separate analytical model stating the number and type of platforms required. Thus the linear optimization model was used to select the appropriate platform and the respectively number of entities required to perform both missions while minimizing cost. Each of the mission areas were considered individually and then combined into a single output.

1. Civil Support Optimization

The delivery of aid and support to a disaster area consists of 2 stages: The first stage requires the transportation of all required supplies and personnel via a ship platform near the disaster site; stage 2 involves the ship-to-shore transportation of personnel, logistics and equipment through the use of helicopters to the affected area. To model stage 1 of the operations, it was necessary to translate the mission requirements into units that can be contrasted with the platform capabilities. Hence the food, medical and other Civil Support supplies were translated into cubic feet (ft^3) to ensure that the volume requirements (i.e. typical measure used for ship storage space) of the supplies were met by the respective ship platform under considerations. On the other hand, the vehicle storage space which was typically measured by the floor space occupied was translated into square feet (ft^2). To model Stage 2 of the operations, it was necessary to translate the mission requirements into units that could be contrasted with the platform capabilities. There were two key categories of requirements, i.e. the daily max rate supply required and the total supply required over the 5-day mission period. Given that the daily

max rate supply imposed a higher demand, satisfying it would enable the force to meet the total supply required over the 5-day mission period as well. For items where daily max supply rate was not specified, the average (over the 5-day period) could be used to work out the overall daily demand that had to be met for the mission.

Based on the operational practice of using the external sling for cargo/vehicle lifting (without internal load) and transporting passengers using cabin space (without external load) for transfer efficiency, the maximum daily sorties achievable for each platform was computed and summarized in the table below. The calculation took into consideration the above-mentioned platform capability, types of load that the platform could carry, penetration distance (i.e. distance of disaster area from the shoreline) and supply requirements for the respective severity scenarios.

S/N	Scenario Severity	Airlift Platform Type		
		SH-60S	**MV-22**	**MH-53K**
A.	**For General Supply**			
1.	Low	52	70	59
2.	Mean	12	17	14
3.	High	6	10	8
A.	**For Equipment Supply**			
1.	Low	Not Capable	70	59
2.	Mean		17	14
3.	High		10	8
C.	**For Passenger**			
1.	Low	24	29	24
2.	Mean	11	17	12
3.	High	7	12	8

Table 57: Maximum Daily Sorties for Probable Airlift Platforms

Model Development:

Sets:

I: Set of ships available for force structure selection { CG-47 Ticonderoga, DDG-51 Burke, FFG-7 Perry, LCC-19 Blue Ridge, LHA-1 Tarawa, LHD-1 Wasp, LPD-17 San Antonio, LPD-4 Austin, LSD-41 Whidbey Island, LSD-49 Harpers Ferry, USCG FRC, LCS-1 Freedom, JHSV, LHA-6 America, M-80 Stiletto, JMSDF DDH Hyuga, Visby }

J: Set of helicopters available for force structure selection { MV-22 Osprey, MH-53K Super Stallion, SH-60 Seahawk }

K: Set of aircraft sortie types {passenger lift, general supply lift, equipment lift}

Indices:

Index	Platform
i	**Ship**
1	CG-47 Ticonderoga
2	DDG-51 Burke
3	FFG-7 Perry
4	LCC-19 Blue Ridge
5	LHA-1 Tarawa
6	LHD-1 Wasp
7	LPD-17 San Antonio
8	LPD-4 Austin
9	LSD-41 Whidbey Island
10	LSD-49 Harpers Ferry
11	USCG FRC
12	LCS-1 Freedom
13	JHSV
14	LHA-6 America
15	M-80 Stiletto
16	JMSDF DDH Hyuga
17	Visby
j	**Aircraft**
1	RQ-8 Fire Scout
2	MV-22 Osprey
3	MH-53K Super Stallion
4	SH-60 Seahawk
k	**Airlift Sortie**
1	Sortie to support passenger lifting
2	Sortie to support general supply
3	Sortie to support equipment supply

Table 58: Optimization Index

Data:

S/N	Data	Unit
1.	Ship_cargo_ capacity$_i$	ft^3
2.	Ship_ vehicle _storage$_i$	ft^2
3.	Ship_ passenger_ capacity$_i$	Pax
4.	Sortie_ general_supply_ daily _capacity$_j$	Lbs
5.	Sortie _ equipment_supply_ daily _capacity$_j$	Sets
6.	Sortie _ passenger_ daily _capacity$_j$	Pax
7.	Number_aircraft$_{jk}$	# aircraft
8.	Number_aircraft_per_ship$_{ij}$	# aircraft per ship

Table 59: Data for Mission Support Operations

Decision Variables:

X_i : Number of ships of type i [# of ships]

Y_j : Number of aircraft of type j [# of aircraft]

Y_{ij}: Number of organic aircraft of type j for ship type i [# of aircraft]

Z_{jk} : Number of sortie of type k for aircraft of type j [# of aircraft sortie]

Formulation:

Min $\sum_{i \in I} c_i X_i + \sum_{j \in J} c_j Y_j$

(1) $\sum_{i \in I} \text{Ship}_{\text{cargo}[\,]_{\text{capacity}_i}} \times X_i \geq \text{Total}_{\text{weight}_{\text{of}[\,]\text{supplies}}}$

(2) $\sum_{i \in I} \text{Ship}_{\text{vehicle}[\,]_{\text{storage}_i}} \times X_i \geq \text{Total}_{\text{volume}_{\text{of}_{\text{supplies}}}}$

(8) $\sum_{i \in I} \text{Ship}_{\text{passenger}[\,]_{\text{capacity}_i}} \times X_i \geq \text{Total}_{[\,][\,]\text{number}_{\text{of}_{\text{passengers}}}}$

(4) $\sum_{j \in J, k \in K} \text{Sortie}_{\text{general}_{\text{supply}[\,]_{\text{daily}_{\text{capacity}_j}}}} \times Z_{jk} \geq \text{Total}_{\text{number}_{\text{of}_{\text{general}_{\text{supply}_{\text{lifted}_{\text{per}_{\text{day}[\,]}}}}}}}$

(5) $\sum_{j \in J, k \in K} \text{Sortie}_{\text{equipment}_{\text{supply}[\,]_{\text{daily}_{\text{capacity}_j}}}} \times Z_{jk} \geq \text{Total}_{\text{number}_{\text{of}_{\text{equipment}_{\text{supply}_{\text{lifted}_{\text{per}_{\text{day}[\,]}}}}}}}$

(6) $\sum_{j \in J, k \in K} \text{Sortie}_{\text{passenger}[\,]_{\text{daily}_{\text{capacity}_j}}} \times Z_{jk} \geq \text{Total}_{\text{number}_{\text{of}_{\text{passenger}_{\text{lifted}_{\text{per}_{\text{day}[\,]}}}}}}$

(7) $Z_{jk} \leq \text{Number}_{\text{aircraft}_{jk}} X_i \quad \forall j \in J, \quad k \in K$

(8) $Y_{ij} \leq \text{Number}_{\text{aircraft}_{\text{per}_{\text{ship}_{ij}}}} X_i \quad \forall i \in I, \quad j \in J$

(9) $Y_1 \geq 1$ (i.e. minimum one MH – 53K required)

(10) $Y_4 \geq 1$ (i.e. minimum one SH – 60 required)

(11) $X_i \geq 0 \quad \forall i \in I$

(12) $Y_j \geq 0 \quad \forall j \in J$

(13) $Z_{jk} \geq 0 \quad \forall j \in J, \quad k \in K$

Additional Assumptions:

Some additional assumptions were made to properly compare platforms for consideration. The mix of organic air platforms for each ship type had a linear relationship based on the capacity defined in Table 2. For example, given the CG-47 can house either 6 RQ-8 or 2 SH-60, we inferred that it could house 3 RQ-8 and 1 SH-60 concurrently (i.e. using a 3:1 conversion ratio). The time taken to reconfigure the air platform for different load-lifting was insignificant to have an impact on the defined maximum sorties per day rates established in Table 6 on the basis that it would be done infrequently.

Results:

The above model was run on a trial version of classic LINDO[158] for the following 6 scenarios: Run#1 – Low Severity Scenario using Current Force Assets only, Run#2 – Mean Severity Scenario using Current Force Assets only, Run#3 – High Severity Scenario using Current Force Assets only, Run#4 – Low Severity Scenario using Current and Future Force Assets, Run#5 – Mean Severity Scenario using Current and Future Force Assets, Run#6 – High Severity Scenario using Current and Future Force Assets.

[158] LINDO, A program for linear and integer programming, http://www.lindo.com/index.php?option=com_content&view=article&id=34&Itemid=15, accessed May 01, 2009.

Cat		LINDO Index	Platform	Current Force			Future Force		
			Severity Scenarios	Low	Mean	High	Low	Mean	High
Ship Platforms	Current Force	X_1	CG-47 Ticonderoga	-	-	-	-	-	-
		X_2	DDG-51 Burke	-	-	-	-	-	-
		X_3	FFG-7 Perry	-	-	-	-	-	-
		X_4	LCC-19 Blue Ridge	-	-	-	-	-	-
		X_5	LHA-1 Tarawa	-	-	-	-	-	-
		X_6	LHD-1 Wasp	-	1	1	-	1	1
		X_7	LPD-17 San Antonio	-	-	-	-	-	-
		X_8	LPD-4 Austin	1	-	-	-	-	-
		X_9	LSD-41 Whidbey Island	-	-	-	1	-	-
		X_10	LSD-49 Harpers Ferry	-	-	-	-	-	-
	Future Force	X_11	USCG FRC	N.A	N.A	N.A	-	-	-
		X_12	LCS-1 Freedom	N.A	N.A	N.A	-	-	-
		X_13	JHSV	N.A	N.A	N.A	1	-	-
		X_14	LHA-6 America	N.A	N.A	N.A	-	-	-
		X_15	M-80 Stiletto	N.A	N.A	N.A	-	-	-
		X_16	JMSDF DDH Hyuga	N.A	N.A	N.A	-	-	-
		X_17	Visby	N.A	N.A	N.A	-	-	-
		Y_1	RQ-8 Firescout	N.A	N.A	N.A	-	-	-
Air Platforms	Current Force	Y_2	MV-22 Osprey	-	-	-	-	-	-
		Y_3	MH-53K Super Stallion	1	2	6	1	2	6
		Y_4	SH-60 Seahawk	1	2	1	1	2	1
			Total Cost (US$M)	**93.671**	**132.519**	**165.526**	**88.255**	**132.519**	**165.526**

Table 60: Results for Civil Support Mission Only

For the low severity mission using current force assets, the recommended force structure consisted of 1 LHD-4, 1 MH-53K Super Stallion and 1 SH-60 Seahawk at a cost of $93.671 million dollars. With the introduction of future force assets, the cost was reduced to $88.255

million dollars by replacing the LHD-4with the existing LSD-41 and the JHSV. The JHSV platform essentially provided the additional facility required to support the organic air platform operation.

The Future Force assets did not contribute to the medium and high severity mission support. The existing force assets could be deployed to provide the optimal force structure to support the medium and high severity mission at a cost $132.519 million dollars and $165.526 million dollars respectively. The recommended force structure for the medium severity mission consisted of 1 LHD-1, 2 MH-53Ks, and 2 SH-60s and for the high severity mission, 1 LHD-1, 6 MH-53Ks and 1 SH-60.

Across all the 3 different levels of severity, a single ship is sufficient, the LHD-1 was sufficient. However for stage 2 of the operation where personnel and supplies are airlifted to the affected area, the number and type of helicopters required differs from mission to mission with the number required increasing with the level of severity. The following table summarizes how the airlift platforms should be deployed for the different load types and the respective number of sorties involved as recommended by the optimization model. A difference in the MH-53K Super Stallion and SH-60 Seahawk sortie distribution for high severity mission (Current vs. Future force) was observed, though the number of aircraft for both scenarios was the same. This was due to the spare lift capacities in the optimal solution and that the model was optimized for platform annualized life cycle cost rather than aircraft sortie-level costs.

LINDO Index	Platform	Current Force			Future Force		
	Severity Scenarios	Low	Mean	High	Low	Mean	High
Y_2	**MV-22 Osprey**	**-**	**-**	**-**	**-**	**-**	**-**
Z_21	- Sorties for Passenger Lifting	-	-	-	-	-	-
Z_22	- Sorties or General Supply	-	-	-	-	-	-
Z_23	- Sorties for Equipment Supply	-	-		-	-	-
Y_3	**MH-53K Super Stallion**	**1**	**2**	**4**	**1**	**2**	**4**
Z_31	- Sorties for Passenger Lifting	1	-	1	1	-	2
Z_32	- Sorties or General Supply	7	28	46	16	28	46
Z_33	- Sorties for Equipment Supply	3	5	7	3	5	5
Y_4	**SH-60 Seahawk**	**1**	**2**	**1**	**1**	**2**	**1**
Z_31	- Sorties for Passenger Lifting	-	6	4	-	6	-
Z_32	- Sorties or General Supply	50	16	-	-	16	-
Z_33	- Sorties for Equipment Supply	Not Capable					

Table 61: Recommended Air Platforms and Number of Sorties for Civil Support Only

2. Combining Civil Support Anti-smuggling Missions

The Anti-smuggling mission force structure components were outputs from a separate analytical model stating the number and type of platforms required. Thus the linear optimization model was used to select the appropriate platform and the respectively number of entities required to perform both missions while minimizing cost. The output of the analytical model provided the following constraints on Anti-smuggling operations. A total of 17 aircraft were required to provide the sensor coverage in fulfilling the Anti-smuggling objectives. The MH-53 was not considered for selection. A factor of 1.214 was applied to the RQ-8 to account for its longer endurance in providing the sensor coverage. A set of interceptors were required to provide interception for the detected targets in fulfilling the Anti-smuggling objectives. The number required for each ship platform type, was pre-defined based on the number-speed chart provided in the interceptor discussion above. This imposes additional constraints on the original model formulated strictly for the Civil Support missions. These constraints were formulated accordingly and added to the original model so that an optimal force structure that could fulfill both missions could be established.

Additional Data:

S/N	Data	Unit
1.	Number _of_antiSmug_aircraft_needed	# aircraft
2.	Number _of_antiSmug_ship _needed_for_type i	# ship
3.	Number _of_antiSmug_ship _needed	# ship

Table X. Additional Data for Anti-smuggling Mission

Additional Constraints:

$$X_i - \text{Number}\square_{\text{of}_{\text{antiSmug}_{\text{ship}_{\text{needed}_{\text{for}_{\text{type}i}}}}}} \geq 0 \quad \forall i \in I$$

$$\sum_{i \in I} \square\ \text{Number}\square_{\text{of}_{\text{antiSmug}_{\text{ship}_{\text{needed}_{\text{for}_{\text{type}i}}}}}} \geq Total_{\text{number}_{\text{antiSmug}_{\text{ship}_{\text{needed}}}}}$$

$$1.214Y_1 + Y_2 + Y_4 \geq \text{Number}_{\text{of}_{\text{antiSmug}_{\text{aircraft}_{\text{needed}}}}}$$

Results:

Cat		LindoIndex	Platform	Current Force Only			Current & Future Force		
			Severity Scenarios	Low	Mean	High	Low	Mean	High
Ship Platforms	Current Force	X_1	CG-47 Ticonderoga	-	-	-	-	-	-
		X_2	DDG-51 Burke	-	-	-	-	-	-
		X_3	FFG-7 Perry	-	-	-	-	-	-
		X_4	LCC-19 Blue Ridge	-	-	-	-	-	-
		X_5	LHA-1 Tarawa	-	-	-	-	-	-
		X_6	LHD-1 Wasp	1	1	1	-	1	1
		X_7	LPD-17 San Antonio	-	-	-	-	-	-
		X_8	LPD-4 Austin	-	-	-	-	-	-
		X_9	LSD-41 Whidbey Island	-	-	-	-	-	-
		X_10	LSD-49 Harpers Ferry	4	4	4	-	-	-
	Future Force	X_11	USCG FRC	N.A	N.A	N.A	-	-	-
		X_12	LCS-1 Freedom	N.A	N.A	N.A	-	-	-
		X_13	JHSV	N.A	N.A	N.A	3	-	-
		X_14	LHA-6 America	N.A	N.A	N.A	-	-	-
		X_15	M-80 Stiletto	N.A	N.A	N.A	-	3	3
		X_16	JMSDF DDH Hyuga	N.A	N.A	N.A	-	-	-
		X_17	Visby	N.A	N.A	N.A	-	-	-
Air Platforms		Y_1	RQ-8 Firescout	N.A	N.A	N.A	14	13	6
	Current Force	Y_2	MV-22 Osprey	-	-	2	-	-	9
		Y_3	MH-53K Super Stallion	1	1	1	1	2	1
		Y_4	SH-60 Seahawk	17	17	15	1	2	1
Total Cost (US$M)				**424.387**	**424.387**	**427.459**	**155.329**	**186.753**	**219.108**

Table 62: Results for Civil Support and Anti-smuggling

The following table summarizes the revised airlift platform deployment for the mission support operation taking into consideration of their capability in support for the Anti-smuggling operation as well.

LINDO Index	Platform	Current Force Only			Current & Future Force		
	Severity Scenarios	Low	Mean	High	Low	Mean	High
Y_2	**MV-22 Osprey**	**-**	**-**	**2**	**-**	**-**	**9**
Z_21	- Sorties for Passenger Lifting	-	-	3	-	-	17
Z_22	- Sorties or General Supply	-	-	14	-	-	107
Z_23	- Sorties for Equipment Supply	-	-	-	-	-	-
Y_3	**MH-53K Super Stallion**	**1**	**1**	**1**	**1**	**2**	**1**
Z_31	- Sorties for Passenger Lifting	1	-	-	-	-	-
Z_32	- Sorties or General Supply	16	14	8	59	28	8
Z_33	- Sorties for Equipment Supply	3	5	5	3	5	5
Y_4	**SH-60 Seahawk**	**17**	**17**	**15**	**1**	**2**	**1**
Z_31	- Sorties for Passenger Lifting	-	6	-	23	6	7
Z_32	- Sorties or General Supply	-	197	105	-	17	-
Z_33	- Sorties for Equipment Supply	Not Capable					

Table 63: Recommended Air Platforms and Number of Sorties

The suggested "mother" ships for the respective air platforms were summarized in the following table. In most of the force structures proposed, the air platforms were housed in one common "ship" except for the mean and high severity scenarios using the Current Force assets only whereby the SH-60s were split across the LHD-1 and LSD-49. Further analysis showed the LHD-1 capable of housing all the SH-60s together with other air platforms. A difference in sortie distribution for Civil Support missions was observed in the Current Force model for the low and mean scenarios. Again, this was due to the spare lift capacities in the optimal solution and the fact that the model was optimized for platform annualized lifecycle cost rather than aircraft sortie-level costs.

Platform	Current Force Only (# Air Platforms / "Mother" Ship)			Current & Future Force (# Air Platforms / "Mother" Ship)		
Severity Scenarios	Low	Mean	High	Low	Mean	High
RQ-8 Firescout	Not Applicable			14 / JHSV	13 / LHD-1	6 / LHD-1
MV-22 Osprey	-	-	2 / LSD-49	-	-	9 / LHD-1
MH-53K Super Stallion	1 / LHD-1	1 / LHD-1	1 / LSD-49	1 / JHSV	2 / LHD-1	1 / LHD-1
SH-60 Seahawk	17 / LHD-1	8 / LSD-49 9 / LHD-1	2 / LSD-49 13 / LHD-1	1 / JHSV	2 / LHD-1	1 / LHD-1

Table 64: Recommended "Mother" Ships for Respective Air Platforms

3. Optimization Outputs

Using linear optimization and the previously mentioned constraints, the current and future force structures were derived. These optimized force structures were used as an input to develop the final recommended for structures.

a. Current Force Structure

For the low and mean severity scenarios, the linearly optimized force structure consisted of 1 LHD-1s, 4 LSD-49s, 1 MH-53K and 17 SH-60s at a cost of $424.387 million dollars. The SH-60s were chosen for smuggling detection and the LSD-49s were chosen in place of the M-80s. These differences contributed significantly to the higher costs for current force structure. For the high severity mission, the linearly optimized force structure consisted of 1 LHD-1, LSD-49s, 2 MV-22 Ospreys, 1 MH-53K and 15 SH-60s at a cost of $427.459 million dollars. Similarly, in replacement of the M-80, the LSD-49s was selected to be the interceptors for the Anti-smuggling mission. However we can see that for the higher severity scenarios, the number of MV-22s increased as it was more suited for the Civil Support mission (and cheaper than the MH-53K) while the number of SH-60s, which were more cost effective for the Anti-smuggling mission, decreased, indicating effective sharing of air assets across mission.

b. Future Force Structure

For the low severity mission, the linearly optimized force structure consisted of 3 JHSVs, 14 RQ-8Bs, 1 MH-53K and 1 SH-60 at a cost of $155.329 million dollars. For the medium severity mission, the linearly optimized force structure consisted of 1 LHD-1, 3 M-80s, 13 RQ-8Bs, 2 MH-53Ks and 2 SH-60s at a cost of $186.753 million dollars. For the high severity mission, the linearly optimized force structure consisted of 1 LHD-1, 3 M-80s, 6 RQ-8Bs, 9 MV-22s, 1 MH-53K and 1 SH-60 at a cost of $219.108 million dollars. As with the Civil Support-only model, the number of air platforms required increased with scenario severity. When requirements of the Civil Support and Anti-smuggling missions were combined, we saw that the number of RQ-8Bs, which were used solely for the Anti-smuggling mission, decreased for higher severity scenarios.

I. CURRENT AND FUTURE FORCE STRUCTURES

The third and fourth phases of force structure selection were to develop current and future force structures that could meet all mission requirements for the lowest cost while taking into account the information contained in threat study and to use optimization to fine tune the force selection. With the requirements for the Civil Support mission being broken into three severities three possible force configurations were developed for both the force utilizing only current platforms and for the force utilizing current and future platforms. This produced a total of six force structures, each of which completely fulfilled all requirements for the Civil Support, Anti-smuggling, and Information Sharing missions.

1. Current Force Structure Selection

The selection of the current force was based on the following assumptions:

- Will only be required to perform Civil Support mission or Anti-smuggling mission at a given time.
- Force must meet all mission requirements.
- LCS and JHSV are considered to be future ships.
- Total annual cost of the force will be for procurement and operating costs of the ships and aircraft.
- Must have at least one heavy lift helicopter in force.
- Must have at least one SH-60 in force.
- Heavy lift helicopters cannot perform Anti-smuggling mission.
- Force will be able to resupply from normal forward deployed supply ships and does not require a dedicated supply ship.
- Aircraft have an 85% availability.

During the force selection process it became clear that several key parameters were going to have a large impact on the force selected. The first and the most critical of these parameters was the number of SH-60 helicopters required to perform the Anti-smuggling mission. From modeling it was determined that 17 SH-60 helicopters would be required to maintain six helicopters on the barrier at any given time. This requirement drove the force to include a large deck amphibious ship. Despite the relatively large cost of the LHD/LHA it was more cost effective to use this ship vice the larger number of smaller ships that would be required to base the aircraft. The next largest ship, the LPD 17 class, was only designed to support four SH-60 helicopters. With the of basing several SH-60s on intercept vessels, the force required at a minimum three LPD 17 class ships which had a greater annualized cost than an LHD or LHA.

The number of intercept vessels required for the Anti-smuggling mission was the second force driving requirement. The number of intercept ships required was based on the speed of the intercept ship and the barrier distance as detailed in the modeling section. To meet the requirement the forces needed three ships that could travel at 30kts.

The number and type of aircraft required to meet the airlift requirement was the third key parameter. This requirement further necessitated the use of a large deck platform. The table below shows the number of aircraft required based on the mission severity. The number of aircraft listed in the table fulfill the lift requirement with only that type of platform. For example the numbers of aircraft needed to meet the airlift requirement for the high intensity Civil Support mission were 43 SH-60s, or 13 MV-22s, or 7 CH-53s. There was no requirement that the force consist of only one type of aircraft and a combination of these three platforms could have been utilized.

Scenario Severity	Low	Mean	High
SH-60's required:	2	17	43
MV-22's required:	1	5	13
CH-53's required:	1	3	7

Table 65: Number of Air Assets Required for Civil Support Mission

The fourth key parameter was the cargo capacity required for the Civil Support mission. In most cases this parameter was less of a driving factor than the three parameters above. The relatively large amount of cargo, extra medical personnel, and marines that needed to be transported made it necessary for the selection of at least one amphibious ship to be included with the current force structures.

These four parameters were not the only parameters taken into consideration for the development of the force structures, however, they were the most limiting. Some other parameters taken into consideration were the amount of excess water production needed for Civil Support mission, vehicle space requirements, on board medical facilities, self defense capability, and the ability to perform all thirteen missions.

a. Current Force Structure, High Severity:

In the high severity case the force selection was primarily driven by the number of aircraft required to carry out the Anti-smuggling and Civil Support mission. The most economical plan for the selection of aircraft was to utilize the 17 SH-60 helicopters required for the Anti-smuggling mission in both the Anti-smuggling mission and the Civil Support missions. The remaining lift requirement was fulfilled by inserting the required number of CH-53 helicopters. In the high severity case this required four CH-53 helicopters in addition to the 17 SH-60 helicopters.

With the number of air assets set, the mix of surface platforms was primarily determined by the amount of flight deck and hangar space available for the required aircraft and the number of intercept vessels required. Three FFG 7 class frigates were chosen to fulfill the intercept vessel requirement. The FFG 7 had approximately the same top speed of a DDG 51 class ship and the same size flight deck and hangar space, which in the Anti-smuggling model made the ships equal for intercept purposes. The FFG 7 was chosen because each FFG 7 costed $13 million less per year than a DDG 51.

With six of the required 17 SH-60 helicopters assigned to the three FFG 7 class ships, the remaining 11 SH-60 and four CH-53 helicopters had to be based on the other ships selected for the force. Several possible combinations of ships were considered, however, the large number of aircraft made the LHD 1 class the most economical choice. The LHD 1 class with its large cargo capacity, vehicle space, troop space, and command and control systems allowed for all other mission requirements to be filled with a single hull.

The need for a large deck amphibious ship was confirmed by the optimization done during the modeling phase. The optimization used one LHD 1 class ship with four LSD-49 class ships. In the optimization the LSDs were used as intercept vessels instead of three FFGs. In the final force structure selected for the High severity mission three FFG 7 class ships were utilized due to the cost savings over four LSD 49 class ships.

The aircraft mix developed through optimization was one CH-53, two MV-22s and 15 SH-60Bs. The reduced numbers of SH-60s was due to the two MV-22s ability to be used for both heavy lift and barrier patrol. The MV-22 was not equipped with a surface search radar or Forward Looking Infrared system and was therefore not as well adapted for this mission as the SH-60B. Also considered was the increased logistical concerns placed on the force by having an

additional type of aircraft in the force structure. The final factor that drove the recommended aircraft mix was that the mix of aircraft developed through optimization did not fully meet the daily maximum lift requirement. The final mix of aircraft recommended was four CH-53s and 17 SH-60Bs.

The force selected for the high severity case using only current platforms was as follows:

- LHD 1 class
  - (4) CH-53
  - (11) SH-60B
- (3) FFG 7 class
  - (6) SH-60B

The following table shows the forces ability to fulfill some of the selected mission requirements.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	99,553	109,000	109%
Vehicle Storage Requirement (ft^2):	6,080	20,900	344%
Water production(gal/day):	75,000	131,761	176%
Medical/Marine personnel	491	1685	343%
Airlift capability:			
(lbs/day):	**1,238,200**	**1,453,500**	117%
Personnel/day:	**99**	**99**	100%
Equipment/day:	**16**	**16**	100%
SH-60 required for Anti-smuggling	17	17	100%

Table 66: Current Force, High Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $422 million as shown in the table below. This was based on the cost analysis presented in the cost section of this paper which took into account the number of each platform required. The cost of medical personnel required for Civil Support, Marines required for security during a Civil Support mission, and Civil Support mission specific supplies and equipment costs which were independent of the force selected but also had to be taken into account for the total cost of the Phase Zero force. The total

annual cost of the force including support personnel and equipment for the Civil Support mission was $460 million.

Platform	Quantity	Annualized Cost/ Unit
LHD-1 Wasp	1	$101,103,230
FFG-7 Perry	3	$60,184,272
SH-60 Seahawk	17	$5,965,275
MH-53 Super Stallion	4	$9,742,892
	Total	$422,037,218

Table 67: Current Force, High Severity Annual Cost

b. Current Force Structure, Mean Severity:

The most constraining mission requirements for the force were the number of aircraft and intercept ships required for Anti-smuggling. As with the high severity force structure the 17 SH-60 helicopters necessitated the selection of an LHD 1 class ship. With 17 SH-60 aircraft, only one heavy lift helicopter was required to transport vehicles, personnel, and equipment. The mix of ships selected was the same as the high severity case. The difference between the high severity and mean severity cases were the number of aircraft required.

The optimization agreed with the force structure for the mean severity mission with the exception of the intercept vessels. Similarly to the high severity scenario, the optimization suggested the use of four LSD-49 class ships as the intercept vessels. The recommended force structure consisted of three FFG-7 class vessels for this role for the reasons as stated under the high severity scenario.

<u>The force selected for the mean severity case using only current platforms was as follows</u>:

- LHD 1 class
  - (1) CH-53
  - (11) SH-60B
- (3) FFG 7 class
  - (6) SH-60B
  -

The following table shows the forces ability to fulfill some of the selected mission requirements.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	66,458	109,000	164%
Vehicle Storage Requirement (ft^2):	3,880	20,900	539%
Water production(gal/day):	50,000	131,761	264%
Medical/Marine personnel	359	1685	469%
Airlift capability:			
(lbs/day):	**825,900**	**1,575,500**	191%
Personnel/day:	**72**	**72**	100%
Equipment/day:	**11**	**11**	100%
SH-60 required for Anti-smuggling	17	17	100%

Table 68: Current Force, Mean Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $392.8 million as shown in the table below. The total annual cost of the force including support personnel and equipment for the Civil Support mission was $422.8 million.

Platform	Quantity	Annualized Cost/ Unit
LHD-1 Wasp	1	$101,103,230
FFG-7 Perry	3	$60,184,272
SH-60 Seahawk	17	$5,965,275
MH-53 Super Stallion	1	$9,742,892
	Total	$392,808,605

Table 69: Current Force, Mean Severity Annual Cost

c. Current Force Structure, Low Severity:

The force selected for the low severity case was the same as the force selected in the mean severity case. The use of a large ship such as an LHD appeared excessive when looking at

the requirement fulfillment rate. However, due to the constraint that the force must meet 100% of all requirements, the LHD proved to be the most economical platform. The optimization also selected the same force for both the mean and low severity missions.

The force selected for the low severity case using only current platforms was as follows:

- LHD 1 class
  - (1) CH-53
  - (11) SH-60B
- (3) FFG 7 class
  - (6) SH-60B

The following table shows the forces ability to fulfill some of the selected mission requirements.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	33,362	109,000	327%
Vehicle Storage Requirement (ft^2):	2,080	20,900	1005%
Water production(gal/day):	25,000	131,761	527%
Medical/Marine personnel	158	1685	1066%
Airlift capability:			
(lbs/day):	**413,600**	**3,942,000**	953%
Personnel/day:	**32**	**32**	100%
Equipment/day:	**6**	**6**	100%
SH-60 required for Anti-smuggling	17	17	100%

Table 70: Current Force, Low Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $392.8 million as shown in the table below. The total annual cost of the force including support personnel and equipment for the Civil Support mission was $411.8 million.

Platform	Quantity	Annualized Cost/ Unit
LHD-1 Wasp	1	$101,103,230
FFG-7 Perry	3	$60,184,272
SH-60 Seahawk	17	$5,965,275
MH-53 Super Stallion	1	$9,742,892
	Total	$392,808,605

Table 71: Current Force, Low Severity Annual Cost

d. Recommended Current Force Structure:

The recommended force utilizing only current platforms was the force which was capable of performing the high severity mission for a total annual cost of $460 million. The small increase in cost over the other two lower severity scenarios was outweighed by the increase in capabilities.

- LHD 1 class
  - (4) CH-53
  - (11) SH-60B
- (3) FFG 7 class
  - (6) SH-60B

2. Future Force Selection

The selection of the future force was based on the following assumptions:

- Will only be required to perform Civil Support mission or Anti-smuggling mission at a given time.
- Force must meet all mission requirements.
- Total annual cost of the force will be for procurement and operating costs of the ships and aircraft.
- Must have at least one heavy lift helicopter in force.
- Must have at least one SH-60 in force.
- Heavy lift helicopters cannot perform Anti-smuggling mission.
- Force will be able to resupply from normal forward deployed supply ships and does not require a dedicated supply ship.
- Platforms currently built by other nations may be selected.
- Force may be composed of current platforms as well as future platforms.
- If platform is currently produced in another nation it can be produced and procured in this nation for approximately the same cost.
- Platform must be capable of being produced and fielded by 2020.
- Future aircraft will have an 85% availability rate.

By using a force consisting of both current and future ships more flexibility was added to the selection process. As shown in the modeling portion of this report, the increased endurance of an unmanned aerial vehicle reduced the number of aircraft required for the Anti-smuggling mission. The RQ-8 Fire Scout was selected as our Phase Zero force's UAV at the completion of a detailed trade study. The RQ-8 was considerably smaller than the SH-60, which greatly reduced the amount of flight deck and hangar space required by the force. The ability to spot three RQ-8s in place of one SH-60 removed the need for a large deck ship from all the three severity categories. The disadvantage that the integrated study team identified in using the RQ-8 that the Fire Scout was not able to carry cargo and therefore could only be used as a communications relay and airborne surveillance platform during the Civil Support mission.

The number of aircraft required for Anti-smuggling remained a key parameter in the future force selection but with the selection of the RQ-8, was no longer the most limiting on the force. This importance was shifted to the number of aircraft required to achieve the desired lift rate for the Civil Support mission. With a smaller number of CH-53Ks required than MV-22s or SH-60s, the CH-53K was selected as the primary helicopter for Civil Support. While considerably fewer numbers of these aircraft were required, making them more cost effective, their large size reduced the number of ship classes that can support them.

The removal of the large deck ship placed a premium on cargo space in the future force. The Joint High speed vessel was used to supplement the cargo capacity of the force. The JHSV had a reconfigurable mission deck that could be used to store standard cargo containers which increased the force's cargo capability.

The future force also had more flexibility in the types of intercept vessels used. The requirement remained at three intercept ships however the replacement of the SH-60s with the RQ-8s allowed smaller, faster, and less expensive ships to be considered.

a. Future Force Structure, High Severity:

The selection of a future force was driven by the large airlift requirement for the Civil Support mission. The need to support a minimum of seven CH-53 helicopters drove the selection of surface forces. The most cost effective variation of this force utilized a helicopter destroyer built by Japan. While this ship was technically classified as a destroyer it could house up to eight CH-53 helicopters or up to 18 SH-60 helicopters making it what many would classify

as a light (20,000 tons) aircraft carrier. The Japanese DDH also had a 16 cell vertical launch system with a phased array radar. While the vertical launch system would be of little use in Phase Zero operations it could serve as a powerful self defense weapon. The large flight deck and hangar allowed all seven of the CH-53s required for the Civil Support mission to be based on the DDH as well as up to six of the RQ-8 Fire Scouts required for the Anti-smuggling mission.

Little information was available about the cargo capability of the Japanese DDH or the excess water production capability; therefore, it was assumed that the ship would only be able to carry enough supplies for the operations of the personnel and aircraft based onboard. It was also assumed that the ship would only be capable of producing 30,000 gallons per day of excess water. To increase the cargo carry capability of the force a JHSV was added. The JHSV would deploy with no organic helicopters but could support operations as required. To add more water production capacity a Tactical Water Purification System (TWPS) was added to the force's equipment list. The TWPS was capable of producing 900 gallons per hour in extremely salty water, and up to 2000 gallons per hour in less salty water. This system was also transportable by a CH-53 and took up approximately 100 square feet of vehicle space. In keeping with the base assumptions it was assumed that all water would be required to be supplied from the ships and transported to shore. In the event that water could be produced on shore the daily lift requirement for the force would decrease significantly.

A LPD 17 was also added to the force. This ship would be able to add cargo capacity to the force in order to meet the minimum volume required and add flight deck space for the force's two SH-60 helicopters and three RQ-8 Fire Scouts. The LPD 17 was also equipped with a 188 foot long well deck capable of supporting two M-80 Stilettos. The M-80s would serve the role of intercept platforms. The M-80 was a flexible weapons platform with a 50+ knot top speed and the ability to launch a RHIB. These two M-80 boats would fill the requirement for two of the three intercept ships needed for the Anti-smuggling mission.

The third intercept vessel was a Visby class corvette. The capabilities of the Visby were based on the Visby+ model which had a slightly larger flight deck making it capable of landing a SH-60 or supporting up to three RQ-8 Fire Scouts. These three Fire Scouts along with the six carried by the DDH and the three on the LPD 17 met the required number of aircraft for the barrier patrol.

Through optimization it was determined that the best platform to be utilized as an intercept vessel was the M-80 Stiletto. The optimization also highlighted the need for a large deck platform capable of supporting a large percentage of the air assets. The optimization chose the LHD to fill this role. However, after further analysis of the costs for the later ships in the LHD 1 class, it was determined that using several of the smaller platforms such as the JMSDF DDH, LPD 17 and JHSV were the more cost effective.

The force selected for the high severity case using current and future platforms was as follows:

- JMSDF DDH
  - (7) CH-53K
  - (6) RQ-8
- LPD-17
  - (2) SH-60
  - (3) RQ-8
  - (2) M-80 Stiletto
- JHSV
- Visby
  - (3) RQ-8

The following table shows the forces ability to fulfill some of the selected mission requirements.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	99,553	100,000	100%
Vehicle Storage Requirement (ft^2):	6,080	28,250	465%
Water production(gal/day):	75,000	77,486	103%
Medical/Marine personnel	491	880	179%
Airlift capability:			
(lbs/day):	**1,238,200**	**1,377,000**	111%
Personnel/day:	**99**	**99**	100%
Equipment/day:	**16**	**16**	100%
RQ-8 required for Anti-smuggling	12	12	100%

Table 72: Future Force, High Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $305.1 million as shown in the table below. The total annual cost of the force including support personnel and equipment for the Civil Support mission was $343.9 million.

Platform	Quantity	Annualized Cost/ Unit
JMSDF DDH Hyuga	1	$82,082,604
LPD-17 San Antonio	1	$68,580,414
JHSV	1	$14,091,366
HMS Visby Class	1	$14,805,403
M-80 Stiletto	2	$6,040,437
RQ-8 Firescout	12	$2,777,633
SH-60 Seahawk	2	$5,965,275
MH-53 Super Stallion	7	$9,742,892
	Total	$305,103,049

Table 73: Future Force, High Severity Annual Cost

b. Future Force Structure, Mean Severity:

The first step in the deriving the force to meet the mean severity scenario was to determine the number and type of air assets required to fulfill the airlift requirement for the Civil Support mission. It was determined that a mix of two CH-53 helicopters with two SH-60 helicopters would be capable of meeting this requirement. This relatively small number of air assets made it possible to eliminate the Japanese DDH from the mean severity scenario. The air assets would be based onboard the LPD 17 class ship and the JHSV. The JHSV would support two SH-60s and the LPD 17 would support two CH-53Ks. The JHSV would also support three of the RQ-8 Fire Scouts required for the Anti-smuggling mission.

With little flight deck space available for more aircraft the remaining nine RQ-8 Fire Scouts needed to be supported from the three required intercept vessels. This requirement led to the selection of three Visby class corvettes to fill the intercept role.

The force selected for the mean severity case using current and future platforms was as follows:

- JHSV
  - (2) SH-60
  - (3) RQ-8
- LPD-17
  - (2) CH-53K
- (3) Visby
  - (9) RQ-8

The following table shows the forces ability to fulfill some of the selected mission requirements.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	66,458	100,000	150%
Vehicle Storage Requirement (ft^2):	3,880	21,138	545%
Water production(gal/day):	50,000	58,948	118%
Medical/Marine personnel	359	880	245%
Airlift capability:			
(lbs/day):	**825,900**	**855,000**	103%
Personnel/day:	**72**	**72**	100%
Equipment/day:	**11**	**11**	100%
RQ-8 required for Anti-smuggling	12	12	100%

Table 74: Future Force, Mean Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $191.8 million as shown in the table below. The total annual cost of the force including support personnel and equipment for the Civil Support mission was $221.8 million.

Platform	Quantity	Annualized Cost/ Unit
LPD-17 San Antonio	1	$68,580,414
JHSV	1	$14,091,366
HMS Visby Class	3	$14,805,403
RQ-8 Firescout	12	$2,777,633
SH-60 Seahawk	2	$5,965,275
MH-53 Super Stallion	2	$9,742,892
	Total	$191,835,918

Table 75: Future Force, Mean Severity Annual Cost

c. Future Force Structure, Low Severity:

With the required airlift capability further reduced from two CH-53s to one CH-53 the LPD 17 was able to be replaced by another JHSV. A JHSV can support up to one CH-53 on its flight deck. The JHSV did have an aircraft bunker available on the same level as the flight deck, however, the CH-53s length precluded it from being fully covered. In this force one JHSV would support two SH-60s and three RQ-8 Fire Scouts as in the mean severity case. The second JHSV would support the single CH-53. The three Visbys which served as intercept vessels were again required to support three RQ-8 Fire Scouts each.

The optimization confirmed the use of the JHSV but called for three of them. It called for a JHSV to also fill the role of an intercept vessel. The difference in speed between the Visby and the JHSV required the JHSV to carry an additional 6 RQ-8 Fire Scouts. This negated any cost savings from removing the Visby and adding a JHSV.

The force selected for the low severity case using current and future platforms is as follows:

- JHSV
  - (2) SH-60
  - (3) RQ-8
- JHSV
  - (1) CH-53K
- (3) Visby
  - (9) RQ-8

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	33,362	68,000	204%
Vehicle Storage Requirement (ft^2):	2,080	28,240	1358%
Water production(gal/day):	25,000	25,600	102%
Medical/Marine personnel	158	210	133%
Airlift capability:			
(lbs/day):	**413,600**	**1,300,000**	314%
Personnel/day:	**32**	**32**	100%
Equipment/day:	**6**	**6**	100%
RQ-8 required for Anti-smuggling	12	12	100%

Table 76: Future Force, Low Severity Requirement Fulfillment

The annualized procurement and operating costs for this force was $127.6 million as shown in the table below. The total annual cost of the force including support personnel and equipment for the Civil Support mission was $146.7 million.

Platform	Quantity	Annualized Cost/unit
JHSV	2	$14,091,366
HMS Visby Class	3	$14,805,403
RQ-8 Firescout	12	$2,777,633
SH-60 Seahawk	2	$5,965,275
MH-53 Super Stallion	1	$9,742,892
	Total	$127,603,978

Table 77: Future Force, Low Severity Annual Cost

d. Recommended Future Force Structure:

The overall recommend future force structure was the one constructed for the high severity mission. This force was the most flexible force capable of being scaled and adapted to meet the changing requirements placed on a Phase Zero force. It would be capable of defending its self and be able to quickly adapt and support the transition to follow on phases should the need arise.

The Recommended future force structure was:

- JMSDF DDH
  - (7) CH-53K
  - (6) RQ-8
- LPD-17
  - (2) SH-60
  - (3) RQ-8
  - (2) M-80 Stiletto
- JHSV
- Visby
  - (3) RQ-8

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J. LOGISTICAL SUPPORT FOR THE PHASE ZERO FORCE

To sustain its operations, the Phase Zero force required food for its personnel, fuel for ships, and aviation fuel for the helicopters. The personnel included ship's crew, helicopter crew (including shipboard support personnel), Marines (to offer protection to Phase Zero force operating on land), and medical personnel. This section is comprised of three parts to address the logistic support for food, ship fuel and aviation fuel.

For aviation fuel requirements, the future force proved to be more fuel efficient than current force, with the highest consumption rate when operating in the high intensity category of the Civil Support mission. It was estimated that re-supply of aviation fuel had to be conducted every 9 days. This was based on not going below 70% aviation fuel reserve for the supporting vessels. For medium and low intensities, the re-supply period could be extended to 10 days.

For ship fuel requirements, the future force designed for high intensity operations conducting the Anti-smuggling mission required re-supply of ship fuel every 7 days, before any of the ships consumed more than 30% of its fuel capacity leaving a 70% fuel reserve. To conduct Civil Support operations, the re-supply period could be extended to 16 days.

For food requirements, the current force structure operating in high intensity comprised the most number of personnel, thus consumed the highest amount of food per day. It was noted that the future force would consume about 53% of the amount of food that the current force would consume in the same period of time. As the limiting logistic requirement lay with fuel, the re-supply frequency was determined by the rate of ship fuel consumption.

Based on the limiting constraint of ship/aviation fuel consumption, re-supply for the future force operating in high intensity was estimated to be required every 7 days for conducting Anti-smuggling operations, or 9 days for conducting Civil Support operations.

Type of Mission for Future Force operating in High Intensity	**No. of Days before Re-supply**
Anti-smuggling	7
Civil Support	9

Table 78: Future Force Logistical Endurance Summery Conclusions

1. Ship Fuel Support

Background:

A chief resource in the support of the specified missions was that of ship's fuel for mother ships. The mother ships served as the primary means of transporting the helicopter, personnel, cargo and equipment near the site of interest.

Calculation Premise:

The fuel load per day required was derived based on each ship travelling at: (a) 7 knots for Civil Support mission based on a ship normal operation of steaming in a box. And (b) 15 knots for Anti-smuggling mission based on the fact that the ship may have some short high speed sprints, followed by longer period of relatively slow speed operations, thus taking their average. Re supply of fuel will be carried out once the ship exhausted 30% of its capacity leaving a 70% fuel reserve.

The fuel consumption numbers (tons per nm) for the mother ships in use were:

No.	Ship Type	Displacement	Fuel Consumption in tons per nm	Estimated Fuel Consumption in tons per nm (from Plot)
1	LHD-1 Wasp class	40,500	0.65	-
2	FFG-7 OLIVER HAZARD PERRY-class	4100	0.14	-
3	LPD-17 SAN ANTONIO Class	24900	-	0.4
4	Joint High Speed Vessel (JHSV).	1464	-	0.06
5	Visby	600	-	0.05
6	JMSDF DDH	20,000	-	0.34

Table 79: Ship Fuel Consumption Rates

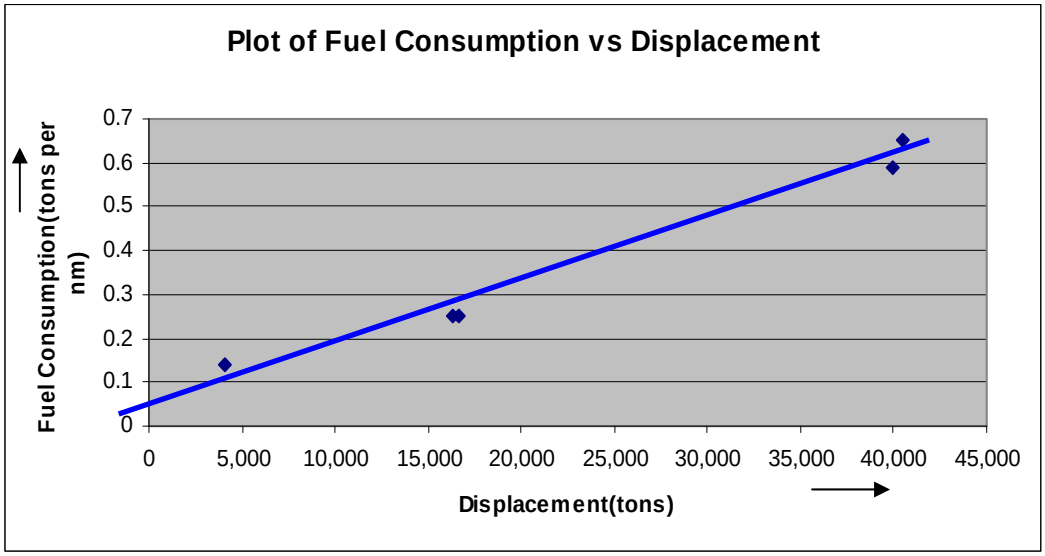

Figure 32: Ship Fuel Consumption Regression

The fuel capacity numbers (tons) for mother ships in use were:

Ship Type	Displacement	Ship Fuel Capacity (tons)	Estimated Ship Fuel Capacity (tons) [from plot]
LHD-1 Wasp class	40,500	6,200	-
FFG-7 OLIVER HAZARD PERRY-class	4100	587	-
LPD-17 SAN ANTONIO Class	24900	-	3500
Joint High Speed Vessel (JHSV).	1464	-	210
Visby	600	-	85
JMSDF DDH	20,000	-	3000
M80	45	-	7

Table 80: Ship Fuel Capacity

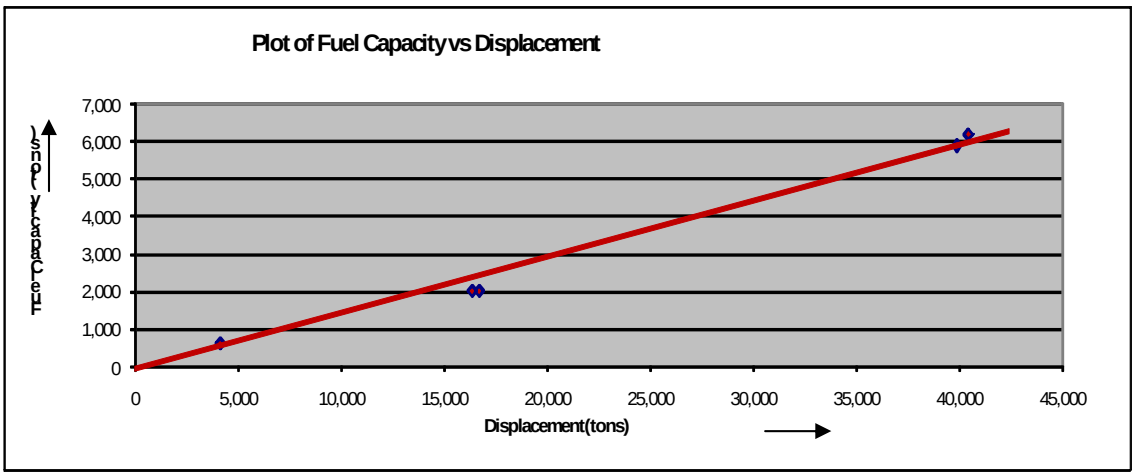

Figure 33: Ship Fuel Capacity Regression

Total Fuel Requirements Per Day:

For the current force, the fuel requirements per day for both Civil Support and Anti-smuggling missions were as follows:

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@7knots = 168nm per day)	Total Fuel consumption(tons) per Ship Type
Civil Support	High	LHD-1 Wasp class	1	109.64	109.64
		FFG-7 OLIVER HAZARD PERRY-class	3	23.48	70.44
	Total:				180.08
	Low/Medium	LHD-1 Wasp class	1	109.64	109.64
		FFG-7 OLIVER HAZARD PERRY-class	3	23.48	70.44
	Total:				180.08

Table 81: Civil Support Mission Fuel Consumption Rate, Current Force

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption(@15knots = 360nm per day)	Total Fuel consumption(tons) per Ship Type
Anti-smuggling	High	LHD-1 Wasp class	1	234.95	234.95
		FFG-7 OLIVER HAZARD PERRY-class	3	50.31	150.94
	Total:				385.89
	Low/Medium	LHD-1 Wasp class	1	234.95	234.95
		FFG-7 OLIVER HAZARD PERRY-class	3	50.31	150.94
	Total:				385.89

Table 82: Anti-smuggling Mission Fuel Consumption Rate, Current Force

For the future force, the fuel requirements per day for both Civil Support and Anti-smuggling missions were as follows:

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@7knots = 168nm per day)	Total Fuel consumption(tons) per Ship Type
Civil Support	High	JMSDF DDH	1	57.12	57.12
		LPD-17 SAN ANTONIO	1	62.16	62.16
		Joint High Speed Vessel (JHSV).	1	3.36	3.36
		Visby	3	1.68	5.04
				Total:	127.68
	Medium	Joint High Speed Vessel (JHSV).	1	3.36	3.36
		LPD-17 SAN ANTONIO Class	1	62.16	62.16
		Visby	3	1.68	5.04
				Total:	70.56
	Low	Joint High Speed Vessel (JHSV).	2	3.36	6.72
		Visby	3	1.68	5.04
				Total:	11.76

Table 83: Civil Support Mission Fuel Consumption Rate, Future Force

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@15knots = 360nm per day)	Total Fuel consumption(tons) per Ship Type
Anti-Smuggling	High	JMSDF DDH	1	122.40	122.40
		LPD-17 SAN ANTONIO	1	144.00	144.00
		Joint High Speed Vessel (JHSV).	1	7.20	7.20
		Visby	3	3.60	10.80
		M80	2	0.36	0.72
				Total:	285.12
	Medium	Joint High Speed Vessel (JHSV).	1	21.60	21.60
		LPD-17 SAN ANTONIO Class	1	144.00	144.00
		Visby	3	18.00	54.00
				Total:	219.60
	Low	Joint High Speed Vessel (JHSV).	2	21.60	43.20
		Visby	3	18.00	54.00
				Total:	97.20

Table 84: Anti-smuggling Mission Fuel Consumption Rate, Future Force

Number of days that ship can operate based on 30% fuel capacity:

For current force, the number of days that ship can operate based on 30% fuel capacity for both Civil Support and Anti-smuggling missions are as follows:

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@7knots = 168nm per day)	30% Fuel Capacity	Days that 30% fuel can sustain
Civil Support	High	LHD-1 Wasp class	1	109.64	1860.00	16.96
		FFG-7 OLIVER HAZARD PERRY-	3	23.48	176.10	7.50
	Low/Medium	LHD-1 Wasp class	1	109.64	1860.00	16.96
		FFG-7 OLIVER HAZARD PERRY-class	3	23.48	176.10	7.50

Table 85: Current Force Number of Days of Unsupported Operations, Civil Support Mission

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@15knots = 360nm per day)	30% Fuel Capacity	Days that 30% fuel can sustain
Anti-Smuggling	High	LHD-1 Wasp class	1	234.95	1860.00	7.92
		FFG-7 OLIVER HAZARD PERRY-	3	50.31	176.10	3.50
	Low/Medium	LHD-1 Wasp class	1	234.95	1860.00	7.92
		FFG-7 OLIVER HAZARD PERRY-class	3	50.31	176.10	3.50

Table 86: Current Force Number of Days of Unsupported Operations, Anti-smuggling Mission

For the future force, the number of days that ship can operate based on 30% fuel capacity for both Civil Support and Anti-smuggling missions are as follows:

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@7knots = 168nm per day)	30% Fuel Capacity	Days that 30% fuel can sustain
Civil Support	High	JMSDF DDH	1	57.12	900.00	15.76
		LPD-17 SAN ANTONIO	1	62.16	1050.00	16.89
		Joint High Speed Vessel (JHSV).	1	3.36	63.00	18.75
		Visby	3	1.68	25.50	15.18
		*LPD-17 +	4	67.20	1075.50	16.00
	Medium	Joint High Speed Vessel (JHSV).	1	3.36	63.00	18.75
		LPD-17 SAN ANTONIO Class	1	62.16	1050.00	16.89
		Visby	3	1.68	25.50	15.18
		*LPD-17 +	4	67.20	1075.50	16.00
	Low	Joint High Speed Vessel (JHSV).	2	3.36	63.00	18.75
		Visby	3	1.68	25.50	15.18
		*JHSV+Visby	5	5.04	88.50	17.56
*LPD-17+Visby = Visby fuel will be resupply by LPD-17						
*JHSV+Visby = Visby fuel will be resupply by JHSV						

Table 87: Future Force Number of Days of Unsupported Operations, Civil Support Mission

Mission Type	Mission Severity	Ship Type	Ship Quantity	Per day fuel consumption (@15knots = 360nm	30% Fuel Capacity	Days that 30% fuel can sustain
Anti-Smuggling	High	JMSDF DDH	1	122.40	900.00	7.35
		LPD-17 SAN ANTONIO	1	133.20	1050.00	7.88
		Joint High Speed Vessel (JHSV).	1	7.20	63.00	8.75
		Visby	3	3.60	25.50	7.08
		M80	2	0.36	2.10	5.83
		*LPD+Visby+M	6	144.72	1077.60	7.45
	Medium	Joint High Speed Vessel (JHSV).	1	7.20	63.00	8.75
		LPD-17 SAN ANTONIO Class	1	133.20	1050.00	7.88
		Visby	3	3.60	25.50	7.08
		*LPD+Visby	4	144.00	1075.50	7.47
	Low	Joint High Speed Vessel (JHSV).	2	7.20	63.00	8.75
		Visby	3	3.60	25.50	7.08
		*JHSV+Visby	4	18.00	88.50	4.92
*LPD+Visby+M80 = Visby and M80 fuel will be resupply by LPD-17						
*JHSV+Visby = Visby fuel will be resupply by JHSV						

Table 88: Future Force Number of Days of Unsupported Operations, Anti-smuggling Mission

Summary Table:

Force Type	Mission Type	Mission Severity	Constraint (Days)	Contraint (Ship type)
Current Force	Civil Support	High	7.50	FFG-7 OLIVER HAZARD PERRY-class
		Low/Medium	7.50	FFG-7 OLIVER HAZARD PERRY-class
	Anti-Smuggling	High	3.50	FFG-7 OLIVER HAZARD PERRY-class
		Low/Medium	3.50	FFG-7 OLIVER HAZARD PERRY-class
Future Force	Civil Support	High	15.76	JMSDF DDH
		Medium	16.00	*LPD-17 + Visby
		Low	17.56	*JHSV+Visby
	Anti-Smuggling	High	7.35	JMSDF DDH
		Medium	7.47	*LPD-17 + Visby
		Low	4.92	*JHSV+Visby

Table 89: Force Mission Endurance Summery based on Ships Fuel

Note: All figures are derived from specifications as recorded in www.globalsecurity.org

2. Aviation Fuel Support

Background:

A chief resource in support of the Civil Support and Anti-smuggling mission scenarios was aviation fuel. Helicopters served as the primary means of transport of personnel, cargo and equipment between the supporting vessels and the site of a disaster. Helicopters also served as the main means of intelligence gathering as well as for surveillance purposes in support of Anti-smuggling and information sharing missions.

Helicopter Fuel Consumption:

The fuel load per day required was derived based upon each helicopter being loaded up to its maximum capacity, flying at cruising speed, and operational for a minimum of 9 hrs per day. The calculated fuel consumption for each helicopter was as follows:

Helicopter Type	Consumption / Time (lbs / Hr)
SH-60	1000[159]
MH-53	2000
RQ-8	145[160]

Table 90: Aircraft Fuel Consumption Rate

Note: The fuel consumption rate for the MH-53 was based on subject matter expert input and based on aircraft weight as compared to the SH-60B

Mission Aviation Fuel Requirements:

The fuel requirements per day were calculated based on the total number of aviation assets each performing at its maximum capacity. The calculation methodology used is shown below:

$$\sum(X_i * Y_i * Z_i)$$

Where X was the number of a specific helicopter i, Y was the number of operational hours per day for helicopter i, and Z was the amount of fuel required per hour of operation for helicopter i.

[159] Sikorsky UH-60, Economy-point.org, http://www.economy-point.org/sikorsky-uh-60/p1.htm, accessed on 25 May 09

[160] Fire Scout VTUAV, Naval-technology.com, http://www.naval-technology.com/projects/firescout/specs.html accessed on 25 May 09

The table below shows the worst case mission for the current or future force:

Mission Type	Fuel Requirement (lbs)
Current Force Structure	
Low / Medium	171000
High	225000
Future Force Structure	
Low	44700
Medium	62700
High	152700

Table 91: Aircraft Fuel Requirement per Mission

Resupply:

In determining the maximum operational duration based on organic supplies, only aviation fuel stored on-board either the resident LPD, or LHD equivalent for the stated force was used and where no more than 30% of the fuel could be expended at any one time. The aviation fuel capacity for the each force global fleet station equivalent was as follows. The exact aviation fuel capacity for the Japanese DDH was not available therefore the capacity was based on 1/3 the aviation fuel capacity of the LHD 1.

Ship Type	Capacity (lbs)[161]
LPD-17	628320
JMSDF DDH	870297

Table 92: Ships Aircraft Fuel Capacity

Based upon each force structure, the resupply time required is as follows:

[161] Global security, http://www.globalsecurity.org accessed on 25 May 2009

Mission Type	Fuel Resupply Time (days)
Current Force Structure	
Low / Medium	5
High	3
Future Force Structure	
Low	10*
Medium	10
High	9

Table 93: Force Mission Endurance Based on Aircraft Fuel

Note: At low intensity, the fuel requirement will not exceed that for a medium intensity mission.

Supportability:

It is clear that the future force structure was more efficient in its use of aviation fuel (152700 lbs for Future High vs 225000 lbs for Current High). This translated to a corresponding decrease in the amount of resupply required. (9 days for Future High vs 3 days for Current High).

3. Food Requirements

Introduction:

In order to carry out its mission, the Phase Zero force would have to carry food supplies on-board its ships so as to feed its personnel. The food supplies on-board the ships must be able to last till the next re-supply. Unlike fuel, the main bulk of the food supplies could be stored in ships with bigger storage capacity, and re-distributed easily to other ships when required.

Number of Personnel:

The total number of the Phase Zero force's personnel was calculated for the different missions (high, medium and low intensities). The total number of personnel was also estimated for the future Phase Zero force structure. The number of personnel included ship's crew, helicopter crew (including ground technicians), marines (to offer protection to Phase Zero force operating on land), and medical personnel.

Amount of Food Required:

Using data gathered for the Civil Support mission, a person was assumed to consume 2.5lb of food per day, which is further converted to $0.102ft^3$ of food per day.

For current force structure operating in high intensity mission, the total number of Phase Zero force's personnel and the calculated amount of food consumed per day were as follows:

Current Force (High)	Quantity	No. of Officers & Troops/unit	Total no. of Personnel
LHD 1	1	1129	1129
CH-53	5	28	140
SH-60B	11	28	308
FFG 7 Class	3	235	705
SH-60B	6	28	168
Total No. of Marines			383
Total No. of Medical Personnel			43
Total No. of Personnel			2876
Total amount of food (lbs) per day	2.5	2876	**7190**

Table 94: Current Force Personnel Food Requirement, High Severity

Similarly, for current force structure operating in low/medium intensity mission, the total number of Phase Zero force's personnel and the calculated amount of food consumed per day were as follows:

Current Force (Low/Medium)	Quantity	No. of Officers & Troops/unit	Total no. of Personnel

LHD 1	1	1129	1129
CH-53	1	28	28
SH-60B	11	28	308
FFG 7 Class	3	235	705
SH-60B	6	28	168
Total No. of Marines			209
Total No. of Medical Personnel			83
Total No. of Personnel			2630
Total amount of food (lbs)	2.5	2630	**6575**

Table 95: Current Force Personnel Food Requirement, Low/Mean Severity

For future force structure operating in high intensity mission, the total number of Phase Zero force personnel and the calculated amount of food consumed per day were as follows:

Future Force (High)	Quantity	No. of Officers & Troops/unit	Total no. of Personnel
JMSDF DDH	1	40	40

CH-53K	7	28	196
RQ-8	6	10	60
LPD-17	1	357	357
SH-60	2	28	56
RQ-8	3	10	30
M-80 Stiletto	2	3	6
JHSV	1	40	40
Visby	3	43	129
RQ-8	9	10	90
Total No. of Marines			383
Total No. of Medical Personnel			123
Total No. of Personnel			1510
Total amount of food (lbs)	2.5	1510	**3775**

Table 96: Future Force Personnel Food Requirement, High Severity

For future force structure operating in medium intensity mission, the total number of Phase Zero force's personnel and the calculated amount of food consumed per day were as follows:

Future Force (Medium)	Quantity	No. of Officers & Troops/unit	Total no. of Personnel
JHSV	1	40	40

SH-60B	2	28	56
RQ-8	3	10	30
LPD-17	1	357	357
CH-53K	2	28	56
Visby	3	43	129
RQ-8	9	10	90
Total No. of Marines			209
Total No. of Medical Personnel			83
Total No. of Personnel			1050
Total amount of food (lbs)	2.5	1050	**2625**

Table 97: Future Force Personnel Food Requirement, Mean Severity

For future force structure operating in low intensity mission, the total number of Phase Zero force's personnel and the calculated amount of food consumed per day are calculated as follows:

Future Force (Low)	Quantity	No. of Officers & Troops/unit	Total no. of Personnel

JHSV	1	40	40
SH-60B	2	28	56
RQ-8	3	10	30
JHSV	1	40	40
CH-53K	1	28	28
Visby	3	43	129
RQ-8	9	10	90
Total No. of Marines			127
Total No. of Medical Personnel			43
Total No. of Personnel			583
Total amount of food (lbs)	2.5	583	**1457.5**

Table 98: Future Force Personnel Food Requirement, Low Severity

	Total no. of Personnel	Total amount of food (lbs)/day	Total amount of food (lbs)/30days	Total amount of food (ft^3)/30 days
Current Force (High)	2876	7190	215700	**8800.56**
Current Force (Low/Medium)	2630	6575	197250	8047.8
Future Force (High)	1510	3775	113250	4620.6
Future Force (Medium)	1050	2625	78750	3213

Table 99: Force Personnel Food Requirement Summary

As can be seen in Table 99, the determined current force structure operating in high intensity comprised the most number of personnel, and consumed the largest amount of food per day. The amount of food (in ft^3) required for 30 days was also calculated. The future force would have consumed about 53% of the amount of food that the current force would have consumed in 30 days.

K. DISCUSSION OF FUTURE AND CURRENT FORCE STRUCTURES

Both the current and future force structures were developed by following the selection methodology described earlier in this section with no pre-conceived notional force structure. The desire was not only to develop a force structure for 2020 Phase Zero operations but also test the global fleet station concept as a contender. Both forces developed utilized the global fleet station concept with forces similar to that presented and developed by the Systems Engineering and Analysis 12 (SEA-12) group project. Due to the large aviation requirement for the current force a LHD was used in this role. In the future force structure, due to the size of the RQ-8 Fire Scout, the aviation requirement was reduced allowing a smaller ship such as the LPD 17 to be utilized in this role. The future force was easily scalable and customizable by the commander to be able to adapt to the unique needs in the region.

The future force met all of the requirements of the three missions modeled for Phase Zero for $343.9 million annually a savings of $78.9 million or approximately 20% over the optimized current force. The two forces were nearly identical in cargo storage capacity and vehicle storage

capacity. Also the air lift capabilities of the two forces were nearly identical. Even with the similarities in some key capabilities there were some large differences between the forces and tradeoffs that must be made to realize this cost savings.

The first of these differences is in onboard medical facilities. The LHD 1 class ship had a very large medical suite with six operating rooms, a 36-bed ward and a surge capability of up to a 600-bed ward. [162] The medical facilities onboard the LPD 17 selected for the future force was considerably smaller with only two operating rooms, 24-bed ward and a surge capability of up to a-100 bed ward. [163] The assumptions in Civil Support mission were that all medical treatment would be conducted on the shore therefore this difference in on board medical facilities would have little impact on the force's ability to carry out the mission.

Another difference is in the water production capability. The current force with the LHD 1 class ship was capable of producing a large amount of water beyond the needs of the ship. In the future force the water production available for the Civil Support mission was primarily produced on the LPD 17. The Japanese DDH would be able to produce some water beyond its own consumption however, that number was unknown and therefore assumed to be small. The future force required a Tactical Water Purifier system (TWPS) to make enough water to meet the mission requirement. This system was relatively inexpensive with an annualized procurement and operating cost of $40,500. This system would be capable of being airlifted and set up ashore to reduce the total airlift requirement however, for the mission analysis a worst case was assumed which required all water to be transported ashore from the ships.

The current and future forces had different logistical concerns. The current force structure was limited by the amount of aviation fuel that it could carry. Based on maintaining 70% fuel capacity the current force would be required to take on aviation fuel every three days of operations during the Anti-smuggling mission. Due to the use of the RQ-8 Fire Scout the future force was not limited by aviation fuel. The future force was limited by the amount of ship's fuel that could be carried maintaining 70% fuel capacity. This force was required to take on fuel every seven days during its most limiting mission of Anti-smuggling. The future force was

[162] USS Kearsarge LHD 3 Ship's loading characteristics Pamphlet, http://www.fas.org/man//dod-101/sys/ship/docs/slcp-lhd-3/index.html accessed on 01 May 2009

[163] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

required to resupply considerably less often then the force comprised of only current ships and aircraft and therefore had a smaller logistical foot print.

There was also a difference in flexibility between the two forces. The future force had a 16 cell vertical launch system as well as a phased array radar system. Both forces were capable of basic self defense. However, the future force had the ability to transition more easily from Phase Zero to follow on phases. This ability was due to the adaptability of the ships themselves. The Visby had several modules available and the JHSV's mission deck could be fitted to support many different missions including anti-mine warfare and anti surface warfare. Both forces had air assets capable of carrying hellfire missiles. However, the RQ-8 employed by the future force had considerably longer mission endurance. Both forces had an anti-submarine warfare capability but only the future force had the capability for offensive action with the missile systems onboard the Japanese DDH and the Visby corvette. The future force was adaptable and gives the commander more options of employment in varying phases of armed conflict.
The current and future forces requirement fulfillment tables are included below.

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	99,553	109,000	109%
Vehicle Storage Requirement (ft^2):	6,080	20,900	344%
Water production(gal/day):	75,000	131,761	176%
Medical/Marine personnel	491	1685	343%
Airlift capability:			
(lbs/day):	**1,238,200**	**1,453,500**	117%
Personnel/day:	**99**	**99**	100%
Equipment/day:	**16**	**16**	100%
SH-60 required for Anti-smuggling	17	17	100%
Annual Cost= $422.8 Million			

Table 100: Selected current force requirement fulfillment

Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft^3):	99,553	100,000	100%
Vehicle Storage Requirement (ft^2):	6,080	28,250	465%
Water production(gal/day):	75,000	77,486	103%
Medical/Marine personnel	491	880	179%
Airlift capability:			
(lbs/day):	**1,238,200**	**1,377,000**	111%
Personnel/day:	**99**	**99**	100%
Equipment/day:	**16**	**16**	100%
RQ-8 required for Anti-smuggling	12	12	100%
Annual Cost= $343.9 Million			

Table 101: Selected future force requirement fulfillment

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VI. COMMAND AND CONTROL

The world's maritime forces spend the vast majority of their time and efforts in the waters, seas, and oceans engaging in uninterrupted actions to maintain stability, prevent or lessen situations, and facilitate other operations should the need arise. We term these aggregate activities as Phase Zero operations. Phase Zero operations is founded on the premises of cooperative partnerships which engage in law enforcement, relief and recovery operations, and assistances to local governments. Whether the cooperative partnerships are premised on bilateral, multilateral, or ad-hoc agreements, a Phase Zero force should share their awareness, assessments, and responsibilities for action. Further, this Phase Zero force should operate with particular awareness of local culture, accepted practices, and norms. Phase Zero operations should support social calm and civility.

Bringing together partnerships underscored by cooperation requires both formal and informal arrangements, processes, and activities. These arrangements are designed to communicate goals, coordinate and plan to develop objectives, agree on actions and resolutions to issues, and engender trust. Collaboration implies working together on the basis of exchanged knowledge to accomplish a shared goal. The architecture must support the acquisition of information, the management of information, the advancement of information, the application of information, and the integration of information to build a base of knowledge. Therefore it is key to develop an architecture for managing (i.e., provide the command and control).

Command and control are functions, but they are sub-functions of the function 'to manage'. In general, the six functions of managing are planning, organizing, communicating, team building, commanding, and controlling.

- 'to command' is perform art of assigning missions; providing resources (analyze, prioritize); directing subordinates (guide, set policy, focus the force to accomplish clear objectives); analyze risk (identify, assess).
- 'to control' is to define limits; negotiate; deal with constraints; determine requirements; allocate resources; report; maintain performance (monitor, identify, correct deviations from guidance).

Command is different from control – and they are often performed by different people. The premise for Phase Zero operations to provide the knowledge that supports the highest level of decision fitness.

Decision fitness is the multiplicative merging of knowledge, perspective, logic, and action. The quality of a decision is only as good as the weakest link in this chain. Knowledge is framed within a particular context; creative, doable alternatives are built up from the coalition's wisdom, meaningful, reliable information is collected, developed, and shared; trade-offs are based on clear values and goals; logically correct reasoning is applied to select an alternative and plan for action; and finally action is adjudicated and taken.

To support decision fitness for managing Phase Zero operations, four primary functions of operations are defined. First, build a body of knowledge that can be rapidly and accurately updated and disseminated; second, to provide a force that has sufficiency to maintain stability; third, apply acceptable and appropriate force to accomplish the intended objective; and fourth, to build an operational architecture that is responsive and scalable to the needs through 2050. These top four Phase Zero functions and their sub-functions are illustrated in the figure below.

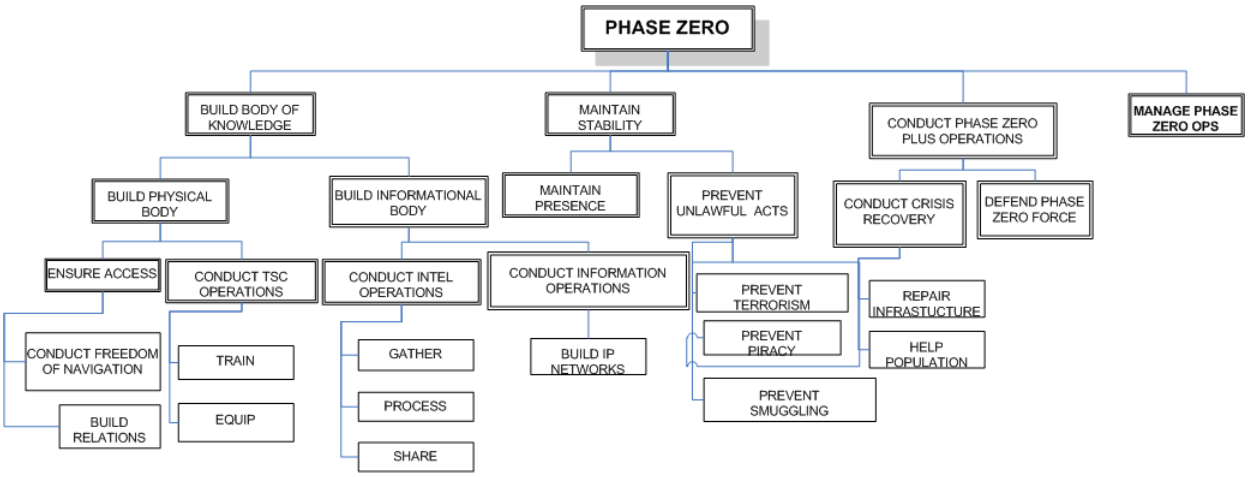


Figure 34: Phase Zero Functions

We have identified thirteen primary missions for Phase Zero operations. These are listed below:

- Ensure freedom of navigation (FON)
- Build relations with local government (BuildRel)
- Conduct anti-terrorism activities (ATO)
- Assist in training local defense forces (TrainLcl)
- Evacuate non-combatants (NEO)
- Access and share intelligence and information (Shintel)
- Reduce smuggling (Smug)
- Support anti-illegal fishing operations (Fish)
- Aid in equipping local defense forces (EquipLcl))
- Assist in restoring critical infrastructure (Infra)
- Help save lives through sustenance and transport (Civil)
- Carry out anti-piracy operations (Piracy)
- Protect against threats (SelfDef)

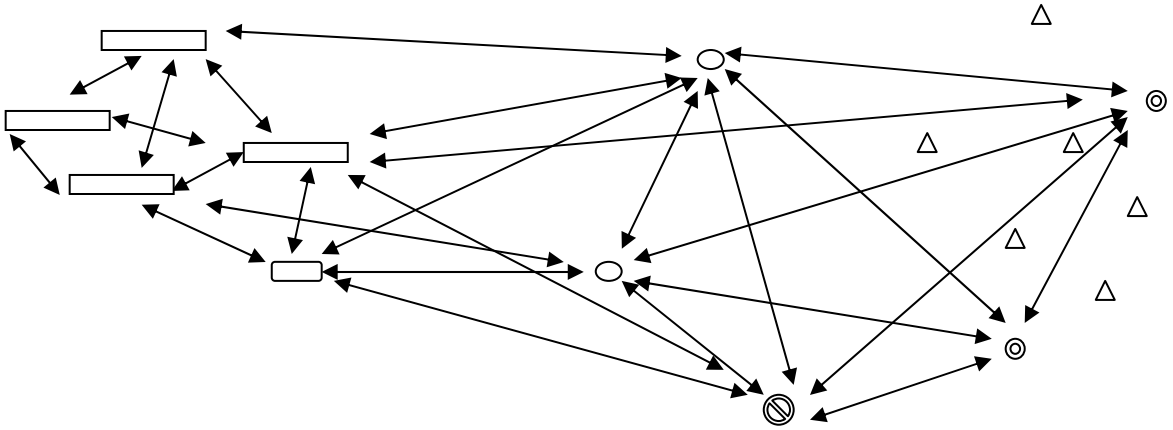


Figure 35: Overview of Phase Zero force architecture (business-end)

Larger Phase Zero Force Ships:

Smaller Phase Zero Force Ships:

Smallest Phase Zero Force Ships:

Type 1 Phase Zero Force Airships:

Type 2 Phase Zero Force Airships:

Target vessels: △

The overriding criterion for the Phase Zero force architecture is to provide just-in-time information (JITI). "When the information is needed, the information is provided". This is in stark contrast to the philosophy, "When the information is needed, the information can be requested". JITI eliminates the need to query for information. Information that is known to be required (i.e., satisfying both the conditions of necessary and sufficient) is sent with the highest priority first-in. Next priorities are staged and sent according to either a push model (that

anticipates the rate of need, based on indicators (e.g., % of buffer memory) or heuristics (e.g., temporal); or a pull model (that calls for the "next" package of information that has been queued. The result of JITI is to eliminate wasteful (e.g., time intensive) "guess-again" strategies that force the formulation of non-productive questions of which there are no answers.

Layered into this JITI architecture are a network of computers that act as nodes in a distribution and assimilation of information. Each computer has a front-end processing unit (FEP) and a back-end processing unit (BEP). The FEP is designed to communicate to other FEPs, whereas a BEP only communicates with its associated FEP. Should a BEP fail, the FEP continues to support the network activities.

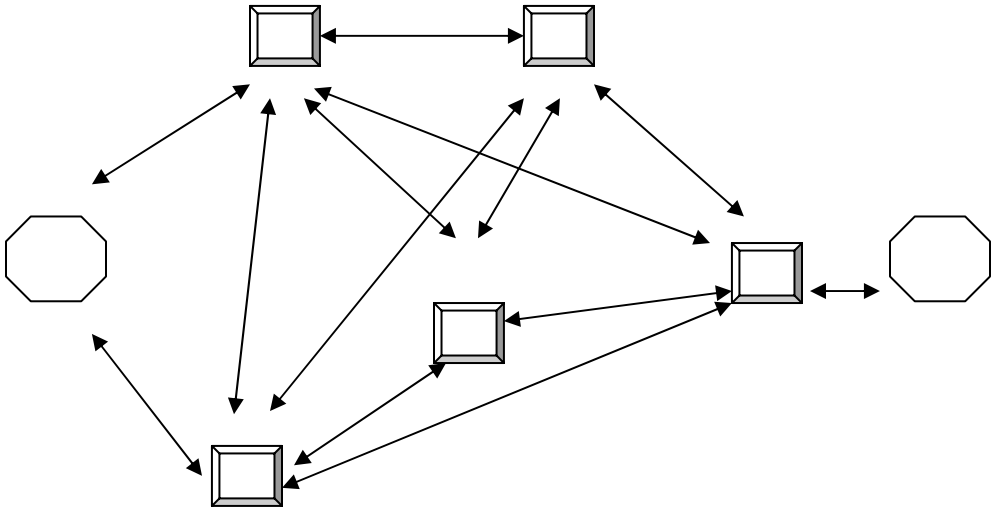
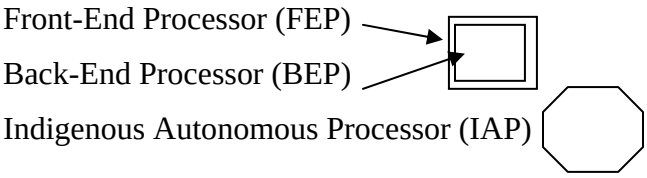


Figure 36: Business end (Front-end and back-end processing)



It is highly desirable (and a primary feature of the Phase Zero force architecture) that information flow from all sources into the Phase Zero knowledge network. The PUBLIC END of the architecture will be open to all electronically distributed sources, including the World Wide Web, the Internet, digital and analog telephone, fax, digital and analog television, broadcast radio (AM and FM), short-wave radio, citizen-band radio, and radio-telephones (by example). The objective of the PUBLIC END is to encourage all sources of data production. This includes individuals who may be involved in peer production and its associated

environments, public network broadcasting, government sources, non-government sources, and individual reportings. In the years between 2020 and 2050, the use of cyberspace will dominate exchange of information. Cyberspace can be considered unconstrained and interactive. The Phase Zero force will need to integrate all modes of communication to better accommodate the cultures, perform more effectively, and gain the cooperative support needed to be efficient.

Connections:

A primary system goal is to connect all users to as many potential sources as feasible. Increasing the number of connections will ensure that the operators have sufficient information to make a fit decision. The system must easily accept connections from diverse input sources as well as ensure that all members of the force are integrated together.

Connection can be made either via radio point to point connection or Satcom radio connection. Both connection modes serve different mission operations or situations. Example, a ship within allied controlled waters may be able to transmit via point to point connection whereas ships in a hostile environment may require Satcom connection. Point to point connection offers near real time transmission whereas Satcom connection has a time lag issue that can be as large as a few seconds due to transmission distance. Bandwidth over Satcom connection is more limited than that of point to point connection which translates to slower speed. Encryption has to be carried out on both connection modes to prevent red force eavesdropping. To summarize, point to point connection offers a better connection in terms of speed, time, bandwidth but limited to controlled areas whereas Satcom connection compensate for this short fall but not the best in terms of speed, time, bandwidth. To maximize its usefulness, the C2 system will have to use both connections efficiently as required by the situation.

The C2 system should reconnect seamlessly lost connections when the link becomes available again as information flow is critical during a decision making process. A bad decision can occur without a good update of the situation awareness through a healthy connecting system. When a reconnection is made, the system will have to orderly bring the reconnecting unit's knowledge base up to a point consistent with the rest of the force's. Since this could potentially be a large amount of information for a unit that experienced a long disconnection, the information exchange begins with critical data and then will pass less sensitive data as time permits.

Sensors:

Sensors are critical in our C2 system as they are the main source of information feed. Sensors types can come in a form of hardware equipments such as radars, cameras, satellite imagery etc or can be human sources such as informants or users. They provide valuable information to assist Phase Zero force in carry out their respective mission. The information collected from these sensors will be stored for current and future usage in a local database and access via global database. Hardware sensors such as cameras can provide excellent situation awareness near coastal area whereas radar/satellite imagery can provide open sea situation awareness. Information from human sensor can be gathered via an open input source such as Internet. Informants are no longer restricted to a small group size; anyone in any part of this world can provide valuable information. Example, information identifying smuggling ships, illegal fishing activities, etc.

Modular Interface:

Changes are inevitable in a development, thus any modifications to the command and control model at system level as to constantly enhance the overall system must always be ready and easy to implement. Thus, it should be modular model as any changes made to one part of the model should not affect other parts. This modularity allows for parallel development of models and greatest flexibility. However, being modular, means more development effort and components which equals to higher cost. To create a modular system, it will use exchangeable interfaces to interact without side sources. The interfaces will act as an intermediary between inputs and the actual mechanics of the system. Since these interfaces can be adapted to interact with a vast array of differing system types, the system can be employed by many different users. This will allow it to connect with allied forces as they participate with the U.S. in Phase Zero operations.

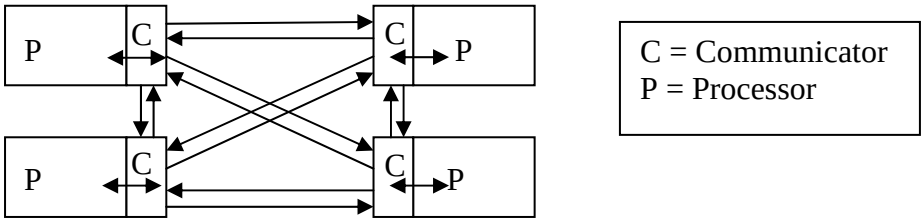


Figure 37: Four node network diagram

The figure above shows the typical connections for four interface system. Each system has two separate processors. An internal processor to do the required local computations and a

communications processor dedicated solely to manage the network connections. The processing module communicates with the communications module to interact with other users. Each node maintains directional control links and bidirectional data links with all the other know nodes. To do this in a wireless network, individual channels will be allocated for each communication link. The diagram shows four nodes, but more can be added in the same manner.

A token is used to control the network work. It is constantly passed between peers to ensure that the connection remains open. If a reply is not received after a fixed time, the node is assumed to be unavailable and is disconnected from the network. Changing the timeout time can increase or decrease the physical size of the network. To rejoin the network, a broadcast is sent form a node and connections are established when a reply is received. Bidirectional channels are used to exchange data on an as needed basis. Since the control message is small, bandwidth can be saved and used dynamically creating and efficient system. This creates a robust system with redundant transactions preventing the loss of data.

Adding nodes to the network increases reliability since more paths are available for data transmission. The figure below shows the increasing trend. Reliability increases linearly with the addition of the first node and then exponentially after that. Since the number of connections increases exponentially, it follows that the overall system reliability increases exponentially. As even more nodes are added, the reliability asymptotically approaches a finite limit. This limit follows from common observation since practical systems can not improve at an exponential rate indefinitely.

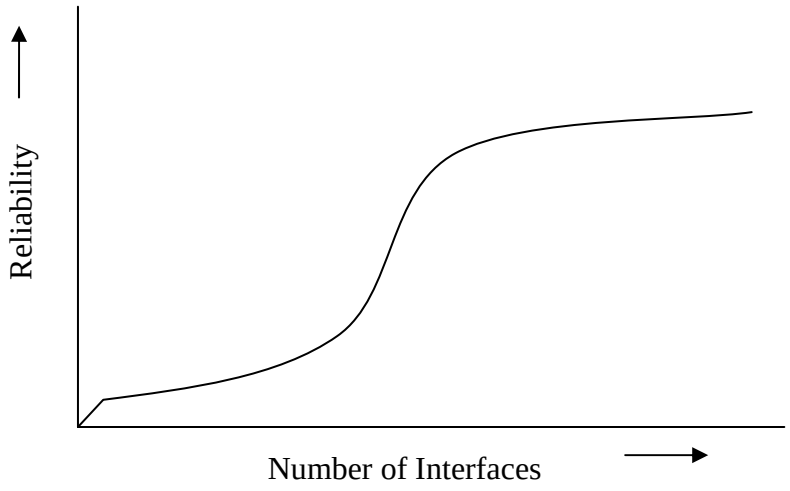


Figure 38: System reliability

Processing:

When individual is connected to the network (access granted), the network will load min necessary information into the user system and bring the user up to the same information awareness as the rest of the network user before the user can starts to contribute. However, in special cases (when information is considered vital), the network will upload user critical information (depending on trust level) and update other users in the network.

When a user that was previously connected in the network and disconnected and get connected again, the network will upload him the delta information (when user is away) and bring up his information awareness.

The system will evaluate information as it arrives based to compare information from varying sources. Since information from differing sources may conflict, the system needs a method to determine which data will create fit decisions. The data will be measured based on its timeliness with a preference given to more recent information. Past accuracy of the data source will also be used to determine its relevance. Using these two metrics to compare information as it enters the system will ensure that the best available information is used to make decisions.

Inference Engine:

The inference engine is a very powerful, intelligent, high processing speed processor. It is responsible for organizing the vast amount of data feed to the system. The engine will prioritize the information so that it can alert the user to vital information. Each inference engine is configured differently as each user has different information needs. The Inference engine is

able to sniff out the information that is required from all the information that it is receiving from the network and present it timely to the user thru a max 3 touch GUI. The inference engine is self learning and updating always keeping the user with the latest information.

Implementation difficulties:

It is hard to implement the inference engine on current processor chip that runs on a synchronous clock, which has lots of idle time. This calls for a change in the architecture to something that runs on asynchronous processing or parallel processing and a processor with less logic gate and consume less power.

Distribution:

Information is distributed to all users in the network. Every user will contribute information to other users. Different access rights will enable user to contribute information to different levels (or wider network: public domains and private/secure). The data will be pushed to other users when needed as it becomes available.

The C2 architecture network we are proposing is of a push model or Just In time Information (JITI), where the user is updated with the information he wanted when the event happens or when he needed the information so that he is decision fit. As compared to the time driven model (on demand), the user only gets the information when he ask for it. The information sought is likely obsolete or taken over by events by the time he found the information and that makes the user decision unfit.

Secure:

To prevent unauthorized access, the system will depend on Two Factor Authentication for identity management. For data a new user to access the system, a known user will have to vouch for its identity. The system will leverage on Access Control Lists (ACLS) enforcing Mandatory Access Control (ACL) according to the Bell-LaPadula Security Model. It will also fully segregate unclassified (internet) and classified information. Access to classified information by coalition partners to be restricted based on Principle of Least Privilege (POLP). Strong encryption based on accepted standards of the day will be implemented to ensure confidentiality. Current standards dictate cryptography equivalent to AES 256. The system will segregate duties to be enforced to prevent single point of failure, inclusive of at least one technical member and one management member.

Since the system allows open data input, it needs a mechanism to prevent unauthorized modifications. All requests and responses to requests to the system will be signed with Nonces (One-Time Unique Key) leveraging on PKI infrastructure to ensure authenticity and non-repudiation. Audit Logs will be maintained to facilitate analysis and aid the inference engine in its input validation. System hashing will be based on accepted standards of the day. The Biba security model will be enforced by the model

Since the system is critical to mission commanders ability to make fit decisions, it should be continuously available. This requires 100% redundancy for identified critical subsystems (network, servers, power systems). The critical subsystems should use High Availability (HA) equipment. To prevent jamming of and disruptions of service, frequency agile spread spectrum techniques should be incorporated into the system.

Manage:

Standard Operating Procedures (SOP) to be established to determine the functional requirements of the C2 system. Each mission to have its own unique SOP which is made open-source for coalition collaboration and subjected to continued review and improvement. The SOP serves as a document that details what management has decided upon in order to prosecute a mission successfully. Each mission characteristic will determine the type and extent of C2 support required, which will then translate to the actual network to be established. The SOP is to include, but not limited to the following areas:

- Stakeholder List:

A list of interested parties and their role in a process as well as the established hierarchy is available which will determine access to a particular systems.

- Process Flow:

To direct the flow of information and corresponding actions between stakeholders to achieve a particular task.

- Standards:

To set a minimal performance standard for each task in terms of outcome, duration and other aspects as determine by a mission's specific Methods of Effectiveness (MOE).

- Procedures:

To direct the actual execution of each step in a process and how each subsystem goal is to be achieved.

- Supporting Elements:

To list the types of hardware and software required to complete the mission and acceptable alternatives.

C2 System Optimization:

When implementing the Phase Zero C2 system, three different metrics should be optimized. Speed of information, level of uncertainty, and connectivity simultaneously place conflicting demands on the system. For each mission, the demands on the C2 system vary with speed of information to provide the Phase Zero forces with timely and relevant information. Highest level of speed of information for a Phase Zero mission means that the C2 Architecture must be able to identify and filter out the required information, and make it available to the Phase Zero force near instantaneously for it to execute its mission.

The level of uncertainty describes a lack of conclusive evidentiary information as to when, where, and how a monitored event would take place. Highest level of uncertainty means that the Phase Zero force has to work with minimum amount of definitive information available, and has to rely on C2 system to propose alternatives and next best course-of-action. The C2 system does that based on computer simulators or data gathered from past events.

Network connectivity provides Phase Zero force, partners, and the general public with network connection and information access to database. Security mechanisms will be implemented to restrict information access based on security clearance levels and need-to-know basis (e.g. in self defense scenarios). The highest level of network connectivity means that the mission requires increased level of information transfer from multiple sources, and often access of information beyond the allocated security clearance.

The following three tables illustrate the levels of requirements of the thirteen primary missions of the Phase Zero operations, on each of optimization factor for the C2 architecture.

Speed of Information		
Level of priority	No.	Mission
Highest	1	**SelfDef**
-	2	**ShIntel**
-	3	**ATO**
-	4	**Piracy**
-	5	**Fish**
-	6	**Smug**
-	7	**NEO**
-	8	**FON**
-	9	**BuildRel**
-	10	**EquipLcl**
-	11	**TrainLcl**
-	12	**Infra**
Lowest	13	**Civil**

Table 102: Speed of Information Priority

Level of Uncertainty		
Level of priority	No.	Mission
Highest	1	**ATO**
-	2	**Piracy**
-	3	**Smug**
-	4	**NEO**
-	5	**Fish**
-	6	**BuildRel**
-	7	**TrainLcl**
-	8	**EquipLcl**
-	9	**Civil**
-	10	**Infra**
-	11	**ShIntel**
-	12	**FON**
Lowest	13	**SelfDef**

Table 103: Level of Uncertainty Priority

Network Connectivity		
Level of priority	No.	Mission
Highest	1	**ATO**
-	2	**ShIntel**
-	3	**BuildRel**
-	4	**Infra**
-	5	**Civil**
-	6	**TrainLcl**
-	7	**EquipLcl**
-	8	**Smug**
-	9	**Piracy**
-	10	**Fish**
-	11	**NEO**
-	12	**SelfDef**
Lowest	13	**FON**

Table 104: Network Connectivity Priority

Summary:

We need to consider the initial conditions of the Phase Zero force architecture. Other entities may have existing and operating information sharing systems. Consider: CENTRIXS for the 5 COCOMSs, 77-nations, NATO and U.S. ships; Cooperating Nation Information Exchange System (CNIES) [164] for U.S. Southern Command; Maritime Safety and Security Information System (MSSIS) [165] for the U.S. Navy Sixth Fleet; Nationwide Automatic Identification System (NAIS) [166] for the U.S. Coast Guard. Additionally, there are systems being demonstrated today,

[164] Defense Link: "DoD Briefing with Deputy Assistant Secretary Douglas from the Pentagon Briefing Room, Arlington, Va" 24 April 2007 http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3947 accessed on 29 May 2009

[165] Atlantic Council of the United States: "Improving our Maritime Vision" 2 December 2008. http://www.acus.org/new_atlanticist/improving-our-maritime-vision accessed on 29 May 2009

[166] United States Coast Guard: "Nationwide Automatic Identification System" http://www.uscg.mil/acquisition/nais/ accessed on 29 May 2009.

including Regional Maritime Awareness Capability (RMAC) [167] for the U.S. European Command; Comprehensive Maritime Awareness tool (CMA) [168] for US NORTHCOM; and Long Range Identification and Tracking (LRIT) [169] for the International Maritime Organization. Additionally, the Malacca Strait Initiative has linked Singapore, Indonesia, and Malaysia for maritime domain awareness. However, none of these systems (either operational or proposed) have open channels to all sources or support JITI concepts and protocols.

The key architectural issues are autonomous computing and JITI. Autonomous computer is the indigenous capability of each of the nodes in the partnership to build their own database from a wide range of information sources. Each node can be connected to an Indigenous Autonomous Processor (IAP), Figure 3 that supports the decision fitness of a particular Phase Zero Force Coalition Partner. Each partner is provided JITI from the network knowledge base, distributes information and knowledge from their own Indigenous Autonomous Processor (IAP), and shares their decision fitness.

The two main advantages of the JITI Phase Zero Force Architecture over existing architectures are scalability and adaptability. The JITI Phase Zero Force Architecture is scalable simply by adding FEPs and adaptable to all sources of information.

The technology required for the C2 system should be built incrementally. Starting with currently available techniques and technology, system response time might be on the order of several seconds. As the design and technology matures, response times will decrease. Using a modular interface will assist with the incremental design process. A common core can be engineered to meet the required functions and updated as newer techniques become available.

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[167] Acquisition, Office of the Secretary of defense. "Joint Capability Technology Demonstrations" http://www.acq.osd.mil/jctd/descript.htm accessed 29 May 2009

[168] Acquisition, Office of the Secretary of defense. "Joint Capability Technology Demonstrations" http://www.acq.osd.mil/asc/downloads/JCTD_ACTD_Quotes.pdf accessed on 29 May 2009

[169] Wikipedia: "LRIT" http://en.wikipedia.org/wiki/LRIT accessed on 29 May 2009

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VII. CONCLUSION

A. MEASURES OF EFFECTIVENESS AND REGIONAL STABILITY

In any design it is necessary to have standards from which to compare effectiveness. This is particularly difficult for the Phase Zero force. The primary goal of the force is to promote regional stability. Stability is not a physical property that can be directly measured. This made it difficult to judge the effectiveness of the Phase Zero force. Two major studies of regional stability were identified. Each attempted to score the stability of a region based on a large series of statistics. The first study was developed by the World Bank to measure the effectiveness of loans made by the bank. The second study is entitled "Proposal for a Stability Matrix" by Dr. Nayef R.F. Al-Rodhan. We found Dr. Al-Rodhan's study to be a more comprehensive study and proposed using his method for judging the effectiveness of the force in a region. All of the indicators are lagging indicators. It would take up to 18 months to measure results of the forces presence.

Dr Al-Rodham's study identified several hundred indexes that can be reliably measured. They were broken down into several broad categories including Economic, Environmental, Military and Security, Political, and Societal. The indicators and variables included in Dr. Al-Rodnan's study that the integrated study team identified as being able to be directly influenced by a Phase Zero Force are listed at the conclusion of this section.

In the event of the deployment of a Phase Zero force, it would be easy to measure the effect that force would have on the indicators that are directly linked. For example it would be easy to tie a decrease in illegal fishing to the arrival of a Phase Zero force. Unfortunately, it would be more difficult to measure the change in an indirect factor after the deployment of a Phase Zero Force. For example, it would be harder to attribute a rise in a nation's GDP to the arrival of a Phase Zero force. However, the argument can be made that a Phase Zero Force would decrease instances of illegal fishing allowing a nation to receive more money for the fish within its waters, thus raising the GDP.

Broad Sectors	Original Stability Matrix	Additional Variables
Military and Security	• Total Armed Forces (Subsumed under d#/dP) • Military Expenditure • Arms Availability • Society(Civil) Military Relation • Confidence in Police Prosecution /Courts of Law (Subsumed under Confidence of Judicial System) • Arbitrary Application of Law • Public Perception of Security • Armed Internal Conflicts • Regional Conflicts • International Conflicts (All 3 conflicts subsumed under Internal and External Conflicts) • Border Dispute (Subsumed under Territorial Disputes under Societal) • Bordering Countries in Civil or Regional Wars (Subsumed under External Conflicts) • Terrorism • Operational Ability	• Weapons Availability • WMD • Aggression • Participation in Exercises with foreign militaries
Unlawful Acts (Additional broad sector that distinguishes between military and policing activities)		• Vices • Violent Crimes • Smuggling • Illegal Fishing • Terrorist Acts • Piracy • Crime Rate (from Military and Security)
Economy	• Black Market • Living Standard • Conflict Induced Poverty	• GDP • Investments • Value of Currency • Inflation • Loans • Infrastructure (from military & security) • Price of Energy • Price of Coco Cola • # of Starbucks • # of McDonalds
Environmental	• Resource Dispute • Natural Disaster	
Political	• Confidence in Government • Integrity of Elections	• UN Membership • Tenure Length

	• Changing Alliance • Social Unrest • Trustworthiness of Media • Sources of News	• Public Servies • Corruption
Societal	• Territorial Dispute • Freedom of Movement (From Political) • Inter-Group Violence • Civility • Radio (subsumed under News Sources) • # of Schooling Institutions • Access to Sanitation • Infant Mortality • Maternal Mortality (Subsumed under Life Span) • HIV/AIDS Prevalence • Internet Users	• Birth Rate • Employment • Immigration • Emigration • Refugee

Table 105: List of Variables

APPENDICES

A. CURRENT PLATFORM CAPABILITIES

1. LHD 1 WASP CLASS [170]

Displacement (Tonnes)	40500
Draft (Ft)	27
Endurance (nm)	9,500
Speed (Knts)	24
Officers	62
Enlisted	1,067
Troops	1,685
Organic Boats	1 LCPL and 1 RHIB (7m)
Well Deck Capability	322ft long x 50ft wide x 28ft high 3 LCAC or 2 LCU 1610 or 6 LCM(8) or 12 LCM (6) or 40 AAV
Cargo Capacity (ft^3)	109,000
Vehicle Space (ft^2)	20,900
Water Purification capability (gal/day)[171]	200,000
Helo Capable	Yes
Help Spots	9 CH-53 Spot
Organic Aircraft	6 AV-8B, 4 AH-1, 12 CH-46, 9 CH-53, or 4UH-1 or 6 AV-8B 12 CH-46, 9 CH-53 or 42 CH-46 or 20 AV-8B, 6 ASW Helicopters
Operating Rooms	6

[170] USS Kearsarge LHD 3 Ship's loading characteristics Pamphlet, http://www.fas.org/man//dod-101/sys/ship/docs/slcp-lhd-3/index.html viewed 01 May 2009

[171] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Beds	36 Bed Ward, 600 bed surge
Dental Facilities	Yes
Self Defense Weapons	(2)MK-49 RAM, (2)MK-29 Sea Sparrow, (3)MK-15 CIWS, (4) MK-38 Bushmaster, (4) M2HB .50 cal machine guns
Offensive Weapons	N/A
Radar	SPS-48E Air search, SPS-49 Air search SPS-64 Navigation, SPS-67 Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A, SRS-1 Joint Services Imagery Processing System-Navy (JSIPS-N)
Communications	SHF,EHF,UHF,HF, VHF YS-2(V)5. USQ-119(V)11 Naval Tactical Command System,(URC-109) integrated communications system, SMQ-11 weather satellite receiving system, USQ-82(V) data multiplexing
Command/Flag Space	Ship Signals Exploitation Space, Flag Plot, Landing Force Operations Center, Joint Intelligence Center, Supporting Arms Coordination Center, Tactical-Logistical Group, Helicopter Logistics Group, Tactical Air Control Center, Helicopter Direction Center, and Helicopter Coordination Section

Table 106: LHD 1 WASP Class

2. LHA-1 TARAWA CLASS [172]

Displacement (Tonnes)	39967
Draft (Ft)	26
Endurance (nm)	10,000
Speed (Knts)	24
Officers	61
Enlisted	1,044
Troops	1,700
Organic Boats	2 LCPL
Well Deck Capability	249ft long x 76ft wide x 26ft high 1 LCAC or 4 LCU 1610 or 7 LCM(8) or 17 LCM(6) or 45 AAV
Cargo Capacity (ft^3)	105,900
Vehicle Space (ft^2)	25,400
Water Purification capability (gal/day)[173]	140,000
Helo Capable	Yes
Help Spots	9 CH-53 Spot
Organic Aircraft	30 CH-46/CH-53 + 6 AV-8B
Operating Rooms	3
Beds	48 Bed Ward, 300 bed surge
Dental Facilities	Yes
Self Defense Weapons	(2)MK-49 RAM, (2)MK-15 CIWS, (4) MK-38 Bushmaster, (2) M2HB .50 cal machine guns
Offensive Weapons	N/A
Radar	SPS-48E Air search,

[172] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[173] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	SPS-40 Air search SPS-64 Navigation, SPS-67 Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A, SRS-1 Joint Services Imagery Processing System-Navy (JSIPS-N)
Communications	SHF,EHF,UHF,HF, VHF YS-2(V)5. USQ-119(V)11 Naval Tactical Command System,(URC-109) integrated communications system, SMQ-11 weather satellite receiving system, USQ-82(V) data multiplexing
Command/Flag Space	Ship Signals Exploitation Space, Flag Plot, Landing Force Operations Center, Joint Intelligence Center, Supporting Arms Coordination Center, Tactical-Logistical Group, Helicopter Logistics Group, Tactical Air Control Center, Helicopter Direction Center, and Helicopter Coordination Section

Table 107: LHA 1 Tarawa Class

3. LPD-4 AUSTIN CLASS [174]

Displacement (Tonnes)	17244
Draft (Ft)	24
Endurance (nm)	7,700
Speed (Knts)	21
Officers	24
Enlisted	354
Troops	840
Organic Boats	2 LCPL, 1 RHIB (7m),1 utility boat
Well Deck Capability	168ft long x50ft wide x 20ft high 2 LCAC or 1 LCU 1610 & 3 LCM(6) or 9 LCM(6) or 4 LCM(8) or 28 AAV
Cargo Capacity (ft^3)	40,000
Vehicle Space (ft^2)	12,000
Water Purification capability (gal/day)[175]	60,000
Helo Capable	Yes
Help Spots	2 CH-53 Spot/ 4 extended spots
Organic Aircraft	4 CH-46/CH-53
Operating Rooms	1
Beds	12 Bed Ward
Dental Facilities	Yes
Self Defense Weapons	(2)MK-15 CIWS, (2) MK-38 Bushmaster, (2) M2HB .50 cal machine guns
Offensive Weapons	N/A
Radar	SPS-40 Air search, SPS-64 Navigation

[174] Global security, LPD-4 Austin class, http://www.globalsecurity.org/military/systems/ship/lpd-4.htm viewed 01May2009

[175] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	SPS-67 Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A, SRS-1 Joint Services Imagery Processing System-Navy (JSIPS-N)
Communications	SHF,EHF,UHF,HF,VHF
Command/Flag Space	Ship Signals Exploitation Space, Flag Plot, Landing Force Operations Center, Supporting Arms Coordination Center

Table 108: LPD 4 Austin Class

4. LPD-17 SAN ANTONIO CLASS [176]

Displacement (Tonnes)	24900
Draft (Ft)	23
Endurance (nm)	8,000
Speed (Knts)	25
Officers	24
Enlisted	333
Troops	720
Organic Boats	2 LCPL, 1 RHIB (7m), 1 utility boat
Well Deck Capability	188ft long x50ft wide x 31ft high 2 LCAC or 1 LCU 1610 plus 14 EFV
Cargo Capacity (ft^3)	30,000
Vehicle Space (ft^2)	25,000
Water Purification capability (gal/day)[177]	60,000
Helo Capable	Yes
Help Spots	2 CH-53 Spot/ 6 extended spots
Organic Aircraft	Two CH-53s, or Four AH/UH-1s, or Four CH-46s, or Two MV-22s, or One AV-8B Harrier
Operating Rooms	2
Beds	24 Bed Ward
Dental Facilities	Yes
Self Defense Weapons	(2) MK-49 RAM, (2) MK-38 Bushmaster, (2) MK-26 12.7mm machine guns
Offensive Weapons	N/A

[176] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[177] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Radar	SPS-48E Air search, SPS-73 Navigation/Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A, SRS-1 Joint Services Imagery Processing System-Navy (JSIPS-N)
Communications	SHF,UHF,HF,VHF
Command/Flag Space	N/A

Table 109: LPD 17 San Antonio Class

5. LSD-49 HARPERS FERRY CLASS [178]

Displacement (Tonnes)	16695
Draft (Ft)	20
Endurance (nm)	8,000
Speed (Knts)	22
Officers	19
Enlisted	288
Troops	400
Organic Boats	2 LCPL, 1 RHIB (7m), 1 utility boat
Well Deck Capability	180ft long x 50ft wide x 30ft high 2 LCAC or 1 LCU 1610 or 9 LCM(6) or 4 LCM(8) or 15 AAV
Cargo Capacity (ft^3)	50,700
Vehicle Space (ft^2)	16,600
Water Purification capability (gal/day)[179]	60,000
Helo Capable	Yes/Landing only, no hanger
Help Spots	2 CH-53 Spot
Organic Aircraft	Two CH-53/ CH-46
Operating Rooms	1
Beds	5 Bed Ward
Dental Facilities	Yes
Self Defense Weapons	(2)MK-49 RAM, (2)MK-15 CIWS, (2)MK-38 Bushmaster, (6)MSHB .50 cal machine guns
Offensive Weapons	N/A
Radar	SPS-49 Air search,

[178] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[179] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	SPS-64 Navigation, SPS-67 Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A
Communications	SHF,UHF,HF,VHF
Command/Flag Space	N/A

Table 110: LSD 49 Harpers Ferry Class

6. LSD-41 WHIDBEY ISLAND CLASS [180]

Displacement (Tonnes)	15745
Draft (Ft)	20
Endurance (nm)	8,000
Speed (Knts)	22
Officers	19
Enlisted	291
Troops	560
Organic Boats	2 LCPL, 1 RHIB (7m), 1 utility boat
Well Deck Capability	440ft long x 50ft wide x 27ft high 4 LCAC or 3 LCU 1610 or 21 LCM(6) or 10 LCM(8) or 64 AAV
Cargo Capacity (ft^3)	5,100
Vehicle Space (ft^2)	13,500
Water Purification capability (gal/day)[181]	60,000
Helo Capable	Yes/Landing only, no hanger
Help Spots	2 CH-53 Spot
Organic Aircraft	Two CH-53/ CH-46
Operating Rooms	1
Beds	5 Bed Ward
Dental Facilities	Yes
Self Defense Weapons	(2)MK-49 RAM, (2)MK-15 CIWS, (2)MK-38 Bushmaster, (6)MSHB .50 cal machine guns
Offensive Weapons	N/A
Radar	SPS-49 Air search,

[180] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[181] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	SPS-64 Navigation, SPS-67 Surface search
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A
Communications	SHF,UHF,HF,VHF
Command/Flag Space	N/A

Table 111: LSD 41 Whidbey Island Class

7. CVN-68 NIMITZ CLASS [182]

Displacement (Tonnes)	102,000
Draft (Ft)	37
Endurance (nm)	Undefined
Speed (Knts)	30
Officers	160 (Crew), 320 (Air wing), 25 (Flag)
Enlisted	3040 (Crew), 2160 (Air wing), 45 (Flag)
Troops	26
Organic Boats	2 RHIB (7m), 2 utility boat
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[183]	400,000
Helo Capable	Yes
Help Spots	7
Organic Aircraft	4 SH-60F, 2 HH-60H, 9 SH-60B, 44 F-18, 4 EA-6B, 4 E-2C
Operating Rooms	1
Beds	65 Bed Ward
Dental Facilities	Yes
Self Defense Weapons	(4) MK-15 Phalanx (3) MK-29 (2) RIM-116 RAM (4) RIM-7
Offensive Weapons	N/A
Radar	SPS-48E Air Search SPS-49 Air Search Hughes MK-23 TAS Air Search SPS-67 Surface Search SPN-41 SPN-43C (2) SPN-46 TPX-42A SPS-64 Navigation

182 GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/surface.htm, viewed 01 May 09

183 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	(4) MK-95 URN 25 (3) MK91 FC
Sonar	N/A
EW / Intel	SLQ-32 SLQ-25 Nixie WLR-1H ESM
Communications	ACDS Block 0; Links 4A, 11, 16; Satellite Tadil J. GCCS; SATCOMS; SSR-1; UHF, SHF, SHF EHF, SSR-2A(GBS); SSDS MK-2
Command/Flag Space	Ship Signals Exploitation Space, Flag Plot, Joint Intelligence Center, Tactical Air Control Center, Helicopter Direction Center, and Helicopter Coordination Section

Table 112: CVN 68 Nimitz Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

8. CG-47 TICONDEROGA CLASS [184]

Displacement (Tonnes)	9,957
Draft (Ft)	31
Endurance (nm)	6000
Speed (Knts)	30
Officers	24
Enlisted	334
Troops	N/A
Organic Boats	2 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[185]	24,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 SH-60B
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2)MK-15 CIWS
Offensive Weapons	(2)MK-45, (2) 25mm HMG (2) .50 cal HMG (2) MK-32 Tubes for MK-46/50 torpedoes (2) MK-41 VLS Tomahawk SM-2 ASROC
Radar	SPY-1B Air Search/FC SPS-49 Air Search SPS-55 Surface Search SPS-64 Navigation SPQ-9A/B FC SPG-62 FC

184 GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/surface.htm, viewed 01 May 09

185 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Sonar	SQQ-89
EW / Intel	SLQ-32 SLQ-25 Nixie
Communications	CEC; NTDS w Links 4A, 11, 14; GCCS; Link 16; WRN-5 SATCOM; UHF; EHF; SQQ-28; UYK-7/UKY-43/44
Command/Flag Space	N/A

Table 113: CG 47 Ticonderoga Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

9. DDG-51 ARLEIGH BURKE CLASS (FLIGHT I/II) [186]

Displacement (Tonnes)	8300
Draft (Ft)	31
Endurance (nm)	4400
Speed (Knts)	30
Officers	28
Enlisted	330
Troops	N/A
Organic Boats	2 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[187]	24,000
Helo Capable	Yes/ Landing only, No hanger
Help Spots	1
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2)MK-15 CIWS
Offensive Weapons	(1)MK-45, (2) 25mm HMG (2) .50 cal HMG (2) MK-32 Tubes for MK-46/50 torpedoes (2) MK-41 VLS Tomahawk SM-2 ASROC
Radar	SPS-64 Navigation SPS-67 Surface Search SPY-1D Air Search/FC
Sonar	SQQ-89
EW / Intel	SLQ-32 SLQ-25 Nixie

186 GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/surface.htm, viewed 01 May 09

187 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Communications	CEC, Link 4A, Link 11, Link 16, HF, VHF, UHF, SATCOM
Command/Flag Space	N/A

Table 114: DDG 51 Arleigh Burke Class (Flight I/II)

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

10. DDG-51 ARLEIGH BURKE CLASS (FLIGHT IIA) [188]

Displacement (Tonnes)	9150
Draft (Ft)	31
Endurance (nm)	4400
Speed (Knts)	30
Officers	32
Enlisted	348
Troops	N/A
Organic Boats	2 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[189]	24,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 SH-60R
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2)MK-15 CIWS
Offensive Weapons	(1)MK-45, (2) 25mm HMG (2) .50 cal HMG (2) MK-32 Tubes for MK-46/50 torpedoes (2) MK-41 VLS Tomahawk SM-2 ASROC
Radar	SPS-64 Navigation SPS-67 Surface Search SPY-1D Air Search/FC
Sonar	SQQ-89
EW / Intel	SLQ-32 SLQ-25 Nixie

188 GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/surface.htm, viewed 01 May 09

189 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Communications	CEC, Link 4A, Link 11, Link 16, HF, VHF, UHF, SATCOM
Command/Flag Space	N/A

Table 115: DDG 51 Arleigh Burke Class (Flight IIE)

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

11. FFG-7 OLIVER HAZARD PERRY CLASS [190]

Displacement (Tonnes)	4100
Draft (Ft)	22
Endurance (nm)	4200
Speed (Knts)	29
Officers	22
Enlisted	213
Troops	N/A
Organic Boats	1 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[191]	12,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 SH-60
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2)MK-15 CIWS
Offensive Weapons	(1)MK-75, (2) 25mm HMG (2) .50 cal HMG (2) MK-32 Tubes for MK-46/50 torpedoes
Radar	SPS-49 Air Search SPS-55 Surface Search Sperry MK-92 Fire Control Furuno Navigation URN 25 TACAN
Sonar	SQQ-89
EW / Intel	SLQ-32 SLQ-25 Nixie
Communications	Link 11,14; SATCOM; SRR-1; UHF;

190 GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/surface.htm, viewed 01 May 09

191 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	LAMPS III
Command/Flag Space	N/A

Table 116: FFG 7 Oliver Hazard Perry Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

12. LCS 1 FREEDOM CLASS [192]

Displacement (Tonnes)	3089
Draft (Ft)	12.1
Endurance (nm)	3500
Speed (Knts)	45
Officers	8
Enlisted	32
Troops	N/A
Organic Boats	1 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[193]	12,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 MH-60R or 1 MH-60R & 3 UAVs
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	1 RIM-116
Offensive Weapons	(1) BAE MK-2 (2) M2 .50 cal machine gun MK-50 Torpedo
Radar	EADS TRS-3D Air/Surface Search FABA DORNA FC
Sonar	TBD
EW / Intel	TBD
Communications	HF,VHF,UHF, SATCOM
Command/Flag Space	N/A

Table 117: LCS 1 Freedom Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

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192 Littoral Combat Ship, Lockhead Martin et al, http://www.lmlcsteam.com/overview.html, viewed 01 May 09

193 United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

13. LCS-2 INDEPENDENCE CLASS [194]

Displacement (Tonnes)	2790
Draft (Ft)	14.8
Endurance (nm)	3500
Speed (Knts)	40
Officers	8
Enlisted	32
Troops	N/A
Organic Boats	1 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[195]	12,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 MH-60R or 1 MH-60R & 3 UAVs
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	1 RIM-116
Offensive Weapons	(1) BAE MK-2 (4) M2 .50 cal machine gun MK-50 Torpedo
Radar	Ericcson Sea Giraffe Air Search Sperry Bridgemaster Navigation
Sonar	TBD
EW / Intel	EDO ES-3601 ESM
Communications	HF,VHF,UHF, SATCOM
Command/Flag Space	N/A

Table 118: LCS 2 Independence Class

[194] Defense – Littoral Combat Ship, Austal, http://www.austal.com/index.cfm?objectid=8CB536ED-65BF-EBC1-29D0BD06A94CC667, viewed 01 May 09

[195] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

14. DDX ZUMWALT CLASS [196]

Displacement (Tonnes)	14564
Draft (Ft)	27.6
Endurance (nm)	4500
Speed (Knts)	30
Officers	22
Enlisted	148
Troops	N/A
Organic Boats	2 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[197]	24,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 MH-60R or 1 MH-60R & 3 UAVs
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2) MK-15 CIWS, Evolved Sea Sparrow
Offensive Weapons	MK-41 VLS Tomahawk ASROC SM-2 (2) 155mm Advanced Gun System (2) 57mm CIGs Anti-Terrorism System
Radar	SPY-3 Air Search SPY-1D
Sonar	Bow-Mounted Active Search/Attack; Passive Towed Array; ISMA

[196] GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/dd-x-specs.htm, viewed 01 May 09

[197] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

EW / Intel	ESM ECM Torpedo Decoys
Communications	HF,VHF,UHF, SATCOM
Command/Flag Space	N/A

Table 119: DDX Zumwalt Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

15. MCM-1 AVENGER CLASS [198]

Displacement (Tonnes)	1,312
Draft (Ft)	11.5
Endurance (nm)	2500
Speed (Knts)	13.5
Officers	8
Enlisted	84
Troops	N/A
Organic Boats	3 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[199]	6,000
Helo Capable	No
Help Spots	N/A
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2) M2HB .50 cal machine guns
Offensive Weapons	N/A
Radar	ISC Cardion SPS-55; I/J-band.
Sonar	Raytheon/Thomson Sintra SQQ-32(V)3; VDS; active minehunting; high frequency.
EW / Intel	N/A
Communications	SATCOM SRR-1; WSC-3 (UHF). GEC/Marconi Nautis M in last two ships includes SSN 2 PINS command system and control. USQ-119E(V), UHF Dama and OTCIXS provide JMCIS connectivity.
Command/Flag Space	N/A

[198] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[199] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

Table 120: MCM 1 Avenger Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

16. LCC-19 BLUE RIDGE CLASS [200]

Displacement (Tonnes)	18,646
Draft (Ft)	27
Endurance (nm)	13,500
Speed (Knts)	22
Officers	35 Crew, 72 Flag
Enlisted	587 Crew, 185 Flag
Troops	N/A
Organic Boats	3 LCPL, 2 LCVP
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[201]	60,000
Helo Capable	Yes/ Landing only, No hanger
Help Spots	1
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(2) MK-15 CIWS, (2) MK38 Bushmaster
Offensive Weapons	N/A
Radar	SPS-40E air search, SPS-48C 3-D search, SPS-64(V)9 navigation, SPS-65(V)1 surface search
Sonar	N/A
EW / Intel	SLQ-32(V)3, SLQ-25A
Communications	SSR-1, WSC-3 UHF, WSC-6 SHF, and USC-38 SHF, Link 4A, Link 11, Link 14, Joint Maritime Command Information System (JMCIS)
Command/Flag Space	ACIS (Amphibious Command Information System); NIPS (Naval

[200] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[201] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

	Intelligence Processing System); , photographic laboratories and document-publication facilities. Command facilities include a Ship Signals Exploitation Space (SSES), Flag Plot, Landing Force Operations Center (LFOC), Joint Intelligence Center (JIC), Supporting Arms Coordination Center (SACC), Helicopter Logistics Support Group (HLSG), Tactical Air Control Center (TACC), Helicopter Direction Center (HDC), and Helicopter Coordination Section (HCS).

Table 121: LCC 19 Blue Ridge Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

17. PC-1 CYCLONE CLASS [202]

Displacement (Tonnes)	331
Draft (Ft)	7.9
Endurance (nm)	2,000
Speed (Knts)	35
Officers	4
Enlisted	24
Troops	N/A
Organic Boats	1 RHIB (7m)
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Note 1
Vehicle Space (ft^2)	Note 1
Water Purification capability (gal/day)[203]	800
Helo Capable	No
Help Spots	N/A
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	(4) M2HB .50 cal machine guns, (2)M60 7.62mm machine guns
Offensive Weapons	(2) MK38 Bushmaster
Radar	2 Sperry RASCAR 2500 surface search
Sonar	Wesmar side scanning
EW / Intel	APR-39A(V)1 radar warning receiver
Communications	VHF,UHF
Command/Flag Space	N/A

Table 122: PC 1 Cyclone Class

Note 1: Specific cargo and vehicle capacity unknown and assumed to be zero available for Civil Support mission

[202] Norman Polmar, Naval Institute guide to the ships and aircraft of the U.S. Fleet Eighteenth edition, Naval Institute Press Annapolis, Maryland, 2005

[203] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

18. T-AKE LEWIS AND CLARK CLASS [204]

Displacement (Tonnes)	40,539
Draft (Ft)	29
Endurance (nm)	14,000
Speed (Knts)	20
Officers	123 civilian + 13 Navy + 36 aviation det.
Enlisted	
Troops	N/A
Organic Boats	N/A
Well Deck Capability	N/A
Cargo Capacity (ft^3)	214,557
Vehicle Space (ft^2)	162,500
Water Purification capability (gal/day)[205]	8,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	2 MH-60S
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	N/A
Offensive Weapons	N/A
Radar	Navigation
Sonar	N/A
EW / Intel	N/A
Communications	VHF,UHF
Command/Flag Space	N/A

Table 123: T-AKE Lewis and Clark Class

[204] http://www.navy.mil/navydata/fact_display.asp?cid=4400&tid=500&ct=4, accessed on 3/9/2009
[205] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

19. T-AO 187 HENRY J. KAISER CLASS [206]

Displacement (Tonnes)	40,700
Draft (Ft)	36
Endurance (nm)	6,000
Speed (Knts)	20
Officers	81 civilian + 21 Navy
Enlisted	
Troops	N/A
Organic Boats	N/A
Well Deck Capability	N/A
Cargo Capacity (ft^3)	59,000
Fuel Capacity	Diesel Fuel Marine (DFM) 1,100,600 gal
Water Purification capability (gal/day)[207]	12,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	None
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	N/A
Offensive Weapons	N/A
Radar	Navigation
Sonar	N/A
EW / Intel	N/A
Communications	VHF,UHF
Command/Flag Space	N/A

Table 124: T-AO 187 Henry J. Kaiser Class

[206] From Jane's Defense Equipment and Technology www.janes.com viewed 01May2009

[207] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

20. TAOE-6 SUPPLY CLASS [208]

Displacement (Tonnes)	48,800
Draft (Ft)	39
Endurance (nm)	6,000
Speed (Knts)	20
Officers	176 civilian + 27 Navy
Enlisted	
Troops	N/A
Organic Boats	N/A
Well Deck Capability	N/A
Cargo Capacity (ft^3)	200,000
Fuel Capacity	Diesel Fuel Marine (DFM) 1,965,600 gal JP-5 Fuel 2,620,800 gal Lube Oil, 500 55 gallon drums Bottled Gas 800 bottles,
Water Purification capability (gal/day)[209]	12,000
Helo Capable	Yes
Help Spots	1
Organic Aircraft	3 UH-46
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	N/A
Offensive Weapons	N/A
Radar	AN/SPS-67 Surface Search Radar AN/SPS-64(V)9 Navigation Radar MK 23 Target Acquisition System
Sonar	N/A
EW / Intel	N/A
Communications	VHF,UHF
Command/Flag Space	N/A

Table 125: TAOE 6 Supply Class

[208] http://navysite.de/ships/aoe6.htm, accessed on 3/9/2009

[209] United States Army, Office of the Chief of Engineers, TM 5-813-3/AFM 88-10, Volume 3, Water treatment.

21. SH-60B SEAHAWK [210]

Max Range (NM one way)	300
Cruise A/S (KNTS)	126
Max A/S (KNTS)	180
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	21,700
Cargo Lift Capability (Lbs)	6,600
External Lift Capability (LBS)	6,000
Normal sling lift (Lbs)	4,500
# of passengers	2
Surface Radar	Yes
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	No
FLIR	Yes
EW/ESM	Yes
Sonobouys	Yes
Dipping Sonar	No

Table 126: SH 60B Seahawk

[210] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

22. SH-60F SEAHAWK [211]

Max Range (NM one way)	500
Cruise A/S (KNTS)	147
Max A/S (KNTS)	180
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	21,884
Cargo Lift Capability (Lbs)	7,468
External Lift Capability (LBS)	6,000
Normal sling lift (Lbs)	4,500
# of passengers	2
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	No
FLIR	No
EW/ESM	No
Sonobouys	Yes
Dipping Sonar	Yes

Table 127: SH 60F Seahawk

[211] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

23. HH-60H SEAHAWK [212]

Max Range (NM one way)	500
Cruise A/S (KNTS)	147
Max A/S (KNTS)	180
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	21,884
Cargo Lift Capability (Lbs)	7,468
External Lift Capability (LBS)	6,000
Normal sling lift (Lbs)	4,500
# of passengers	5
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	No
FLIR	Yes
EW/ESM	No
Sonobouys	No
Dipping Sonar	No

Table 128: HH 60H Seahawk

[212] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

24. MH-60S KNIGHT HAWK [213]

Max Range (NM one way)	200
Cruise A/S (KNTS)	147
Max A/S (KNTS)	180
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	22,000
Cargo Lift Capability (Lbs)	8,000
External Lift Capability (LBS)	6,000
Normal sling lift (Lbs)	4,500
# of passengers	12
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborne Mine Counter-measures	Yes
FLIR	Yes
EW/ESM	No
Sonobouys	No
Dipping Sonar	No

Table 129: MH 60S Knight Hawk

[213] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

25. MH-60R SEAHAWK [214]

Max Range (NM one way)	300
Cruise A/S (KNTS)	126
Max A/S (KNTS)	180
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	23500
Cargo Lift Capability (Lbs)	6,000
External Lift Capability (LBS)	6,000
Normal sling lift (Lbs)	4,500
# of passengers	2
Surface Radar	Yes
Air Radar	No
SAR/ISAR	Yes
Airborne Mine Counter-measures	No
FLIR	Yes
EW/ESM	Yes
Sonobouys	Yes
Dipping Sonar	Yes

Table 130: MH-60R Seahawk

[214] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

26. CH-53E SUPER STALLION [215]

Max Range (NM one way)	540
Cruise A/S (KNTS)	150
Max A/S (KNTS)	170
Speed with external load (KNTS)	80
Inflight Refueling	Yes
Max Gross Wt (Lbs)	73,500
Cargo Lift Capability (Lbs)	30,000
External Lift Capability (LBS)	32,000
Normal sling lift (Lbs)	27,000
# of passengers	55
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	Yes
FLIR	No
EW/ESM	No
Sonobouys	No
Dipping Sonar	No

Table 131: CH 53E Super Stallion

[215] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

27. CH-46 SEA KNIGHT [216]

Max Range (NM one way)	360
Cruise A/S (KNTS)	145
Max A/S (KNTS)	145
Speed with external load (KNTS)	80
Inflight Refueling	No
Max Gross Wt (Lbs)	24300
Cargo Lift Capability (Lbs)	7,000
External Lift Capability (LBS)	4,000
Normal sling lift (Lbs)	3,000
# of passengers	15
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	No
FLIR	No
EW/ESM	No
Sonobouys	No
Dipping Sonar	No

Table 132: Ch 46 Sea Knight

[216] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

28. MV-22 OSPREY [217]

Max Range (NM one way)	880
Cruise A/S (KNTS)	240
Max A/S (KNTS)	305
Speed with external load (KNTS)	100
Inflight Refueling	Yes
Max Gross Wt (Lbs)	60,500
Cargo Lift Capability (Lbs)	20,000
External Lift Capability (LBS)	15,000
Normal sling lift (Lbs)	10,000
# of passengers	24
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	No
FLIR	No
EW/ESM	No
Sonobouys	No
Dipping Sonar	No

Table 133: MV 22 Osprey

[217] Jane's All the Worlds Aircraft. Available online http://www.janes.com May, 15, 2009

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B. FUTURE PLATFORM CHARACTERISTICS

1. LHA(R) [218]

Displacement (Tonnes)	44,971
Draft (Ft)	27
Endurance (nm)	9,500
Speed (Knts)	22
Officers	65
Enlisted	1,059
Troops	1,687
Organic Boats	2 RHIB
Well Deck Capability	N/A
Cargo Capacity (ft^3)	145,963
Vehicle Space (ft^2)	19,112
Helo Capable	Yes
Help Spots	9 CH-53 Spot
Organic Aircraft	10 - F-35B STOVL aircraft 12 - MV-22 Osprey tilt-rotor aircraft 4 - CH-53K Heavy-lift helicopters 8 - AH-1W Super Cobra 4 - MH-60 Night Hawk
Operating Rooms	2
Beds	24 Bed Ward, 300 bed surge
Dental Facilities	Yes
Self Defense Weapons	2 - Mk-29 NATO Evolved Sea Sparrow launchers 2 - MK49 Rolling Airframe Missile [RAM] 3 - 20mm Phalanx CIWS mounts 7 - .50 cal. machine guns
Offensive Weapons	N/A
Radar	AN/SPS-48 Radar, AN/SPS-49 Radar, AN/SPQ-9B
Sonar	N/A
EW / Intel	SLQ-32, SLQ-25A, SSR-1 Joint Service Imagery Processing
Communications	SHF,EHF,UHF,HF, VHF, YS-2(V)5.

[218] Global Security, LHA-6 America, 02 May 2009, http://www.globalsecurity.org/military/systems/ship/lhx-specs.htm

	USQ-119(V)11 Naval Tactical Command System,(URC-109) integrated communications system, SMQ-11 weather satellite receiving system
Command/Flag Space	Ship Signals Exploitation Space, Flag Plot, Landing Force Operations Center, Joint Intelligence Center, Supporting Arms Coordination Center, Tactical-Logistical Group, Helicopter Logistics Group, Tactical Air Control Center, Helicopter Direction Center, and Helicopter Coordination Section
Estimated Cost per Ship	$3.1 Billion[219]
Special Features (e.g. Mission Modules)	N/A

Table 134: LHA (R)

The Navy's LHA(R) will replace the ageing Tarawa-class amphibious assault ships. The fist LHA(R) is LHA 6 which is an aviation enhanced type of LHA(R). LHA 6 will have no well deck, instead it will have and extended hanger bay, increased aviation maintenance facilities, increased cargo space, and increased JP-5 storage capacity. The LHA-6 design is optimized to support new aircraft such as the V-22 Osprey and the Joint strike Fighter.

The LHA 6 was funded in FY07 and is scheduled to be delivered to the fleet in 2012. LHA 6 will begin to replace the Tarawa class LHAs which are scheduled to be decommissioned between 2011 and 2015.

Suitability for missions:

- Anti-smuggling:

The LHA(R) will be able to support Anti-smuggling operations through the use of the organic air assets to aid in detection and identification of smugglers. The ship does have several RHIBs which could be used as intercept boats but the use of an LHA in this

[219] Defense Acquisitions: Assessments of Selected Weapon Programs. March 2008 Government Acountability Office Report [GAO-08-467SP]

role is unlikely. The LHA also brings a large command and control capability as well as an intelligence gathering capability with can be used in the anti smuggling mission.

- Civil Support:

The LHA(R) will have extensive air assets capable of transporting material from ship to shore. The LHA 6 is optimized for the MV-22 and has an increased storage capacity of approximately 145,000 ft^3. LHAs and LHDs have been often used in the Civil Support and humanitarian assistance role. On September 6, 2007 USS Wasp arrived off the coast of Nicaragua to assist with disaster relief efforts following Hurricane Felix.[220]

- Information sharing:

LHA(R) has extensive command and control capabilities as a flag configured ship. These systems could be used to manage and disseminate information to the other ships in the force, other agencies and other nations.

[220] USS Wasp (LHD 1) history, 03 MAY 2009, <http://www.uscarriers.net/lhd1history.htm>

2. HIGH SPEED VESSEL 2 SWIFT [221]

Displacement (Tonnes)	1463.6
Draft (Ft)	11
Endurance (nm)	3500
Speed (Knts)	45
Crew	40
Troops	107+87
Organic Boats	2 RHIB
Well Deck Capability	No
Cargo/Vehicle Capacity (ft^3)	28,740
Helo Capable	Yes
Help Spots	2 (MH-60)
Organic Aircraft	N/A
Operating Rooms	1 (foldable operating table)
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	N/A
Offensive Weapons	Mk 96 Stabilized Weapon System (25mm Bushmaster Cannon & Mk 19 40mm Grenade Launcher); Mk 45 40mm Grenade Launcher System
Radar Type	Assume to include equivalent systems as current Mine Warfare surface vessels and LCS
Sonar	
EW / Intel	
Communications	HF/UHF/VHF
Command/Flag Space	2 Conference Room, 2 Staff Rooms
Estimated Cost per Ship	$171 million
Special Features (e.g. Mission Modules)	See below

Table 135: HSV 2 Swift

[221] U.S. Navy Fact file, HSV-2 Swift, May 6 2009, <http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=1400&ct=4>

The HSV-2 (High Speed Vessel) Swift is a high-speed, wave-piercing catamaran. Its high speed, shallow draft, mission flexibility and modularity, and hull design offer the Navy an opportunity to see, first hand, what effect emergent technologies will have on future ship design and development. There are currently three HSV ships in active service: HSV-X1 Joint Venture was the initial prototype. It served with the US Navy from November 1998 through March 2004 when it was stricken from the Naval Vessel Register and assigned to the US Army, where it serves as a high-speed supply vessel. TSV-X1 Is a Theater Support vessel assigned to the US Army for high speed, in theater logistical support, and HSV-2 is currently under contract with the US Navy.

As part of the Swift's conversion from a civilian to military craft, a helicopter flight deck was added, the vehicle deck was strengthened to accommodate military vehicles (the rear mounted loading ramp is M1A2 capable), and the Swift was equipped with the capacity to launch small boats as well as unmanned, remotely operated submersibles.

Suitability for missions:

- Anti-smuggling:

The HSV has organic RMIBs on-board, but its lack of a well deck would not allow it to carry surface craft of a larger tonnage.

- Civil Support:

The HSV is particularly well-suited in the role of a Global Fleet Station. Its large cargo capacity, vehicle space, and modularity allows it to be quickly converted for specialized support in times of need. Its performance in various humanitarian missions during its current least to the US Armed Forces is testament to its suitability for Civil Support missions.

- Information sharing:

The HSV can be augmented with the necessary C4I systems for it to operate efficiently as an Intelligence node. With its large helo deck, it can also support a complement of UAVs for additional real time intelligence.

The Swift's modular system construction facilitates mission reconfiguration and retrofitting without lengthy shipyard stays. This modular design also facilitates system upgrading as new technologies become available. [222] To date, four modules have been designed, as listed below. [223]

[222] Military.com, HSV-2 Swift, May 1 2009 http://tech.military.com/equipment/view/127898/hsv-2-swift.html

[223] GlobalSecurity.org, HSV-2 Swift, May 1 2009 http://www.globalsecurity.org/military/systems/ship/hsv-mod.htm

3. HIGH SPEED VESSEL (HSV) / THEATER SUPPORT VESSEL (TSV) ACTD MODULES

The commercial sector has already developed and demonstrated a number of relevant technologies and capabilities; specifically, high-speed ships (45+ kts), long range at endurance speeds (30 kts, >4000 nm), good sea keeping ability (30 kts in 4.5-5 meter seas), shallow draft (12-14 ft) and ease of rapid modular adaptability to multiple missions. A singular baseline configuration, depicted here, with a dedicated crew of 20, remotely injected with a tailorable and versatile C4I capability could allow rapid mission reconfiguration (within hours) and the embarkation of roll on / roll off mission specific equipment or modules, with specific staffs and personnel tailored to meet a wide variety of military tasks.

These rapidly adaptive characteristics create opportunities for adopting transformational alternative operational concepts for bringing military power to bear at responsive speeds from long range. The current Joint Venture HSV-XI experimentation series will support the development and refinement of these missions using Network Centric principles and existing and proposed fleet modular capabilities.

Specifically, the HSV technology has the potential to better balance and transform the Fleet for operation in the information age over a wide variety of missions including assuring access in the littorals. Our future will rely on and most certainly require a mix of traditional forces along with the emerging HSV capabilities in order to successfully accomplish the full spectrum of future missions from Humanitarian Assistance, Logistic Support to NEO and Power Projection capabilities to gain, maintain and sustain access in the littorals. Assuring access to the world's littorals by Navy striking forces and Army / Marine combat elements is clearly a fundamental imperative for our 21st century Navy.
The modular adaptive concept of the HSV brings into focus four significant 21st century realities:

- The emergence and development of Expeditionary Sensor Grid (ESG), Cooperative Engagement Capability (CEC), Global Information Grid (GIG), and FORCE NET all supporting the tenets of Network Centric Operations (NCO), will sharply increase combat power at the individual ship and force levels. The electronic keel or data bus of the

HSV which provides the information back-plane that ensures C4ISR connectivity and shared awareness required for the information age, will create the design and investment trade space to allow HSV the ability to rapidly reconfigure, much as our multi mission F/A-18 does today.

- Sustained access to the world's oceans and littorals, to space, and to cyberspace remain a strategic, operational, and a tactical imperative. The ability of HSV to rapidly reconfigure ensures that those rapidly developing missions such as NEO, MCM, responsive Logistics support and sustainment, required and demanded by the Joint Force commander, will be immediately tailorable and responsive by a maritime force structure to better meet his operational needs and commitments.
- Current acquisition strategies and fiscal choices that result in the concentration of combat power at the expense of robustness and force size (numbers) could truncate force utility while sharply increasing risk and vulnerability. Numbers count; the real cost of a baseline HSV is commercially proven to be an order of magnitude less than current existing programs including the cost of development and acquisition (estimated costs are $70-100 million for baseline militarized vessel).
- Demonstrated new technologies such as modern composite materials, vessels with high speed (> 45 kts.), and shallow draft (12-14 ft fully loaded), and long range (> 4000 nm at > 30 kts) enable a considerably expanded trade space yielding increased robustness, flexibility of employment, and mission effectiveness. With regard to surface combatants, the three key elements of combat power, sustainability, and robustness under stress are no longer clearly coupled to displacement. Proven composite ship construction and the development of new hull forms allows for the construction of entirely different classes of ships capable of sea-worthiness and payload fractions (30-50%) unachievable by the traditional construction techniques.

The future war fighting environment will place higher value on maneuver, sensing, signature control, speed, battle space preparation, numbers, modularity, adaptability and risk tolerance in addition to and coupled with the robust power projection capabilities of our current force. Each of these characteristics of a future force will directly impact the U.S. Navy's ability to respond to crises while we secure, maintain, and exploit access. While analysis continues to validate the foregoing, the confluence of analysis to date points to the increasing combat value of smaller, faster, reconfigurable, and modularly adaptable surface vessels for the future Navy.

Baseline HSV Characteristics

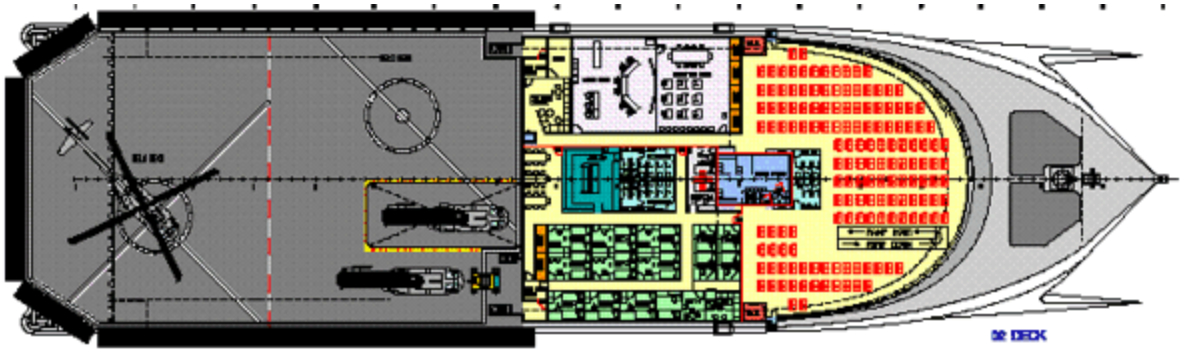

Figure 39: HSV Diagram

HSV is part of a larger concept for sizing, shaping, operating, and continuously transforming the Navy to meet evolving challenges. A clear operational vision and the strategy to achieve it must be in consonance with the evolving nature of war, the principles of combined joint operation, and emerging technologies and concepts. Some examples of mission possible reconfigurability are constructed within these pages.

A preeminent characteristic resident in the emerging High Speed Vessel (HSV) concept is the flexibility to modularly adapt and reconfigure to meet a number of mission profiles from a singular cost effective baseline vessel configuration. Instrumental is the capacity of the baseline configuration to accept and integrate existing modular suites, containers, and readily mobile transportable mission specific equipment onto its reconfigurable cargo spaces and to rapidly plug them into a standardized electronic keel. Simultaneously, with rapid reconfiguration, the HSV can embark the requisite staff assigned to meet the assigned missions. This operational scheme may allow the fullest, most flexible and adaptable design for employing a vessel for several different requirements and provide the fleet with the most responsive capability at the lowest total system cost. The small core crew size is also easily accommodated with a forward deployed Blue / Gold or "Horizon" manning scheme.

Resident in the proposed total mission baseline would include key features such as; a helicopter deck, aircraft/cargo elevator, multi-function command and control suite along with vehicle ramps and vehicle stowage areas for roll-on and roll-off containers, vehicles, mission planning cells, crew quarters, living spaces as well as weapon modules, adding to its enormous versatility.

The Navy Warfare Development Command (NWDC), along with partner commands, has attempted to ensure that developing HSV concepts developing through HSV-XI Joint Venture are compatible with existing and proposed mobile units and systems. NWDC along with industry has developed an initial baseline configuration that could serve as a starting point for a modularly adaptable vehicle based on an off-the-self, 112 meter, 12 foot draft design. Illustrated below are some of the possibilities;

A. Mine Warfare Command and Control Configuration

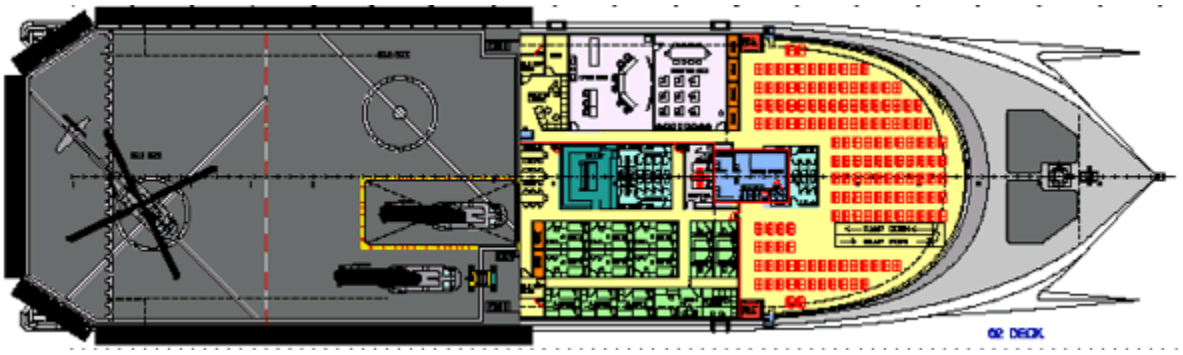

Figure 40: HSV Mine Warfare Configuration

The HSV's demonstrated seakeeping characteristics and ability to quickly integrate modularized mine warfare capabilities would provide a more responsive, stable, seaworthy, and tailorable C2 platform for the MIWC, capable of coordinating MCM operations from the sea.

Proposed MCW load out would include:

- 60 additional staff and personnel
- Four SH/MH-60S helos

- Six berthing trailers (10 berths per trailer)
- Two hotel services trailers (toilet/shower)

By 2010 MCM assets could be "assigned" to the CVBG, ARG, or forward based available for tasking by the MIWC. This organic capability is currently planned to be deployed from CVN, DDG, and SSN assets. The proposed deployment of the assigned MCM systems from these current platforms may have negative impact on their primary missions which sub optimizes their use in several mission areas. Use of a MCM configured HSV as the mission need arises would eliminate those conflicts at affordable costs. Experimental objectives will include the C2 concept as well as suitability of the HSV to launch and recover future MCM vehicles and sensors (HSV (MIW) as MCM-X augment. The militarized HSV would be able to quickly deploy a variety of MH HELO / RHIB / UUV / USV in support of MIW with a covert internal "launch between the hulls" capability.

Current experimentation objectives include:

- Utilize the HSV as a MCM-X platform with future MCM Unmanned Underwater Vessels tasked by the MIWC.
- Two Unmanned Underwater Vehicles, provided by the Office of Naval Research, to operate from the HSV examining launch and recovery suitability as well as data download and insertion into the Common Tactical Picture CTP. These UUVs are Battlespace Planning Autonomous Underwater Vehicle (BPAUV) and REMUS.
- EOD Det embarked and deploy from the HSV to execute a Raise, Tow and Beach Mine Exploitation mission about 60 NM away from the GOMEX AOA which will be conducted between UUV launch and recovery missions.
- Embarked MIWC on MCS. A command center with a full C4ISR suite installed on the HSV, which will provide C4ISR capabilities of a MICFAC.
- GCCS-M/MEDAL, NMWS and SIPRNET connectivity will be used to input UUV data into the CTP as well as allow the MIWC to observe the GOMEX tactical picture and support tactical decision making.

B. Medical Support Facility Configuration

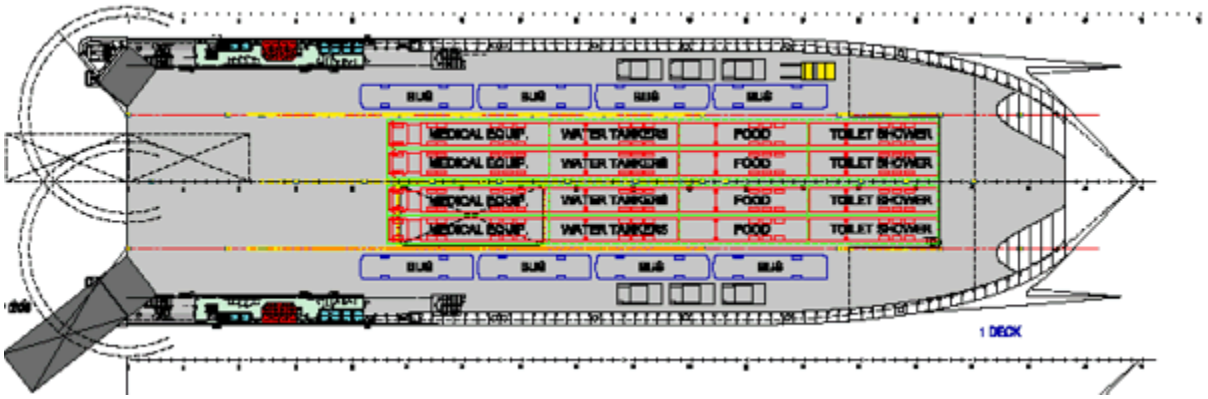

Figure 41: HSV Medical Support Configuration

Future High Speed Vessels may be the preeminent choice for these humanitarian mission areas because of is rapid reaction in speed of delivery as well as its adaptability and modular refitting of cargo. Initially evaluated by the Royal Australian Navy experience in East Timor, with a significantly less capable platform, the high speed, RO/RO capability and twelve foot draft enabling access to shallow water austere ports, provided the capabilities to ingress / egress easily and quickly, care for large numbers of personnel, transport them to a safe haven and return to the scene at high speed in order to continue the effort. These rapidly loadable vessels can effectively switch from an employment role to a sustainment role for a deployed force almost immediately.

A Single baseline HSV can be configured to carry:

- Six semi-trailers with fully-equipped operating rooms
- Four water tankers
- Four food trailers
- Four toilet/shower trailers
- Six HUMVEES
- Eight to Twelve passenger busses
- Radiological services
- Medical laboratory to include; pharmacy, optometry lab, and cat scan
- Mobile oxygen producing plant

- Portal between twin Hulls providing a lee in order to take on patients at sea
- Four Semi-Trailers hospital bed facility

C. Maritime Intercept Operations Configuration

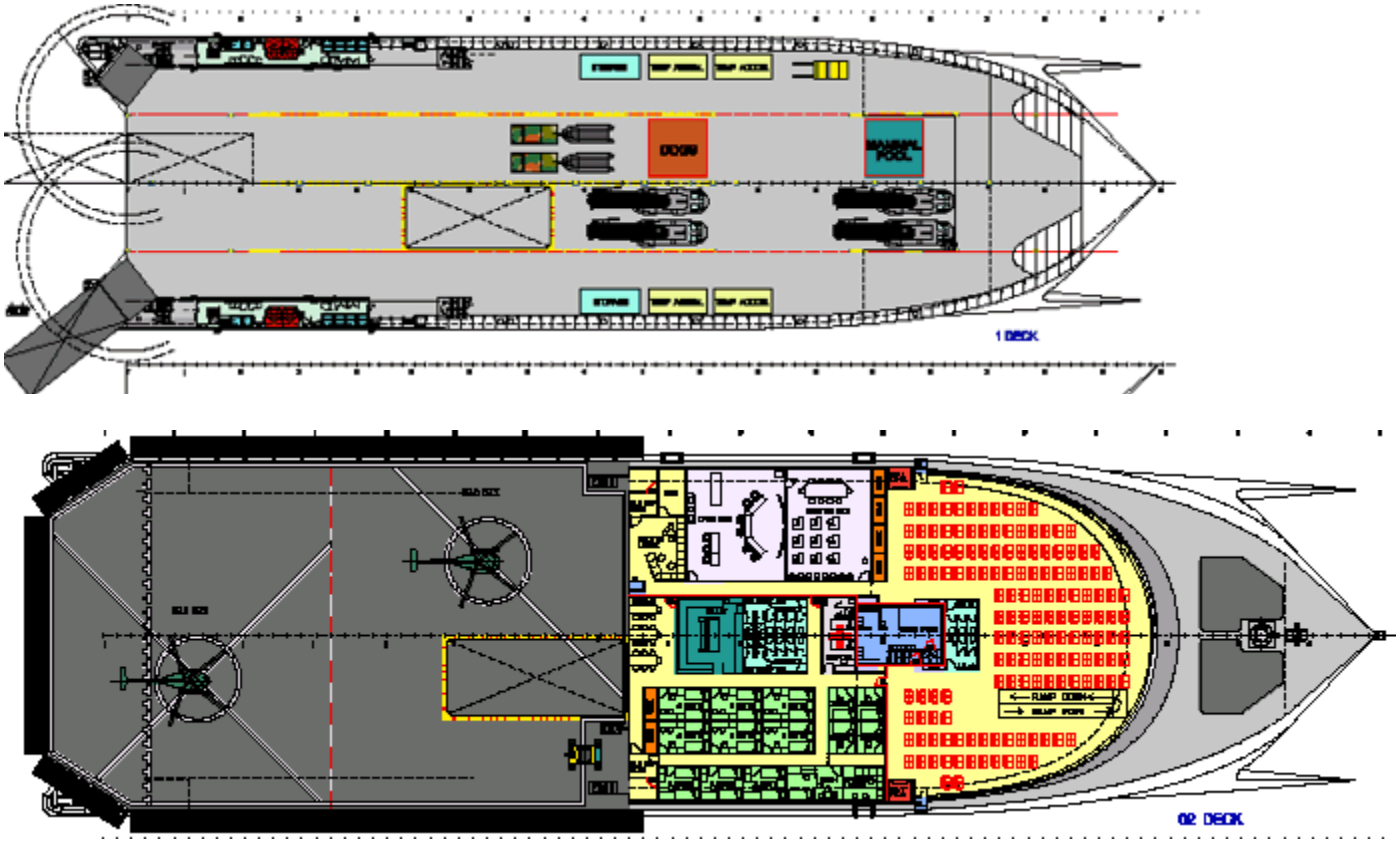

Figure 42: HSV MIO Configuration

A single HSV configured for the Anti-Terrorism Force Protection role could provide a significant capability to operate a scalable force protection augmentation package in support of U.S. Navy port visits and force protection requirements. Within the Homeland Security (HLS) scenarios, it is envisioned that maritime forces, both US Navy and USCG, will be required to investigate, query, intercept and potentially board high-risk vessels. These missions will be rapid in nature, often directed on short notice but at a sufficient distance from CONUS to prevent danger to the continental US. To support this mission high speed, wide ranging, responsive, suitably equipped, maritime tasking is required.

HSV configured for ATFP / Maritime Intercept Operations (MIO) package:

- Augments ship's force protection capabilities and provides a full spectrum of landside/waterside security functions for ship port visits.
- Force level protection is rapidly scalable and tailored to threat and host nation considerations.
- Minimizes high cost airlift and local civilian contracting requirements by bringing organic mission support capabilities with the vessel (C2, berthing/messing, barriers, etc.)
    - 44 additional personnel
    - Two 21' RHIBs rapidly deployed via "Moon Pool" with boarding/security party
    - Team of working dogs (cage area on vehicle deck 20'x20')
    - Four HMMWVs
    - Mammal pool (20'x20'x4' total weight 3500 pounds) deployed through "Moon Pool"
    - Support USCG HH-60J JayHawk involved in SAR/Armed Recon/Drug Interdiction
- Notional Homeland Security (HLS) package:
- 22 additional personnel
- Two 21' RHIBs rapidly deployed via "Moon Pool" with boarding/security party
- Two USCG HH-60J or Special Forces (MH-6) on deck (up to Six in vehicle storage area)

4. VISBY CLASS CORVETTE [224]

Displacement (Tonnes)	600
Draft (Ft)	7.5
Endurance (nm)	2,300
Speed (Knts)	35
Crew	43 (Total)
Troops	N/A
Organic Boats	N/A
Well Deck Capability	N/A
Cargo Capacity (ft^3)	N/A
Vehicle Space (ft^2)	N/A
Helo Capable	1
Help Spots	1
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	Umkhonto (Air Defense Missile)
Offensive Weapons	Saab Bofors Dynamics RBS 15 Mk2/MK3 Anti-Ship Missile; Saab 40mm Grenade Launchers; Saab Underwater Systems Tp 45 Torpedo; Bofors 57mm 70 SAK MK3 GPMG
Radar Type	SaabTech CEROS 200 / Fire Control; Saab Sea Giraffe AMB / Air Search; Celsius Tech Pilot I-band Surface Search; CEROS 200 MK3 I/J-band Fire Control Radar
Sonar	Hydra Multi-Sonar Suite
EW / Intel	CS-3701 TRSS; MASS Decoy System;
Communications	CETRIS C3
Command/Flag Space	N/A

[224] ThyssenKrupp Marine Systems, "The Visby Class Corvette" May 6 2009 http://www.kockums.se/pdf/visby2006.pdf

Estimated Cost per Ship	$184 million
Special Features (e.g. Mission Modules)	ASW, AS, MCM mission modules

Table 136: Visby Class Corvette

Currently undergoing sea trials, and due for commissioning in 2010, the Visby is the latest addition to the Swedish Navy aimed at fulfilling the ASW, MCM and Anti-Surface Warfare role. Setting it apart from past vessels of the same class is its Stealth capabilities through the minimization of optical, infrared signatures, above water acoustic and hydroacoustic signature, underwater electrical potential, and magnetic, pressure signature, radar cross section and actively emitted signatures. It has been designed to leverage on the geographical features of Sweden, consisting of many Fjords for concealment, to wage hit-and-run operations against a numerically superior enemy. The relatively short endurance of the Visby has been criticized in view of the shift of maritime operations from short static defense to a more dynamic expeditionary approach. There will be 6 ships by 2010. The 7th has been cancelled. [225]

Suitability for missions:

- Anti-smuggling Operations:

Equipped with organic anti-personnel weaponry inclusive of a General Purpose Gun and a Grenade Launcher. Max speed of 35 knots may limit performance in pursuit engagements. Small crew may limit any possible ground operations. Improved speed will serve as a possible enhancement.

- Civil Support:

The Visby has limited cargo capacity, and serves best as a mobile platform for helicopters, albeit a single one, when confronted with a Civil Support mission. It has also limited endurance.

[225] Visby Class Corvettes, Sweden, Naval Technology .Com, 01 May 2009 http://www.naval-technology.com/projects/visby/

- Information Sharing:

It is limited to the support of a single Firescout UAV, and hence has limited influence on Information Sharing operations. But its stealth capabilities may render it particular useful in scouting missions, and in this sense, its small signature will be an asset.

5. GREEN WATER PATROL CRAFT - COMBAT PATROL CRAFT (PC) [226]

Characteristics	Low cost variant of the Cyclone class patrol craft augmented with offensive and defensive weaponry
Displacement (Tonnes)	400
Draft (Ft)	Not available
Endurance (nm)	Not available
Speed (Knts)	35
Officers	30(crew), 30(combat crew)
Enlisted	N/A
Troops	N/A
Organic Boats	N/A
Well Deck Capability	N/A
Cargo Capacity (ft^3)	N/A
Vehicle Space (ft^2)	N/A
Helo Capable	No
Help Spots	N/A
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	Zero, based on assumption that its top speed of 35 knots can effectively defend against one incoming missile through evasion
Offensive Weapons	2 ASCMs, 25mm Guns
Radar Type	N/A
Sonar	N/A
EW / Intel	N/A
Communications	N/A
Command/Flag Space	N/A
Estimated Cost per Ship	$60 million
Special Features (e.g. Mission Modules)	N/A

Table 137: Green Water Patrol Craft (PC)

[226] NPS Thesis: LITTORAL COMBAT VESSELS: ANALYSIS AND COMPARISON OF DESIGNS by Bryan J. Christiansen - Table 1, dated Sep 2008

The introduction of new technologies force navies to adapt and the introduction of surface-to-surface anti-ship cruise missiles from a large number of small coastal combatants created vulnerability in the Navy's force structure of large, expensive, nonexpendable warships. To counter this threat, the adoption by the U.S. Navy of small, inexpensive, missile bearing vessels is recommended.

Utilizing the Salvo Model developed by Captain Wayne Hughes, USN (Retired) of the Naval Post Graduate School, four candidate vessels were compared in a mathematical simulation of combat scenarios and Combat Patrol Craft, a variant of the Cyclone class patrol craft augmented with offensive and defensive weaponry is one of them.

Equal cost force structures for the four candidate vessels are developed, and then these forces are "fought" in simulated battles against a missile-firing opponent force of variable strength. Additional roles such as maritime interdiction and theater security cooperation are considered and the candidate vessels are qualitatively compared for their ability to perform in these missions.[227]

Suitability for:

- Anti-smuggling Operations:

Patrol craft as its name suggests, was designed for patrol purposes but not missile combat. Thus it will be more appropriate to carry out patrolling operation in green water environment against Anti-smuggling operation assuming smuggling ships are lightly armed. But in the scenario where a heavier armed hostile smuggling ship is being engaged, patrol craft may proved incapable as it was lightly armed with only 2 ASCMs & 25mm guns. Thus carrying out patrolling operation in pairs or more can be viable.

- Non-Combatant Evacuation:

Being small in size, it can only support up to 30 crews & 30 combat crews and thus, limited capability for large scale evacuation. To improve the patrol craft capability, expanding the size can be an option but not a recommended one as it reduces its mobility in terms of speed (heavier). Thus it may be just a case of a chicken & egg issue.

[227] NPS Thesis: LITTORAL COMBAT VESSELS: ANALYSIS AND COMPARISON OF DESIGNS by Bryan J. Christiansen, dated Sep 2008

- Freedom of Navigation:

Being light in weight & fast in speed (35knots) with greater mobility, gave it an advantage in terms of freedom of navigation.

6. M80 STILETTO [228]

Displacement (Tonnes)	45
Draft (Ft)	3
Endurance (nm)	500
Speed (Knts)	50
Officers	0
Enlisted	3
Troops	Up to 12
Organic Boats	11m RHIB
Well Deck Capability	N/A
Cargo Capacity (ft^3)	Internal capacity for troops and equipment
Vehicle Space (ft^2)	N/A
Helo Capable	No
Help Spots	N/A
Organic Aircraft	Small UAV capable landing pad
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	Currently none however, space provisions have been made for future weapons
Offensive Weapons	Currently none however, space provisions have been made for future weapons
Radar	Navigation Radar
Sonar	N/A
EW / Intel	Currently none however, space provisions have been made for future systems
Communications	Space provisions have been made for future systems
Command/Flag Space	N/A
Estimated Cost per Ship	$12.5 million*
Special Features (e.g. Mission	N/A

[228] Naval Technology, M80 Stiletto Next-Generation Military Vessel. 30 April 2009 http://www.naval-technology.com/projects/m80-stiletto/

Modules)	

Table 138: M80 Stiletto

Note: * Based on 10 million dollar price estimate plus 2.5 million dollars for mission related equipment

The M-80 is a low-profile, high-speed multiple-hulled, carbon fiber, vessel which was built by M Ship company on behalf of the US Department of Defense's Office of Force Transformation. The Stiletto features an M-shaped hull that allows it to cut smoothly through the water while remaining stable. The size of the vessel also gives room to carry troops or equipment (1,996 ft^2) and also to mount electronic sensors.[229]

The M80 has participated in Trident Warrior joint-force exercises as well as tests conducted by the U.S. Navy SEALs off the California coast and was deployed to Colombia to help fight the U.S. war on drugs where it made a high-speed, shallow-water drug interdiction that resulted in the capture of 1,800 lbs. of cocaine.[230]

The ship is 88.6 feet (27.0 m) in length, with a width of 40 feet (12 m) and a height of 18.5 feet (5.6 m), which makes it possible to fit two M80s in a LPD-17 class ship, two in a LSD-49 class ship and three in a LHD-1 class ship, with minor modifications to the well deck of the amphibious ships.

Suitability for missions:

- Anti-smuggling:

M80 can and has acted as a high speed intercept vessel in an Anti-smuggling mission. The low draft allows the M80 to pursue contacts into much shallower water than a conventional U.S. Navy ship and the high speed of the M80 gives a higher probability of intercepting high speed contacts.

- Civil Support:

Based on the assumptions made in the Civil Support mission scenario, in particular that all transport of goods will be conducted by air assets, the M80 will have limited usefulness in the Civil Support mission. The Stiletto will be able to assist in the

[229] M Ship Company, Military M80 Stiletto. 30 April 2009 <http://www.mshipco.com/military_m80.html>

[230] M Ship Company Press Release September 16, 2008. "M Ship's Stiletto Nabs Smugglers After High-speed Chase" 30 April 2009 http://www.mshipco.com/news/press_releases/2008/pr_091608.html

information sharing portion of the Civil Support mission and could aid in providing security afloat for a force conducting Civil Support.

- Information sharing:

M80 will be capable of launching and recovering small UAVs which can act as a communications relay or mobile surveillance platform. The Stiletto will be outfitted with a cluster supercomputer onboard, and satellite communications. [231] In 2006 the M80 participated in naval exercises where it acted as a command and control ship with 40 people on board.

[231] M Ship Company Press Release March 8 2006. "M80 Stiletto Completes Successful Sea Trial, Will Participate in Special Forces Exercises" 30 April 2009 http://www.mshipco.com/news/press_releases/2006/pr_030806.html

7. FAST RESPONSE CUTTER (FRC) [232]

Displacement (Tonnes)	325
Draft (Ft)	9.5
Endurance (nm)	4230 (at 10 kt)
Speed (Knts)	> 28
Officers	2
Enlisted	20
Troops	-
Organic Boats	Short Range Prosecutor (SRP) patrol craft, single 7.9 m rigid-hull inflatable boat
Well Deck Capability	N/A
Cargo Capacity (ft^3)	N/A
Vehicle Space (ft^2)	N/A
Helo Capable	No
Helo Spots	N/A
Organic Aircraft	N/A
Operating Rooms	N/A
Beds	N/A
Dental Facilities	N/A
Self Defense Weapons	4 x 12.7mm-caliber machine guns
Offensive Weapons	1 x 25mm remote operated weapon system
Radar Type	Navigation Radar
Sonar	N/A
EW / Intel	N/A
Communications	Interoperate with CG, DHS, DOD, RESCUE 21
Command/Flag Space	Integrated bridge with 360º visibility
Estimated Cost per Ship	$41.6 million
Special Features (e.g. Mission Modules)	N/A

Table 139: Fast Response Cutter (FRC)

The Fast Response Cutter (FRC) is capable of independent deployment in support of law enforcement, port security, search and rescue, and defense operations missions.

[232] Press Release by Office of Public Affairs, U.S. Coast Guard, "Fact Sheet: Fast Response Cutter-B", accessed on 4/1/2009, from http://www.piersystem.com/go/doc/786/150632/&printerfriendly=1

Typical missions include offshore fishery protection, choke point interdiction, barrier patrols, and presence in high-risk areas. Design features include reduced signature through shaping, active fin stabilisation system, an integrated bridge with 360º visibility and a stern ramp to launch new Short Range Prosecutor (SRP) patrol craft.

The $24-billion, 25-year post-9/11 Deepwater Implementation Plan calls for 58 FRC A and B class end-state assets, in order to close an existing patrol boat operational hour gap and to replace the aging legacy 110-foot patrol boat fleet. Prior to the 11 September 2001 (9/11) terrorist attacks in New York and Washington DC, the US Coast Guard's (USCG's) planned to replace the Island class with a 147 ft FRC by 2018. Following 9/11, a sweeping review of the coastguard's Deepwater acquisition strategy accelerated the FRC program by almost a decade. On 26 September 2008, Bollinger Shipyards won an USD88 million contract to design and build the US Coast Guard's (USCG's) first Sentinel-class Fast Response Cutter (FRC). The USCG said that up to 34 of the 153 ft (47 m) vessels - worth USD1.5 billion - could be built over six to eight years if all options are exercised. Eventually the USCG intends to procure a total of 58 FRCs, at a projected cost of USD3.3 billion, to replace its fleet of 110 ft Island-class cutters. The first-of-class will be built at Bollinger's yard at Lockport, Louisiana, and is scheduled for delivery to Coast Guard District 7 in Miami, Florida, in the first quarter of Fiscal Year 2011. It will complete a comprehensive operational test and evaluation period before entering service in the Caribbean region. The 12th FRC is due to for delivery in 2013.

Fast Response Cutter is based on the Stan Patrol 4708 design from Dutch shipbuilder, Damen. Three such patrol crafts are already in government service in South Africa since 2004. They have conducted operations similar to those that the Sentinel Class patrol boat is required to perform. Using a proven (or parent craft) design will ensure that the Coast Guard receives new patrol boats capable of performing the required missions as soon as possible.

Suitability for missions:

- Anti-smuggling:

It will be capable of operating independently at sea for five days at a time and completing 2,500 hours underway per year. It will be able to conduct missions in

conditions up to Sea State 4 (SS4) and remain on station in conditions up to SS6. It is suitable for close-quarter maneuvers having equipped with a bow thruster and active fin stabilization. Furthermore, it will be equipped with weapons that could effective subdue armed smugglers.

- Civil Support:

It is not design for this mission, thus it has limited cargo and passenger-carrying capacity. However, it could be used to offer ports, waterways and coastal security to the Phase Zero force conducting Civil Support operations.

- Information Sharing:

It is equipped with a communication system that could interoperate with various communication systems, thus facilitating mutual exchange of information with other ships and with shore.

8. CH-53K [233]

Max Range (NM one way)	454
Cruise A/S (KNTS)	170
Max A/S (KNTS)	190
Speed with external load (KNTS)	100
Inflight Refueling	Yes
Max Gross Wt (Lbs)	84,700
Cargo Lift Capability (Lbs)	36,000
External Lift Capability (LBS)	36,000
Normal sling lift (Lbs)	27,000
# of passengers	55
Surface Radar	No
Air Radar	No
SAR/ISAR	No
Airborn Mine Counter-measures	Yes
FLIR	Yes
EW/ESM	Yes
Sonobouys	No
Dipping Sonar	No
Estimated Cost per Unit[234]	$76 Million

Table 140: CH 53K

The CH-53K program was developed to replace the Marine Crop's aging fleet of CH-53E aircraft. The CH-53K's maximum gross weight will increase from 73,000

[233] Sikorsky company, CH-53K Helicopter attributes, May 5 2009 http://www.sikorsky.com/vgn-ext-templating-SIK/v/index.jsp?vgnextoid=709f45d57ef68110VgnVCM1000001382000aRCRD&vgnextchannel=162f45d57ef68110VgnVCM1000001382000aRCRD&vgnextfmt=default&provcmid=bfa955f4a9d98110VgnVCM1000001382000aRCRD&mofvcmid=72fbebb600e98110VgnVCM1000001382000aRCRD&mofid=62fbebb600e98110VgnVCM1000001382000a &movcmid=0f586d890c7b8110VgnVCM1000001382000aRCRD&moid=fe586d890c7b8110VgnVCM1000001382000a

[234] Defense Acquisitions: Assessments of Selected Weapon Programs. March 2008 Government Acountability Office Report [GAO-08-467SP]

pound to 84,700 pounds. It will carry a cargo load of 27,000 pounds, sling loaded, 110 nautical miles, at an altitude of 3,000 feet. This capability is nearly double the capacity of the current CH-53E. This allows for a 220 nautical mile round trip with a 30 minute loiter at the landing zone. The maximum external load, hook rating will be 36,000 pounds. [235]

Suitability for missions:

- Anti-smuggling:

The CH-53K could be used in the Anti-smuggling mission area doing a barrier patrol. With a 454 nautical mile range the CH-53K would have limited on station time therefore, the use of this aircraft would be inefficient way of accomplishing this mission. The CH-53K is not designed with this mission in mind and has limited sensors onboard, other than the eyes of the crew, to aid in the search of an area.

- Civil Support:

The CH-53K will be able to lift a heaver cargo load than any other vertical takeoff aircraft currently under development. The 27,000 pound mission sling load capacity will allow a CH-53K to transport up to two up-armored HMMWV or one MRAP. This increased vehicle lift capacity can also be valuable in the Phase Zero mission area of rebuilding infrastructure. The CH-53K would be able to carry a Caterpillar 450E Backhoe weighing approximately 27,000 pounds or Caterpillar D5 track type crawler dozer weighing 21,000 pounds.[236] The large number of passengers that can be carried as well as the internal cargo capacity can be valuable in this mission area.

- Information Sharing:

It is equipped with a communication system that could interoperate with various communication systems, thus facilitating mutual exchange of information with ships and with shore.

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[235] Defense Industry Daily, "CH-53K: The U.S. Marines' HLR Helicopter Program" April 21 2009, May 5 2009 http://www.defenseindustrydaily.com/ch53k-the-us-marines-hlr-helicopter-program-updated-01724/

[236] Caterpillar company, Caterpillar full product line, May 05 2009, http://www.cat.com/cda/layout?m=37840&x=7

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C. PHASE ZERO PERCEPTION SURVEY

Name_____

Phase Zero Perception Survey

During this survey you will be judging how similar or different a number of Phase Zero missions or tasks are. You will be comparing them two at a time. For us to know how similar or different you find each pair to be we will have you mark a form for us.

You can see that on the form there is a line with the words *exact same* at one end and *most different* at the other. If you find no difference between the two missions or tasks make a mark at the end of the line by *exact same*. If you find there is a difference make a mark somewhere along the line showing how much difference you find. *Most different* is in the setting of the group of Phase Zero missions or tasks. When making a similarity determination, try to think of the capabilities, platforms or equipment that would be required to complete the mission or task. We also realize that the mission requirements may differ depending on location. If necessary select an AOR of your choosing and make all of your similarity judgments in that context. In order for you to get an idea of how much difference there is in Phase Zero missions or tasks, please read though the list of missions and tasks first.

One thing we would like you to remember is that different people judge things in different ways. This means that there are no right or wrong answers. Two missions that are very similar to one person may be quite different to another. Both results are important to us. We are interested in finding out how you as an individual compare these missions.

Example:

Apples «» Oranges

Exact Same----------*Most Different*

Phase Zero Missions and Tasks for Comparison:

(1) Enforce Freedom of Navigation
(2) Build Relations with Local Governments
(3) Conduct Anti-terrorism Operations
(4) Train Local Defense Forces
(5) Conduct Non-combatant Evacuation
(6) Share Intelligence with Partners
(7) Reduce Smuggling
(8) Prevent Illegal Fishing
(9) Support Equipping of Local Defense Forces
(10) Restore Critical Infrastructure
(11) Provide Civil Support (water, food, medical, etc.)
(12) Combat Piracy
(13) Provide for Force Self Defense

(13) Provide for Force Self Defense «» (1) Enforce Freedom of Navigation
Exact Same----------*Most Different*
(12) Combat Piracy «» (2) Build Relations with Local Governments
Exact Same----------*Most Different*
(11) Provide Civil Support (water, food, medical, etc.) «» (3) Conduct Anti-terrorism Operations
Exact Same----------*Most Different*
(10) Restore Critical Infrastructure «» (4) Train Local Defense Forces
Exact Same----------*Most Different*
(9) Support Equipping of Local Defense Forces «» (5) Conduct Non-combatant Evacuation
Exact Same----------*Most Different*
(8) Prevent Illegal Fishing «» (6) Share Intelligence with Partners
Exact Same----------*Most Different*
(9) Support Equipping of Local Defense Forces «» (7) Reduce Smuggling
Exact Same----------*Most Different*
(10) Restore Critical Infrastructure «» (6) Share Intelligence with Partners
Exact Same----------*Most Different*
(11) Provide Civil Support (water, food, medical, etc.) «» (5) Conduct Non-combatant Evacuation
Exact Same----------*Most Different*
(12) Combat Piracy «» (4) Train Local Defense Forces
Exact Same----------*Most Different*
(13) Provide for Force Self Defense «» (3) Conduct Anti-terrorism Operations
Exact Same----------*Most Different*
(5) Conduct Non-combatant Evacuation «» (7) Reduce Smuggling
Exact Same----------*Most Different*
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(9) Support Equipping of Local Defense Forces «» (3) Conduct Anti-terrorism Operations
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(10) Restore Critical Infrastructure «» (2) Build Relations with Local Governments
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Exact Same----------*Most Different*
(5) Conduct Non-combatant Evacuation «» (3) Conduct Anti-terrorism Operations
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(6) Share Intelligence with Partners «» (2) Build Relations with Local Governments
Exact Same----------*Most Different*
(7) Reduce Smuggling «» (1) Enforce Freedom of Navigation
Exact Same----------*Most Different*
(13) Provide for Force Self Defense «» (9) Support Equipping of Local Defense Forces
Exact Same----------*Most Different*
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Exact Same----------*Most Different*
(13) Provide for Force Self Defense «» (12) Combat Piracy
Exact Same----------*Most Different*

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D. PHASE ZERO RESEARCH

1. INTRODUCTION

> "We seek to shape the world, not merely to be shaped by it; to influence events for the better instead of being at their mercy."
>
> -President George W. Bush [237]

The military has long been seen as a sharp tool used in conflicts both for offensive and defensive means. Wars were fought over contrasting ideology, conflict of space, self-serving national ambitions, and at times for a country's national existence. Over the years, the role of the military has been confined to the prosecution of war and nothing more. However, as the sociopolitical issues have evolved, so too has the role of the armed forces. While the historical mission statement of the United States military has been to prosecute and win wars, the current mission includes operations to ensure peace and stability of the nation without the use of armed conflict.

In the current context of military operations, operations are sub divided into phases. Phasing is similar to an arrangement of operations to facilitate sub-unit planning and preparation in terms of forces, resources, time, space and purpose. It is a logical sequence of smaller yet related operations. Joint Publication 3-0 "Joint Operations" defines the phasing model to include six distinct phases. Each phase represents military operations that are synchronized across the entire military effort. Traditionally, the military has constantly trained and honed its capability for a military confrontation. Specific military confrontations can be related to Phases 1 through 6 of the phasing model shown in the figure below.

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[237] "The White House African American Newsletter", http://www.aaenvironment.com/WhiteHouseAANewsletter/WhiteHouseAANewsletter2.pdf, Accessed on 26 May 2009

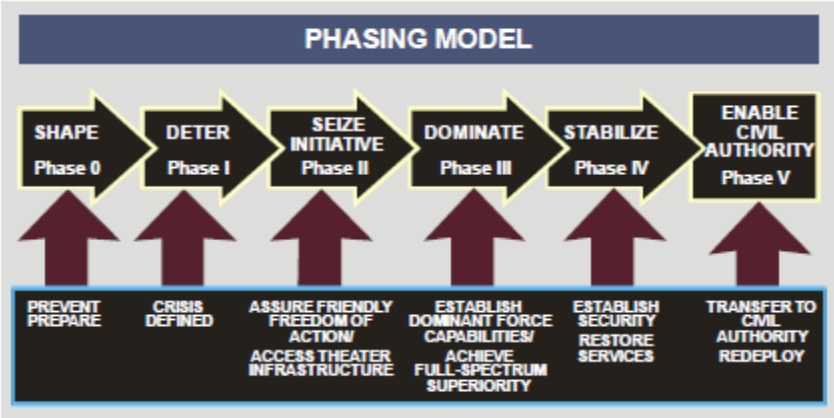

Figure 43: Phasing Model from JP 3-0

Of particular interest for this project is the emphasis on Phase Zero and the conduct of operations to prevent future conflicts. Despite being introduced almost fifteen years ago, the evolution of the term Phase Zero is unclear and the concept often misunderstood. And while the term "Phase Zero" is still not fully integrated into the military lexicon, Phase Zero has been loosely defined as "encompassing everything than can be done to prevent conflicts from developing in the first place." [238] To further understand the requirements of a force capable of accomplishing Phase Zero operations, a clearer understanding is required of the phase and its associated operations.

2. WHAT IS PHASE ZERO

Traditionally, a military campaign comprises four phases: "deter/engage, seize initiative, decisive operations and transition". [239] This model is well suited for conventional enemies, in a conventional conflict. However, modern conflict is far more complex and time-consuming. For much of the world, modern combat is not a new phenomenon. Many countries have experience with domestic and international terrorists waging war in their country. However, for the United States, the war on terror began with a symbolic terrorist attack on September 11, 2001, and combating terrorism appears to be an indefinite enterprise. Terrorist acts can occur at any time and the threat of a

[238] General Charles F Wald , "Phase Zero Campaign", Joint Force Quarterly Issue 43, 4th quarter 2006.
[239] Journal of International Peace Operations Volume 3, Number 3 Nov-Dec 2007, http://peaceops.com/web/images/pdf/journal_2007_1112.pdf, Accessed on 26 May 2009
Accessed on 26 May 2009

terrorist attack is present globally. The hunt for Al Queda, the terrorist group responsible for the attack on September 11, 2001, began in Afghanistan. Al Queda may have ties around the world, within Europe, Asia, Africa and even linking back to the United States. A terrorist attack can be in the form of a car bomb or plane hijacking. Therefore, the four phase model is inadequate in today's context. We must consider shaping operations as an integral aspect to the warfare model.

Phase Zero operations are military operations or endeavors occurring before the first bullet is fired, before the first offensive, before the first invasion and especially before the declaration of war. Phase Zero is therefore a vast spectrum of operational and logistical support encouraged by governmental, social, economic and security considerations to reduce or eliminate violence and conflict and promoting humanitarian efforts. Phase Zero is the mapping of considerations and courses of actions both proactive and reactive to prevent conflicts from developing and expanding. It can be in the form of physiological and personal actions to promote peace and security. Other actions of Phase Zero can be the forming of relations between government and non-government organizations to promote humanity and cooperation in military defense, social defense, economic defense, civil defense and physiological defense.

Phase Zero can also take the form of education and information exchange within society. In countries where literacy is low and there is a low level of trust in the government, the population may be easily influenced by rumors, ill-reporting, and by word-of-mouth thus inculcating ill feeling against an organization or governmental body. Terrorist organizations are adept at blending within a population to capitalize on this form of weakness.

The utmost objective of Phase Zero is to maintain stability and security prior to conflict.

3. TRANSITION TO PHASE ZERO OPERATIONS

Twenty years ago, the United States' strategic objective has been one of containment: to stop the spread of communism; the primary enemy was the Soviet Union. The Navy held strong roles of power projection and sea control during the Cold War.

Heavily armed ships such as Battleships and Aircraft Carriers ruled the seas and held distinction as mighty war ships that could deter enemy forces. Diplomacy and their presence was sometimes enough to influence a nation's decision to befriend the United States. Ballistic Missile submarines maintained the critical role of strategic deterrence where at any point in time, if nuclear war were to break out; the enemy country would know their certain doom was imminent. The term, mutually assured destruction, was coined from this concept. It was very easy to validate the size and cost of the United States Naval forces.

The 1980's began a period of rebuilding the Navy to combat other forces. Ronald Reagan's Secretary of the Navy, John Lehman, called for a 600 ship Navy to combat the Soviet Union's 3000 ship Navy. President Reagan said,

> "Our nation needs a superior Navy to support our Military forces and vital interests overseas. We're now on the road to achieving a 600-ship Navy and increasing the amphibious capabilities of our Marines... This adds up to a major effort, and it isn't cheap. It comes at a time when there are many other pressures on our budget and when American people have already had to make major sacrifices during the recession. But we must not be misled by those who would make defense once again the scapegoat of the federal budget." [240]

His statement illustrates the importance of having a strong deterrent force in our Navy to win America's wars. Robert F. Dorr defines Ronald Reagan's idea of deterrence as:

> "simply this: making sure any adversary who thinks attacking the United States, or our Allies, or our vital interests, concludes that the risks to him outweigh any potential gains. Once he understands that, he won't attack. We maintain the peace through our strength; weakness only invites

[240] http://www.reagan.navy.mil/about_reagan.html Accessed on 26 May 2009.

aggression. This strategy of deterrence has not changed. It still works." [241]

In the 1980's, it made sense to build up U.S. Naval Forces to combat the Soviet powerhouse Navy. A great challenge and goal for Reagan's Presidency was to influence the fall of the Soviet Union and he made this goal clear a number of times with his famous speech from June 12, 1987, "General Secretary Gorbachev, if you seek peace, if you seek prosperity for the Soviet Union and Eastern Europe, if you seek liberalization: Come here to this gate! Mr. Gorbachev, open this gate! Mr. Gorbachev, tear down this wall!" [242] On November 9, 1989, the Berlin came down. This event symbolized the collapse of the Soviet Union and allowed the Navy to shift focus from combating communism and the Soviet Union to spreading U.S. influence to the rest of the World.

The fall of the Soviet Union left the U.S. fleet without a formidable adversary. It is markedly easier to prepare for war with an enemy whose size and capabilities are known. The 1990's were an era of transformation where the US fleet began a severe downsizing campaign. All the services felt the budget cuts after the cold war weapons build-up but the Navy found itself in a more sobering identity crisis. The Clinton Administration, as part of its 1993 Bottom Up Review (BUR) of U.S. military forces, planned a Navy of 346 ships and following the 1997 Quadrennial Defense Review, the plan was for only 305 ships in the fleet. To illustrate the extent of the downsizing of the U.S. navy, at its peak at the end of Fiscal Year 1987, the Navy had reached the size of 568 ships and by February 25, 2002 the Navy had only 318. [243] The primary missions of the Navy during the Cold War were power projection from the sea, strategic deterrence, and sea control. Today, those missions have splintered into peacekeeping operations and many can be considered Phase Zero operations.

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[241] http://www.reagan.navy.mil/about_reagan.html accessed on 26 May 2009

[242] Extract from speech by Ronald Reagan on 12 June 1987, http://www.historyplace.com/speeches/reagan-tear-down.htm, accessed on 26 May 2009.

[243] Ronald O`Burke, "Navy Ship Procurement Rate and Planned Size of the Navy: Background Issues for Congress", CRS Report for Congress, accessed on 26 May 2009.

4. NECESSITY OF PHASE ZERO

Two wars, a violent regime change, and wide spread violence and insecurity have left Iraq in a continuous state of instability. The problem is accentuated by the lack of basic facilities such as sanitation, water, electricity, food, proper employment and distrust of the U.S. and its coalition forces. The pro-Saddam supporters together with the pro-Islamic fighters and terrorist factions present in the general population also contribute to the country's instability and insecurity. The situation is further aggravated when different factions and ethnic groups have their own agenda.

On the African continent, a different situation exists. In West and Central Africa there are threats to the maritime security in Gulf of Guinea that include: illegal fishing, human smuggling, drug trafficking, oil theft and piracy. In countries like Somalia, there is wide-spread civil war and piracy in the Gulf of Aden. The problems may seem prevalent only in the affected countries of the African continent, but implications are felt globally. Approximately 16,000 ships a year navigate the Gulf of Aden, which, as the southern gateway to the Suez Canal, is one of the most important trade routes in the world. Piracy in the Gulf of Aden disrupts trade and increases the cost of shipping as some ships may choose to take a longer and safer route. From 15 September 2008 to 12 January 2009 there were 62 pirate attacks in the Gulf of Aden of which 20 were successful. [244] In all of the cases, ransom money was the objective of the pirates and the only answer was for the shipping companies to pay. Figure 2 is from the United Nations Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT). The growth of piracy in Somalia can be directly tied to the instability in the country.

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[244] "Reported Incidents of Somali Pirate Attacks and Hijackings in the Gulf of ADEN for 2008", 12 January 2009,http://www.unosat.org/freeproducts/somalia/Piracy/UNOSAT_Piracy_Gulf_Aden_2008_Lowres_v7.pdf, accessed on 26 May 2009.

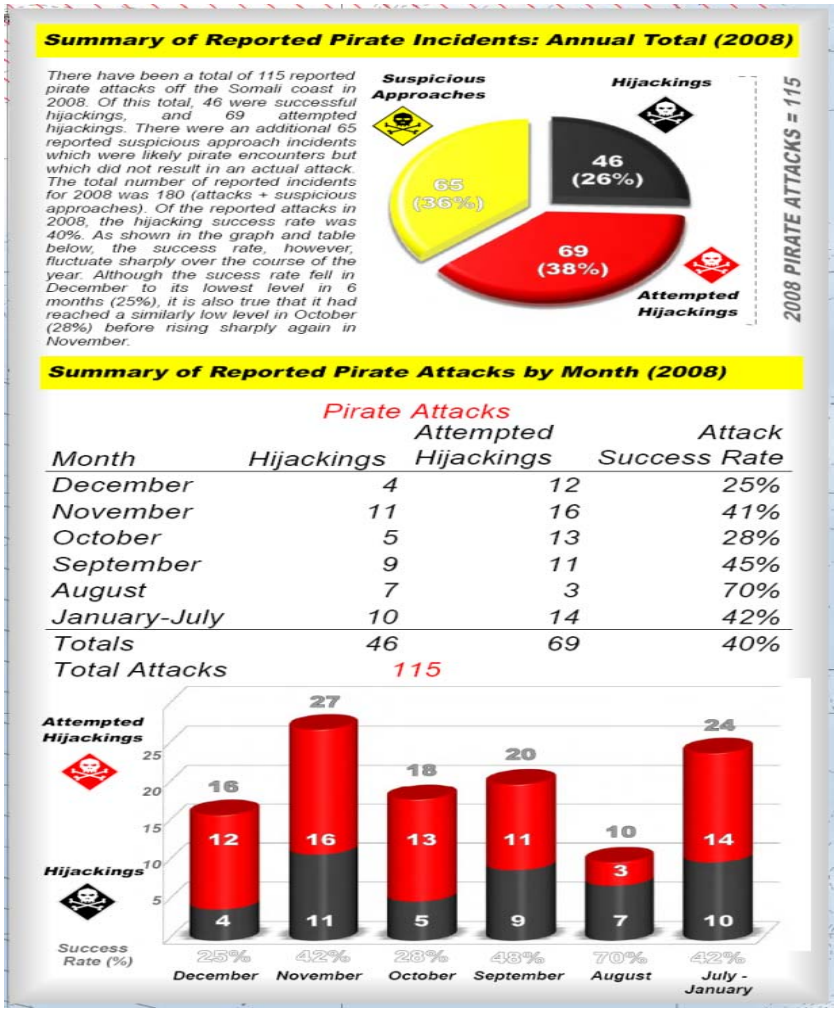

Figure 44: UNOSAT documentation of Piracy activity in Gulf of Aden

A major effort of Operation Iraqi Freedom is to win the hearts and minds of the Iraqi people. This involves creating infrastructure, providing clean water, sanitation answers, security, and a government. The United States military is actively involved in these "Phase Zero" efforts. In Africa, particularly the Gulf of Aden and the Gulf of Guinea, the threat of piracy and oil theft prevails. Before declaring war on piracy or the oil thieves, the U.S. could potentially deter and defeat these threats with a maritime Phase Zero force. If the presence of U.S. and coalition vessels in the region could provide more stability, larger conflicts may be avoided.

The problems described above lead to a series of interesting questions. Can a war be avoided by having the presence of coalition naval vessels patrolling the gulf? Can a

show of presence and force deter the pirates from harassing the shipping vessels? If a shipping vessel is threatened by pirates, can the naval vessels quickly respond to the distress or dispatch helicopters quickly to dispel the tension? If the answer to these questions is yes, then clearly the Phase Zero concept of a small naval presence without use of deadly force can be useful to make the shipping lanes safe.

5. COST REDUCTION

The other impetus of embarking on Phase Zero is the relatively high cost of armed conflicts and wars. The chart below shows the US military spending in the last six major conflicts as of September 2005.

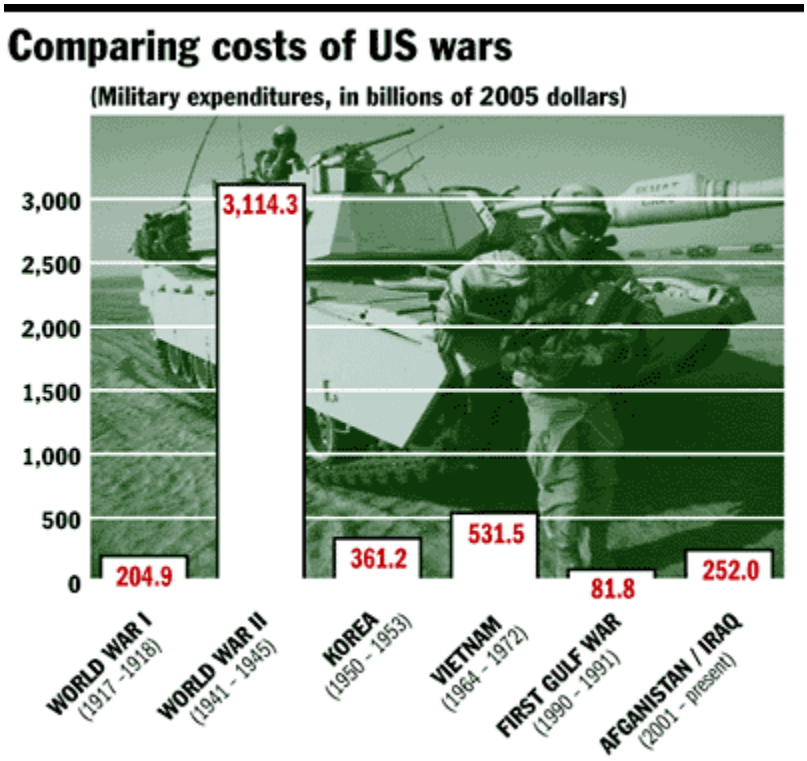

Figure 45: Costs of U.S. Wars [245]

President Obama's approval of the current spending on the Global War on Terror will make it the largest expenditure ever on United States conflict - the cost of the wars in

[245] David R. Francis, "More Costly than the 'war to end all wars'", information source from "War with Iraq", America Academy of Arts and Sciences, http://www.csmonitor.com/2005/0829/p15s01-cogn.html#chart , accessed on 26 May 2009.

Iraq and Afghanistan as of 15 June 2009 is $868 billion. [246] It is therefore very clear that any plan recommending lower spending is of vital interest to the United States and its policy makers. Phase Zero operations, which will seek to avoid war and positively affect the global environment, are in most cases much more cost effective than armed conflict and may in many cases avert armed conflict.

Any savings realized by avoiding war are beneficial to the national interests of the United States. Phase Zero operations offer an alternative to the costly endeavor of war. Historically, the United States has entered a major conflict every fifteen to twenty years. Minor conflicts occur slightly more often: approximately every five to ten years. The cost of a major conflict starts at approximately 100 billion and can climb quickly. A relatively minor conflict such as peace keeping operations in the Balkans quickly added up to over 16 billion dollars. [247] For contrast, the proposed force for this project has an annual budget of 1.5 billion dollars. If Phase Zero operations were to eliminate small conflicts, they would be financially justified. This supposition is quite reasonable. Additionally it is reasonable to believe that the Phase Zero force will be able to reduce the intensity and duration of conflicts thus saving money.

[246] The cost of war website. http://www.costofwar.com/ accessed on 15 June 2009.
[247] CRS Issue Brief for Congress, http://www.au.af.mil/au/awc/awcgate/crs/ib93056.pdf, Accessed on 26 May 2009

Casualties:

The table below outlines the loss of life from each of the last five conflicts in which the United States was involved.

War	Estimate
WWI	60M
WWII	72M
Korean War	3.5M
Vietnam War	5M
Gulf War	~150k

Table 141: List of U.S. Wars Death Toll [248]

Although the death toll generally decreases as the conflicts pass chronologically, the value of the human life does not change, and war is always a costly endeavor. A Phase Zero concept of peacetime operations aiming to prevent or avoid armed conflict can reduce the loss of life associated with war.

Prevent conflict:

An additional aspect of Phase Zero operations is extending medical assistance. From March 17-20, 2009, the Department of Defense (DoD) medical team embarked aboard USS Nashville (LPD 13) for Africa Partnership Station (APS) to assist local doctors with several medical procedures at Obiseam Medical Center Apapa and at the medical clinic at Ojo Naval Base in Lagos, Nigeria. This friendly gesture is a humanitarian effort that deployed a small team to help improve and share medical expertise. The far reaching effect is improved proficiency of the organization being helped and also an experience gained by the medical team. The force deployed created an impression of foreign military presence in the location of interest, but did not show any form of intimidation. It is very difficult to measure the effects of the medical

[248]"List of Wars and Disasters by Death Toll", Wikipedia, http://en.wikipedia.org/wiki/List_of_wars_and_disasters_by_death_toll, accessed on 26 May 2009.

exercise on the stability of the region. However, it can be said that the region is as stable and secure as it was before the Africa Partnership Station and no use of force was necessary. One could argue the humanitarian effort created strong friendships and allies within the region.

6. PHASE ZERO OVERVIEW

A far larger representation of Phase Zero is the formation of United Nations. There are 192 Member States of the United Nations, following the admission Montenegro on 28 June 2006. [249] A member state has to fulfill the basic principles of international relations with the following purposes: maintain international peace and security; develop friendly relations among nations; cooperate in solving international problems and in promoting respect for human rights; to be a center for harmonizing the actions of nations.

As the United Nations is not a world government, it does not make laws. It provides the center stage for Member States to come to an assembly to help resolve international conflicts and formulate policies on global and regional affairs. Each member state owns a right to voice their opinion and a vote on policy changes. This body also lays down the framework for Justice, Human Rights and International Law. It also has the authority to dispatch coalition officers from member states into troubled or affected countries to maintain and uphold the peace and stability that is crucial for humanity.

The United Nations prepares for natural disasters and will quickly mobilize manpower and organizations like the "Red Cross" into disaster hit areas to help deliver food, medical aids or support and temporary shelters. This is a partial framework for Phase Zero because of intervention and preparedness prior to a possible conflict or disaster.

To summarize the term, Phase Zero, is to carry out the activities to promote peace, stability and security without the use of force, using the most cost effective

[249] Member States of the United Nations, http://www.un.org/members/list.shtml#m, Accessed on 26 May 2009

resources involving partnership nations or organizations. The objective is to leverage cost effective resources to achieve an optimal goal that is the pareto-optimum solution. Phase Zero goals avert situations where the onset of the event would present an even larger cost or scale of operation to resolve a problem.

7. EVOLUTION OF PHASE ZERO

The first official mention of Phase Zero is in the 13 April 1995 revision of Joint Publication Five (JP 5-0) where Phase Zero was labeled as "shaping". From JP 5-0,

> The shape phase will contain military security cooperation activities to be coordinated with other interagency activities. When contingency and crisis action planning are conducted in a region with security cooperation activities, both military operational and security cooperation planning must be closely coordinated and linked with interagency plans. In addition, early flexible deterrent activities by all instruments of national power may begin during this phase. [250]

JP 5-0 however does not elaborate on what is required for Phase Zero. JP 5-0 limits comments to,

> Planning that supports most "shaping" requirements typically occurs in the context of day to-day security cooperation, and combatant commands may incorporate Phase 0 activities and tasks into the SCP. Thus, these requirements are beyond the scope of JP 5-0. [251]

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[250] By Peter Pace General, United States Marine Corps, Chairman of the Joint Chiefs of Staff, "Joint Publication 5-0, December 2006, Joint Operation Planning", page II-8, http://www.dtic.mil/doctrine/jel/new_pubs/jp5_0.pdf Accessed on 26 May 2009

[251] Joint Publication 5-0, December 2006 page. Joint Operation Planning, page IV-35, By Peter Pace General, United States Marine Corps, Chairman of the Joint Chiefs of Staff, http://www.dtic.mil/doctrine/jel/new_pubs/jp5_0.pdf Accessed on 26 May 2009

The concept of Phase Zero operations was not further developed until 17 September 2006 in Joint Publication 3-0 (JP 3-0). The updated phasing model includes Phase Zero as well as provided further guidance on what constitutes Phase Zero operations. JP 3 states:

> Shape. Joint and multinational operations — inclusive of normal and routine military activities — and various interagency activities are performed to dissuade or deter potential adversaries and to assure or solidify relationships with friends and allies. They are executed continuously with the intent to enhance international legitimacy and gain multinational cooperation in support of defined military and national strategic objectives. They are designed to assure success by shaping perceptions and influencing the behavior of both adversaries and allies, developing allied and friendly military capabilities for self defense and coalition operations, improving information exchange and intelligence sharing, and providing US forces with peacetime and contingency access. "Shape" phase activities must adapt to a particular theater environment and may be executed in one theater in order to create effects and/or achieve objectives in another. [252]

[252] Joint Publication 3-0, 17 September 2006, Joint Operations, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_0.pdf, Accessed on 26 May 2009

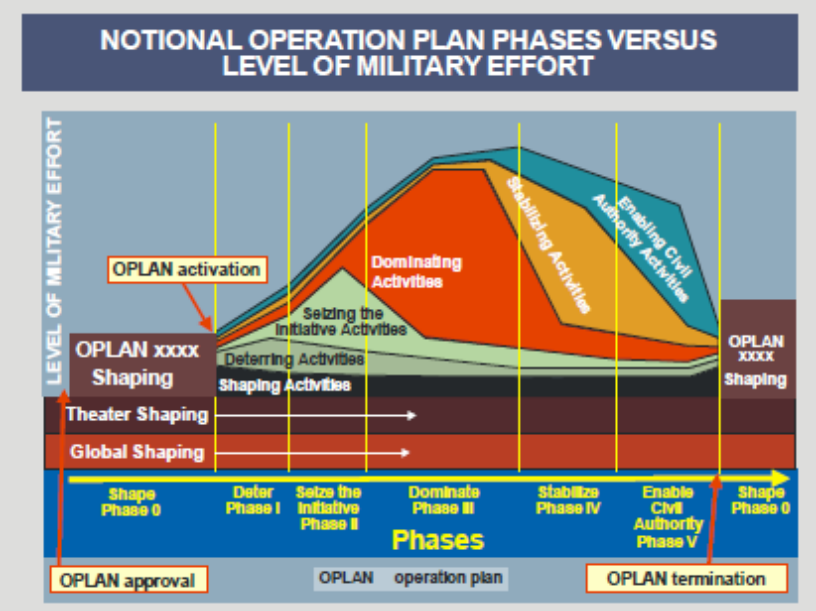

Figure 46: Phase vs. Level of Military Effort JP 3-0

Despite the additional guidance, Phase Zero remains a nebulous concept. Phase Zero missions cover a wide array of ideas that span governments, military, NGO, and civilian actions. It implies not only military actions but also social and economic actions to affect the beliefs and desires of country citizens as well as their leaders.

Shaping the battle space is not a new concept. In fact, it is a traditional concept that has existed for centuries. Sun Tzu spoke of shaping the battle by carefully choosing the place of battle in *The Art of War* written in the 6th century BC. The first impression of shaping operations involves the initial kinetic operations used to prepare the battle field for an assault. A couple examples include shore bombardment before an amphibious landing or an aerial bombardment of bridges and highways to hinder the movement of the enemy. While the term "shaping" has new meaning with regards to Phase Zero operations, the United States has been engaged in these types of functions for years.

Historical Shaping:

The Foreign Assistance and Arms Export Act of 1961 (FAA) is a continuation of the Marshall Plan that expired in 1951. The Kennedy administration recognized the need for both military and civilian aid to help the developing world and to guarantee stability.

In 1961, President Kennedy said the collapse of developing countries "would be disastrous to our national security, harmful to our comparative prosperity, and offensive to our conscience." [253] The FAA evolved out of this idea as a method to provide material support governments and none governmental organizations. The FAA states that:

> "In enacting this legislation, it is therefore the intention of the Congress to promote the peace of the world and the foreign policy, security, and general welfare of the United States by fostering an improved climate of political independence and individual liberty, improving the ability of friendly countries and international organizations to deter or, if necessary, defeat aggression, facilitating arrangements for individual and collective security, assisting friendly countries to maintain internal security, and creating an environment of security and stability in the developing friendly countries essential to their more rapid social, economic, and political progress." [254]

The stated goal of the FAA is "to promote peace and security". Section 545.777 states:

> "Training in Maritime Skills The President is encouraged to allocate a portion of the funds made available each fiscal year to carry out this chapter for use in providing education and training in maritime search and rescue, operation and maintenance of aids to navigation, port security, at-sea law enforcement, international maritime law, and general maritime skills." [255]

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[253] USAID History http://www.usaid.gov/about_usaid/usaidhist.html, Accessed on 30 Apr 2009

[254] Legislation on Foreign Relations Through 2002 , JULY 2003, VOLUME I–AOF VOLUMES I–A AND I–B, Page 236, http://www.usaid.gov/policy/ads/faa.pdf, Accessed on 26 May 2009

[255] Legislation on Foreign Relations Through 2002 , JULY 2003, VOLUME I–AOF VOLUMES I–A AND I–B, Page 268, http://www.usaid.gov/policy/ads/faa.pdf, Accessed on 26 May 2009

The traditional naval guidance including: *Forward From the Sea, From Sea to Land,* and *Sea Power 21* do not mention shaping. The sole focus of these literature pieces is the ability of the Navy to project its power through the use of force. *Sea Power 21* brought the concepts of Sea Shield, Sea Strike, and Sea Basing. The focus remained on having superior weapons and sensors in theater to "create shock, confusion, and chaos in enemy ranks." [256] No mention is made of preventing the need for these forces.

The Naval Operations Concept 2006 (NOC 2006) exemplifies a major change in US strategies. The NOC 2006 recognizes the changes in the world structure. Instead of focusing solely on power projection the NOC identifies new strategic goals of securing the United States from direct attack, securing strategic access, retaining global freedom of action, strengthening existing and emerging alliances and partnerships, and establishing favorable security conditions. These represent a strategic shift from the *Sea Power 21* strategic goals of projecting precise and persistent offensive power, projecting global defensive assurance, and projecting joint operational independence. The NOC 2006 maintains the traditional Navy missions of forward naval presence, sea control, air and missile defense, counter proliferation, and deterrence. However, it introduces a host of new missions including maritime security operations, security cooperation, civil-military operations, counterinsurgency, counter terrorism, information operations, and crisis response. The identification of the new missions was a response to the rise of irregular challenges from both state and none state actors.

The missions identified in NOC 2006 represent operations that affect day to day operations by the U.S. Navy. The goal of these operations is to promote stability and peace by preventing or limiting conflicts. The general idea is to build relationships with governments and people through the provision of training, medical support, disaster relief, and infrastructure repair to foreign nations. The intent is to avoid conflict by building stable governments with good will towards the United States and its coalition partners.

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[256] Admiral Vern Clark, "Sea Power 21 – Projecting Joint Capabilities", Proceedings, Oct 2002, http://www.navy.mil/navydata/cno/proceedings.html, accessed on 26 May 2009.

8. NEWLY DEFINED MISSIONS BY NOC 06

In NOC 2006, a host of missions were included into the core mission capabilities of the Navy in response to the evolving threats in the 21st century. These missions include **maritime security operations**, **security cooperation**, **civil-military operations**, **counterinsurgency**, **counter terrorism**, i**nformation operations**, and **crisis response**. Each of these missions is explained to provide greater understanding of the various over-arching guiding principles that will influence the type of operations that will be considered "Phase Zero".

Maritime Security Cooperation:

> "We will secure the maritime domain from nation-state threats, terrorism, drug trafficking and other forms of transnational crime, piracy, environmental destruction, and illegal seaborne immigration." [257]

The Maritime Security Cooperation (MSC) mission identifies new threats to the national security of the United States as well as threats to the stability of other countries. The threats are by no means new. However, they have been seen traditionally as a police issue instead of a military issue. On the surface it would appear that domestically this would run contrary to the Title Ten restrictions on the military. However this is not the case. The MSC mission recognizes that no organization alone has the capacity to stop these threats. A partnership bringing together the partnership of governmental organizations at all levels and the branches of the armed service is required to protect our national security.

MSC is not limited to domestic concerns. Today 90% of the world's commerce travels on or involves the oceans. [258] Threats to this system of global commerce potentially have a large destabilizing effect on everyone. Examples can be found in the illegal fishing off the Somalia coast and Piracy in the Straits of Malacca. Policing the

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[257] "Naval Operations Concept 2006"

[258] Robert Kaplan, "Center Stage for the 21st Century: Rivalry in the Indian Ocean", Foreign Affairs March/April 2009, http://www1.realclearpolitics.com/articles/2009/03/rivalry_in_the_indian_ocean.html accessed on 16 March 2009.

world's waterways is substantially more than the U.S. wants to perform or can handle alone. In order to effectively secure sea lines of communications we must partner and cooperate with other nations. In most instances local forces are the best choice to patrol areas. They have a geographic advantage allowing short logistical lines as well as short lines of communication. Local forces also have the advantage of being familiar with the local terrains and populations and presumably, their maritime forces are well suited to their mission. This gives insight that no outside force will have.

However, it is not as simple as convincing countries to join the coalition. Most countries do not have the training, equipment or experience to fully capitalize on their position. In order for local forces to work to their maximum efficiency they must be prepared to leverage the other members of the coalition. Examples of this might include gaining maritime situational awareness from foreign radar or Intelligence, Surveillance and Reconnaissance (ISR) assets, receiving training in intercept and boarding techniques, or using none organic air cover. Each of these examples greatly increases the strength of the local forces. However, they are not without cost, effort and commitment. In order for all coalition members to work effectively the forces must be trained and equipped to utilize the resources. These skills are also perishable so continuous training and exercises are required. The pay off however is a disproportionate increase in safety and efficiency in the maritime environment.

Security Cooperation:

The NOC lists Security Cooperation as its own mission. However it really is the more general form of MSC. The Navy's role in global stability is not limited to the sea. As a member of the joint combat team, the Navy and Marine Corps have substantial capabilities outside the maritime environment. For example, the Marines and Special Forces operating in Iraq may never see amphibious operations. Also, naval aircraft fly missions in direct support roles for the Army troops in combat on land. All of the benefits of cooperation realized on the high seas can be leveraged in other theaters as well.

Civil Military Operations (CMO):

Organizationally, Phase Zero missions might benefit from the structure and activities of the CMO and Information Operations IO.

> "[CMO are] activities of a commander that establish collaborative relationships among military forces, governmental and nongovernmental civilian organizations and authorities, and the civilian populace in a friendly, neutral, or hostile operational area in order to facilitate military operations are nested in support of the overall US objectives. CMO may include performance by military forces of activities and functions normally the responsibility of local, regional, or national government." [259]

Civil Military Operations (in Joint terms), also known as Civil Affairs (CA) operations in the Army, or generally categorized as Civil Military Relations (CMR), is anything that is done by the military, with any non-military organization in the effort to support stability, counterinsurgency and operations dealing with threats. A typical CMO sees people from military (e.g. medical, engineer corp, military police, legal and civil affairs department) and non-military organizations. Non-military organizations can include government or non government entities such as the local government, law enforcement agencies, indigenous populations and institutions, intergovernmental agencies, nongovernmental agencies, host nations, foreign nations and even private sectors providing a specific service. The parties involved can be summarized in the diagram below:

[259] "Joint Publication 3-57- Civil Military Operations", 8 July 2008.

Figure 47: Composition of a CMOC

This relatively new type of operation is planned to be the cornerstone of ensuring mission success since the traditional military operations of invade and conquer are only good against conventional conflict, and has shown quite useless against recent conflicts, especially those dealing with terrorism or non-state enemies. These new civil related operations are designed to not only win battles, but also the hearts and cooperation of the local populace. CMO is considered holistic, cumulative, integrative, and synergistic, working in the seams of power and gaps in organizations, phases, and processes. CMO need to take into consideration the culture of the indigenous population since they involves engaging the population and building relationships with the local populace. CMO are inherently joint, interagency, and multinational affairs. At all levels, CMO use political bargaining, collaboration, consensus, and relationship-building to create favourable situations for success." [260]

CMO Organization:

In US military context, CMO are typically centrally coordinated via a CMO center (CMOC). Its organization is mission and theater dependent and is usually flexible in size and composition. The main purpose of the CMOC is to prepare and coordinate all

[260] "Joint Publication 3-57- Civil Military Operations", 8 July 2008.

CMO planning teams support. The planning teams will determine the number and expertise of the Civil Affairs (CA) personnel needed for the specified missions. CMOC also provide and direct CA augmentation requirements as necessary. The definition of CA is:

> "The activities of a commander that establish, maintain, influence, or exploit relations between military forces and civil authorities, both governmental and non-governmental, and the civilian population in a friendly, neutral, or hostile area of operations in order to facilitate military operations and consolidate operational objectives. Civil affairs may include performance by military forces of activities and functions normally the responsibility of local government. These activities may occur prior to, during, or subsequent to other military actions. They may also occur, if directed, in the absence of military operations." [261]

Within the CMO, the Civilian Affairs (CA) personnel perform six functions:

- Law
- Economic Stability
- Governance
- Public Health and Welfare
- Infrastructure
- Public Education and Information

Depending on the type of missions that have been identified, experts with the right skill sets will be brought in for the mission.

Purpose of CMO:

> "The purpose of CMO is to facilitate military operations, and to consolidate and achieve operational US objectives, through the integration of civil and military actions while conducting support to civil

[261] DOD Directive 2000.13, June 27, 1994 www.dtic.mil/whs/directives/corres/rtf/200013x.rtf, accessed on 21 May 2009

administration (SCA), populace and resources control (PRC), foreign humanitarian assistance (FHA), nation assistance (NA), and civil information management (CIM)". [262]

- Support to Civil Administration:

This involves helping and stabilizing the governance of a foreign nation's civil structure by establishing a government or military authority over an occupied population.

- Populace and Resource Control:

This involves helping the hosting nation to retain control over the population centers and resources which are necessary for joint operations.

- Foreign Humanitarian Assistance:

This involves operations that help hosting nations relieve or reduce the effects and results of any natural, man-made or endemic disasters.

- Nation Assistance:

This involves military assistances rendered to nations during peacetime within the host nation's territories, e.g. security assistance and foreign internal assistance.

- Civil Information Management:

This involves collection and dissemination of data regarding civil areas to organizations such as other governmental agencies or NGOs.

<u>CMO at different phases of Operations</u>:

CMO are present in all phases of operations, the figure below summarizes the CMO emphasis at the various phases of operations:

[262] "Joint Publication 3-57- Civil Military Operations", 8 July 2008.

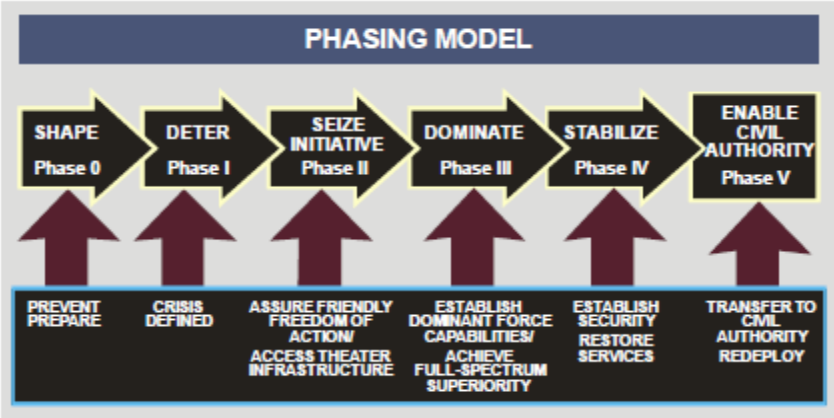

Figure 48: Phasing Model Civil Affairs [263]

The level of involvement might not be as great in some operations (e.g Panama, Bosnia, Kosovo) as it is in operations which are mainly CMO driven (the later phases of Afghanistan and Iraq conflicts).

Counterinsurgency:

If left unchecked, all the underlying issues of instabilities can lead to insurgencies. When a country's stability degrades to the point where an outside country needs to intervene to guarantee the safety of a population and human rights, then the beginnings of an insurgency can be born.

Insurgency and counterinsurgency are complex subsets of warfare. Joint doctrine defines an insurgency as an organized movement aimed at the overthrow of a constituted government through the use of subversion and armed conflict. [264] Stated another way, an insurgency is an organized, protracted politico-military struggle designed to weaken the control and legitimacy of an established government, occupying power, or other political authority while increasing insurgent control. [265] Counterinsurgency is military,

[263] "Joint Publication 3-0 – Joint Operations", 17 September 2006.
[264] "Joint Publication 1-02 – Department of Defense Dictionary of Military and Associated Terms", 12 April 2001.
[265] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.

paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency. [266]

The United States possesses overwhelming conventional military superiority. The strength of the U.S. military, while adequate to win the war, may be mismatched when securing peace, as adversaries often resort to asymmetric and unconventional operations such as insurgency and terrorism.

All insurgencies use different methods, but historical trends point to the common factors motivating insurgents. Often, insurgents and terrorists are the hardest teachers. First, they test, before you are allowed to learn.

> "The strategy of guerrilla war is to pit one man against ten, but the tactic is to pit ten men against one."
>
> - Mao Tse-Tung

This statement best describes the strategy and tactics of insurgents. A small number of insurgents, highly motivated, with simple weapons, good operations security, and even limited mobility can undermine security over a large area. [267] Therefore, maintaining security in an unstable environment requires vast resources. In addition, these asymmetric and unconventional operations also extend beyond military means. Insurgents aim to win by undermining and outlasting morale; public support and exhausting our national will. [268]

History shows that most insurgencies follow a similar course of development and the tactics useful in successfully defeating them are likewise similar in most cases. [269] For example, in Maoist-style guerrilla movements, serious guerrilla activity emerges only

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[266] "Joint Publication 1-02 – Department of Defense Dictionary of Military and Associated Terms", 12 April 2001.
[267] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.
[268], "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.
[269] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.

after a revolutionary organization is already in place. Similarly, history also shows that the same tactics that are usually successful against conventional foes may fail against insurgents. [270] One common occurrence of insurgencies is that the government or occupying force that is being targeted generally takes too much time to recognize that an insurgency is happening. [271] The insurgents take advantage of that time to build strength, such as pruning and developing leadership cadres and gathering support. In addition, the insurgents engage in a pattern of attack and counterattack. This is similar to classic guerrilla warfare, in which the weaker enemy launches surprise attacks with superiority in numbers in the setting of his choosing then withdrawing into the population before counter reinforces can be sent. The harder an occupying force hits back, the more they alienate the populace and create communities that accept, if not actively support, the armed resistance. [272] Americans found this response the hard way in Vietnam, the Russians in Afghanistan, and the British in Northern Ireland. [273]

Another common feature is that forces conducting counterinsurgency operations usually begin poorly. Governments and militaries often falsely believe that armies trained to win large conventional wars are automatically prepared to win small, unconventional and asymmetric ones. In fact, some capabilities required for conventional success, the ability to execute operational maneuver and employ massive firepower, may be of limited utility and may even be counterproductive in counterinsurgency operations. Nevertheless, conventional forces beginning counterinsurgency operations often try to use these capabilities to defeat insurgents; they almost always fail.

Counterinsurgency is waged, won, and lost at a grassroots level. This is because guerrillas, in the face of a dominant conventional force, are usually unable to establish a

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[270] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.
[271] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.
[272] Tom Donnelly & Vance Serchuk, "U.S. Counterinsurgency in Iraq: Lessons from the Philippine War", November 3, 2003.
[273] Tom Donnelly & Vance Serchuk, "U.S. Counterinsurgency in Iraq: Lessons from the Philippine War", November 3, 2003.

reliable system of countrywide networks of command and control. Consequently, tactical decisions are delegated to the separate regions and towns, where there is a need to adapt to local realities. Also, in order to survive and succeed in their insurgency, the insurgents need to have good intelligence of where the enemy is, what their strengths are, what they are likely to do and what the enemy thinks about the insurgents. [274] This localization can be witnessed in the Philippine War from 1899 to 1902, perhaps the most successful counterinsurgency campaign waged by a Western army in the past 200 years, and Iraq in 2003, where American soldiers encounter drastically different challenges between regions and towns.

In the Philippine War, an inevitable consequence of the dispersion and isolation of American forces on the islands forced them to become well acquainted with their area and the local population. This, in turn, gave them good, local intelligence, the prerequisite for effective counterinsurgency operations. [275]

A prerequisite of counterinsurgency is to encourage innovative, adaptive military leadership at the local level, rather than trying to manage the conflict from afar. This enables the local military leaders to develop a handful of semi-autonomous regional counterinsurgency plans to counter the insurgents. For example, in Operation Iraqi Freedom, pacification tactics that are effective in Mosul may be radically inappropriate for Basra. Cultivating a network of informers and gauging the public mood cannot be accomplished at a distance or on the fly. Instead, the first rule of counterinsurgency operations requires troops to be physically present on the ground to engage in sustained, personalized interaction with the local population and to build trusted networks. This helps the local population understand the troops as real people who they can trust and with whom they can conduct business. As mentioned in the Army Field Manual No. 3-24 / Marine Corps Warfighting Publication MCWP No. 3-33.5, this is the true meaning of the phrase "hearts and minds," which comprises two separate components. [276]

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[274] Anthony James Joes, "The war for South Viet Nam 1954-1975", Greenwood Publishing Group, 2001.

[275] Tom Donnelly & Vance Serchuk, "U.S. Counterinsurgency in Iraq: Lessons from the Philippine War", November 3, 2003.

[276] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.

"Hearts" means persuading people that their best interests are served by counterinsurgency success. "Minds" means convincing them that the force can protect them and that resisting it is pointless.

> "Counterinsurgency is almost certain to be a long, hard slog."
>
> – Donald Rumsfeld [277]

This quote is especially true in the face of a hostile or apathetic population. Therefore, successful counterinsurgency operations often require a high ratio of security forces to the number of insurgents. For that reason, counterinsurgency operations are usually protracted operations and are difficult to sustain. Defeating such enemies presents a huge challenge as the effort requires a firm political will and substantial patience by the government, its people, and the countries providing support. [278] The side that learns faster and adapts more rapidly will usually win. The military forces that successfully defeat insurgencies are usually those able to overcome their institutional inclination to wage conventional war.

Long-term success in counterinsurgency depends on the people taking charge of their own affairs and consenting to the government's rule. The success of counterinsurgency is ultimately defined by the degree and intensity of indigenous support it is able to secure. Progress is neither measured by the number of engagements with the enemy nor the number of casualties inflicted or sustained. Rather, the path to victory is best marked by gradual transfers of power from the occupying force to responsible and sustainable institutions of self-governance.

Leaders should never underestimate the scale or complexity; moreover, they should recognize that the military force cannot succeed in counterinsurgency alone. Almost everything in counterinsurgency needs interagency cooperation. Everything from policing to intelligence to civil military operations involves working with interagency and

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[277] Tom Donnelly & Vance Serchuk, "U.S. Counterinsurgency in Iraq: Lessons from the Philippine War", November 3, 2003.

[278] "Counterinsurgency (Field Manual (FM) No. 3-24 / Marine Corps Warfighting Publication (MCWP) No. 3-33.5)", December 2006.

host nation (HN) partners. These agencies are not under military control, but their success is essential to accomplishing the mission.

Counter Terrorism:

Counter-terrorism refers to offensive strategies intended to prevent a belligerent, in a broader conflict, from successfully using the tactic of terrorism. The U.S. military definition for counter-terrorism, compatible with the definitions used by NATO and many other militaries, is "Operations that include the offensive measures taken to prevent, deter, preempt, and respond to terrorism." [279] In other words, counter-terrorism is a set of techniques for denying an opponent the use terrorism-based tactics, just as counter-air is a set of techniques for denying the opponent the use of attack aircraft.

International terrorism threatens the United States, its allies and interests, and the world community. Defeating the terrorist requires sound policies, concerted U.S. Government effort, closely coupled with international cooperation. The key aim of the counter-terrorism strategy is to reduce the risk faced from international terrorism so that people can go about their business freely and safely.

Information Operations:

Information is an important factor to military operations. Operations depend on correct information for many simultaneous and integrated activities. Information Operations (IO) has evolved from the concepts of Command & Control and Information Warfare and now represents a class of operations that seeks to gain a tactical, operational and strategic advantage over an opponent by the use and management of information.

IO has been broadly classified to 3 main capabilities: core, supporting and related capabilities. These capabilities define primary means of conducting IO and the supporting and related tasks for the conduct of such operations.

Core Capabilities:

IO has been defined as the employment of psychological operations (PSYOP), military deception (MILDEC), operations security (OPSEC), electronic warfare (EW) and computer network operations (CNO) in concert with specified supporting and related capabilities, to influence, disrupt, corrupt, or usurp adversarial human and automated

[279] http://wapedia.mobi/en/Counter-terrorism, accessed on 26 May 2009.

decision making while protecting our own. [280] The 5 capabilities represent the core capabilities for the conduct of IO are:

- PSYOP:

Operations that are conducted with the objective of conveying information to potential adversaries and foreign audiences to influence and manipulate their motives, emotions, behavior of individuals and governments. They are conducted with the intent of inducing a favorable behavior towards an objective.

- MILDEC:

Actions that are executed to purposefully mislead potential adversaries on U.S. military capabilities, intentions, operations thereby causing an adversary to take specific courses of action. These courses of action will directly or indirectly contribute to the success of U.S. objectives and missions.

- OPSEC:

The process of identifying key information in any military operation and determining the potential advantage it might pose to the adversary in the event they had access to that information. This information will present potential adversary decision makers' critical information about friendly forces and intentions and in a broader context of operations. The security of this information could affect the U.S.'s ability to execute a mission successfully. In the realm of IO, MILDEC and OPSEC serve similar functions. MILDEC seeks to deceive the adversary by forcing them to make incorrect analysis of data thereby causing them to arrive at false conclusions about U.S. forces while OPSEC seeks to deny real information to the adversary.

- EW:

EW represents a suite of actions involving the use of electromagnetic (EM) and directed energy to control or attack the adversary. There are three main subdivisions of EW: Electronic Attack (EA), Electronic Protection (EP) and Electronic Warfare Support (ES). EA is an offensive use of the EM spectrum to attack, neutralize and destroy adversary combat capability. EP uses the EM spectrum for primarily defensive means

[280] Definition of Information Operations extracted from " Joint Publication 3-13- Information Operations" 13 February 2006.

and is used for protection of assets and personnel. ES consists of actions undertaken to intercept, identify and locate sources of EM radiation, both intentional and unintentional for the purpose of recognition, targeting and future operations.

- CNO:

With the increased prevalence of information technology, CNO has been developed as an operation to attack, deceive, degrade, disrupt, deny, exploit, and defend electronic information and infrastructure. CNO is divided into CNA (Computer Network Attacks), CND (Computer Network Defense) and CNE (Computer Network Exploitation). CNA involves actions to disrupt and deny adversary computing while CND seeks to protect, monitor and detect attacks on information systems in the military. CNE is the set of actions to further improve intelligence collection capabilities through the use of computer networks to gather information from adversary information networks.

Supporting Capabilities:

In addition to the core capabilities for IO, several supporting capabilities contribute to the effective execution of IO. These capabilities have an impact on the mission information environment. The supporting capabilities include Information Assurance (IA), Physical Security, Physical Attack and Counterintelligence (CI).

- IA**:**

IA is the practice of managing information related tasks for data and information systems to ensure their availability, integrity, authentication, confidentiality, and no repudiation. These goals are relevant whether the data is in storage, processing or transit.[281] IO and IA have a symbiotic relationship with IO primarily focused on influencing a certain type of military activity. IA is concerned with the protection of the delivery of the information particularly against adversary intelligence efforts that are directed towards military information and information systems.

[281] Definition obtained from Wikipedia - http://en.wikipedia.org/wiki/Information_Assurance , accessed on 4 May 2009.

- Physical Security:

Physical security deals with the physical aspects of security to safeguard storage data, information and information systems against possible espionage, damage and theft. Physical security is at times considered a sub section of IA, ensuring the physical availability of information and information systems.

- Physical Attack:

Physical attacks are directed offensive actions taken against adversary command, control and communications (C3) nodes and information systems to hinder the adversary's ability to exercise command and control. This capability is often used in tandem with other capabilities such as PSYOP to maximize the effect of attack on the adversary.

- CI**:**

Consists of activities conducted to protect information against espionage and other intelligence activities that may attempt to compromise information systems. CI is part of the overall security effort. Together with IA, physical security and OPSEC, CI is an effort to protect information and information systems. CI gives commanders an understanding of adversary's information gathering methodology. This insight will allow commanders to develop security measures for the information systems, hindering adversary's efforts to obtain or compromise vital information.

Related Capabilities:

Three military functions (public affairs (PA), civil military operations (CMO) and defense support to public diplomacy) are commonly used in conjunction with IO. These functions have several other roles that are not limited solely to IO, but are defined as related capabilities as they make significant contributions to IO when their execution is coordinated with other IO efforts.

- Public Affairs (PA):

PA is information, activities and community relations that are developed for external and internal audiences in DOD. PA and IO must be coordinated for consistent theme and messaging. PA's primary focus is to inform domestic and external audiences on operations and to support the command public information needs. PA is essential to

the commander's mission and important in maintaining public liaisons both in theater and in country.

- Civil Military Operations:

CMO are activities that are conducted in an effort to establish, maintain, influence, or exploit relations between military forces, governmental and the civilian population. These activities span a wide range and include activities such as assistance in reconstruction of buildings in third world countries, providing medical aid to impoverished nations and training of homeland forces. All these actions aim to address the root causes of instability with the intent of avoiding future military action. CMO can be particularly effective in pre/post combat operations.

- Defense Support to Public Diplomacy (DSPD):

DSPD is part of the DOD's contribution to the U.S. government's public diplomacy and foreign policy efforts as it seeks to understand foreign nations by broadening the relationship between American civil and military organizations with their foreign counterparts.

Information Environment:

Military forces operate in an information environment that is rapidly changing and evolving. This adds another layer to an already complex operating environment for which factors affecting this environment have to be carefully studied and resolved to ensure IO can be used effectively. There are 3 types of factors that affect the information environment: long, medium and short term factors for which military operations are planned and executed.

- Long-term factors which may shape the information environment include the various ways by which humans/organizations:
  - Organization (nation states, tribes, families, etc.)
  - Governance
  - Interaction as groups (culture, sociology, religion, etc.)
  - Regionally influences (stability, alliances, economic relationships, etc.)
  - Technological advancements

- Medium-term factors include:

    - Rise and fall of national/political leaders
    - Competition between groups/factions over resources of goals in the area of operations
    - Employment of resources by organizations to take advantage of information technology and infrastructure
- Short-term factors include:
    - Weather
    - Availability of resources for support
    - Ability to extend/maintain sensors and portable information infrastructure to the specific location of distant military operations.

Information Operations are executed at each levels of warfare, tactical, operational and strategic, with guidance given by the task force commander. All IO efforts have to be coordinated to ensure a consistent theme and credible messaging. In a multi-effort, unilateral mission, the responsibility to coordinate IO across different commands is the responsibility of the United States Strategic Command (CDRUSSTRATCOM). For multilateral effort missions, the multinational force commander is responsible for the coordination of all IO efforts. The multinational force commander is responsible to resolve potential conflicts between each nation's IO programs and the IO objectives and it is vital to integrate allies and coalition partners into IO planning as early as possible so that an integrated and achievable IO strategy can be developed early in the planning process. Coupled with CNO, IO activities are an essential ingredient for effective Phase Zero missions.

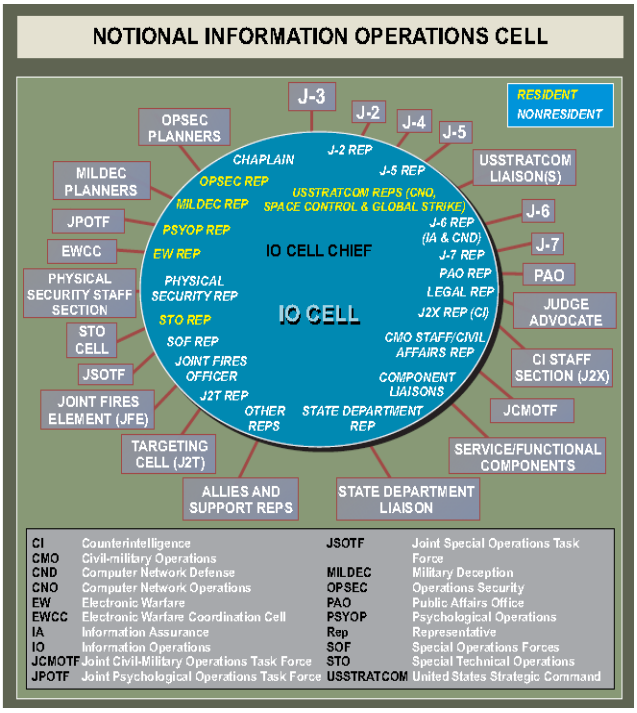

Figure 49: Elements of a typical Joint IO Cell

IO planning must begin at the earliest part of a campaign or operations planning. The use of IO during early phases can significantly influence the amount of effort required for the remaining phases.

Examples of Phase Zero IO:

For Phase Zero operations, there is not the same demand for many parts of the traditional IO mission. Phase Zero forces may not necessarily conduct electronic attack or military deception operations since the objective of Phase Zero is to increase stability in a region and EA and MDO tend to decrease stability. However, IO may be one of the most important Phase Zero missions. The main focus of IO in a Phase Zero force will be establishing command and control and an information network and in public affairs.

One of the missions of Phase Zero is to establish access. In the modern age, access to information and command and control systems is as important as physical access. This is always difficult to achieve. The problem becomes how much information is sharable, with whom do we share this information, and how to protect vital information from our adversaries or potential adversaries. A solution that the U.S. currently uses to

address protecting information from adversaries while still allowing allies access is the Combined Enterprise Regional Information Exchange (CENTRIX) network. CENTRIX is a global architecture used by U.S. Central Command and the U.S. Pacific Command that allows U.S. forces to share information and operational planning with allies. According to Monica R. Shephard, the director of Task Force Web for the CNO, "That [capability] has an ongoing transformational effect because it makes us one force. This isn't a science fair project. It's real; it's deployed; and it's in theater. And it's providing capability because a number of operations, including maritime intercept, are being supported by the allies. The CENTRIX architecture is the system that allows us to work with them very seamlessly." [282] Currently, all US forces that deploy have CENTRIX installed. CENTRIX can maintain secure information sharing with many units from Japan, Australia, Canada, the United Kingdom and Germany. While it is extremely useful for multinational operations, CENTRIX is not easy to setup, maintain or learn. In order to be useful, users must spend a fair amount of time getting to know the system to feel comfortable using it. In order for CENTRIX to provide shared operational capability, the system must be in daily use and not something that is only utilized in crisis response. This is true of any centrally organized and sustained network solution, not just CENTRIX. The SEA Integrated Project team proposed an alternative command and control network for Phase Zero that is easy to access, simple to use and efficient in sharing data, information and knowledge. See section VI.

A Phase Zero force that is able to interact with other countries and demonstrate the capabilities of the system through training and exercises can prove the importance of sharing information and through expanding the number of users.

Another example of potential IO is broadcasts for information purposes. This function supports the shaping mission. Mass media including radio, television, the Internet, and the World Wide Web reach the world's populace. This is perfectly in concert with the concept of Phase Zero. By opening up access to the broad population, our strategic policies and goals may be achieved with less expense and greater ease.

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[282]Maryann Lawlor, "Navy Embarks on Operational Sea Change", http://www.afcea.org/SIGNAL/articles/anmviewer.asp?a=229&print=yes , accessed on May 2003

An example of mass media broadcasting is Radio Rajo, a radio station established during the peacekeeping operation, Restore Hope, in Somalia. Several PA operations were conducted including loud speaker operations, leafleting, and operating a radio station. The loud speaker operation was used as a means of communicating directly with the civilian population. It informed the locals of when and where missions where being performed so civilians could avoid these areas. It was also used to spread positive information about the UN forces working in the area. Major General Wilhelm, the Commander of the US Marine Forces in Somalia, is quoted as saying, "The PSYOP loudspeaker teams were a combat subtractor…. They reduced the amount of unnecessary bloodshed by convincing Somali gunmen to surrender rather than fight." [283] Radio RAJO conducted a 45-minute Somali language broadcast twice daily on AM, Midwave FM, and shortwave. The program included a reading from the Qur'an, a reading of the RAJO newspaper articles, selections of Somali poetry and short stories, news about Africa, significant events throughout the world, and Somali music. [284] It also broadcast anti-warlord information in response to the local war lords' propaganda and intimidations.

Crisis Response:

Crisis response has been an integral part of the military mission for quite some time. The Navy has provided assistance to countries in need of humanitarian relief since shortly after World War I. As part of the crisis response activities, the Navy supports both government and private organizations with aid in the event of a crisis or natural disaster.

The war fighting capabilities of the Navy and Marine Corps lend themselves well to humanitarian assistance and disaster relief. As a result the armed forces have been conducting humanitarian missions regularly as a response of good will. Humanitarian missions are in line with what the FAA, 1961, and the U.S. Navy now plan for such

[283] "Psychological Operations (PSYOP) in support of Operation RESTORE HOPE " http://www.psywarrior.com/somalia.html, accessed on 27 May 2009.
[284] "Psychological Operations (PSYOP) in support of Operation RESTORE HOPE " http://www.psywarrior.com/somalia.html,accessed on 27 May 2009.

operations as part of their primary mission. The Navy possesses a large sea lift capacity and a significant amount of man-power and by virtue of its forward presence around the world can respond quickly to many situations. The Navy is also self sufficient for long periods of time allowing them to move into a crisis without adding additional burdens on the local populace. The Marine Corp ground equipment meant for combat operations can be easily reconfigured for civilian operations. The Marines also possess significant capacities to move material from sea to land via air and surface transport without the need for improved harbors or other infrastructure. This capability can be critical when disasters strike remote areas.

These capabilities were demonstrated after the 2004 South East Asian Tsunami. The BONHOMME RICHARD ESG and ABRAHAM LINCOLN CSG and USNS MERCY responded to the crisis and provided support as part of Operation Unified Assistance. These ships provided vital airlift, command and control functions, 1000 hospital bed as well as production of 90,000 gallons of potable water a day. The disaster struck December 24th and the first American assets arrived in theater days later.

Domestically, the Navy's response to Hurricane Katrina demonstrated the ability of the Navy to quickly respond to a domestic humanitarian crisis. Hurricane Katrina made landfall on the gulf coast of the United States on 29 August 2005. The storm landed as a category five hurricane with sustained winds of 125 mph causing extensive damage over a wide swath of the southern United States. Within twenty four hours of Katrina's land fall the Navy was moving resources into the area. The USS BATAAN and HSV SWIFT were dispatched from Ingleside Texas and were some of the first assets to arrive on scene. The BATAAN brought with it over 100,000 pounds of relief supplies and 8000 gallons of potable water. The BATAAN brought an entirely staffed and supplied hospital with 600 beds and 6 operating rooms to provide support to the residents of New Orleans. Additionally, the BATAAN was able to serve as the base for two fly away teams of eighty four medical personnel who were able to utilize the BATAAN's organic air assets to deliver medical services to remote and isolated areas. The BATAAN also brought with it a helicopter squadron of four MH-53s and two HH-60s helicopters. The helicopters were used by Federal Emergency Management Agency (FEMA) for

initial damage assessments as well as flying numerous medical evacuation and supply missions. The USNS COMFORT was dispatched to provide an additional 250 hospital beds and 270 medical staff to replace medical services destroyed by the Hurricane.

The Navy also made several of its USNS supply ships available for hurricane relief. The USNS BELLATRIX, ALTRAX, PILLIPAU, BOB HOPE, and ARGOL were dispatched to move supplies into the region. On average each of these vessels can carry 40,000 tons of supplies including containerized cargo and vehicles. Each also has the capacity to transfer cargo to shore via heavy airlift. This capacity was useful as most of the improved harbors were damaged or destroyed. The USS TRUMAN CV 75 moved into the Gulf of Mexico to serve as the command and control center for FEMA. The USNS GRAPPLE, a maritime salvage ship, was dispatched to aid in harbor salvage operations and to assist in reopening regional harbors. The Marines aboard USS WHIDBEY ISLAND used their amphibious skills and materials to build floating causeways to replace the downed bridges leading into New Orleans. In total, 28 Navy ships and 60,000 soldiers and sailors where involved in the relief operations. [285]

The scale of the Hurricane Katrina Operation is outside the normal planning range for Phase Zero operations. It would be almost impossible to maintain the number of assets available to support this type of operation globally. However, the operation highlighted the capabilities of the military in crisis response. No other organization on the planet can bring anything close to the number and variety of resources to a problem.

In testimony before the Armed Services committee General James T Conway stated:

> "Today … we have far fewer installations overseas. When conflict is imminent or crises occur, which may require land-based forces, we must conduct political, social, or economic pressure even courtiers friendly to the United States decline to host or place conditions on basing US forces." [286]

[285] Donna Miles, "Military Response to Katrina Intensifies", http://www.defenselink.mil/news/newsarticle.aspx?id=17389, accessed on 27 May 2009.
[286] James Conway 13 Dec 2007.

General Conway expressed a fundamental reality of modern age - access is becoming more difficult to come by. Access comes in multiple forms. The traditional access is physical access to bases located overseas, to maintain over-flight rights, and logistical support from other countries. In the face of modern information warfare, the most import access often includes access to information and networks of a foreign country. Under the heading of security cooperation the NOC states:

> "Marines will be critical members of the joint and inter-agency team that interacts with an expanding set of international partners to build defense relationships, develop friendly capabilities for self-defense and multinational operations, promote cultural awareness and regional understanding, and enhance strategic access. Always conducted with the utmost respect for individual national sovereignty, these cooperative activities will include assisting host nation governments in freeing and/or protecting their societies from subversion, lawlessness, and insurgency." [287]

The purpose of the Crisis Response mission is three-fold. First by developing partnerships we assure access to other countries. Second, by preventing the need for armed conflict all together. By preventing insurgencies, subversion, and lawlessness it is assumed that stable governments are created and sustained. A stable government is a rational actor that ideally can be dealt with without resorting to force. A stable government will also not harbor terrorists or other non-governmental organizations that are a threat to its national security. And third, by partnering to defray the cost of war if it is unavoidable.

9. CURRENT PHASE ZERO EQUIVALENT OPERATIONS

There are many similar terms and concepts substituted for Phase Zero Operations such as Theater Security Cooperation, Global Fleet Station, and Operations Other Then War. However, none of these cover the full range of Phase Zero operations. The military

[287] "Naval Operations Concept 2006" Pg 18

has traditionally conducted a wide range of operations that can be included under the umbrella of Phase Zero operations. These include the naval exercises UNITAS and the Cooperation Afloat Readiness and Training (CARAT) cruises. Although these exercises do not cover the entire range of Phase Zero missions, they present a good platform to gauge the requirements of current day Phase Zero operations and facilitate a projection of mission requirements for 2020.

A. UNITAS

> "We cannot afford to let Latin America and the Caribbean become a backwater of violent, inward-looking states that are cut off from the world around them by populist, authoritarian governments. We must reward and help those governments that are making difficult, disciplined choices that result in the long-term wellbeing of their people. The challenges facing Latin America and the Caribbean today are significant to our national security. We ignore them at our peril." [288]
>
> -General Craddock

UNITAS is an annual five month long multination naval exercise sponsored by US SOUTHCOM. The exercise usually takes place along the Atlantic and Pacific coast of South America. The goals of the exercise are to enhance security cooperation and improve coalition operations. [289] Despite starting in 1960 long before the terminology of Phase Zero was in vogue, UNITAS is a clear example of a Phase Zero operation.

UNITAS is Latin for Unity. [290] It is representative of the coalition that the US is trying to build in South America. Originally UNITAS was a bilateral exercise between the US and varies Latin America and Caribbean countries. The exercise has evolved into a major multilateral exercise including almost a dozen nations including allies from Europe as well as South and Central America. It is involves a five month

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[288] Extract from General Bantz J. Craddock statement to Senate Armed Services Committee dated 15 March 2005, http://www.america.gov/st/washfile-english/2005/March/20050316170548ASrelliM0.2706873.html , accessed on 27 May 2009.
[289] www.southcom.mil/appssc/factfiles.php?id=10, accessed on 27 May 2009.
[290] www.southcom.mil/appssc/factfiles.php?id=10, accessed on 27 May 2009.

circumnavigation of the South American continents. Table 1 shows a list of participants for recent years. Each participating South American country take a turn in hosting the fleet as it travels.

Each year the exercise has a specific focus. Recent UNITAS missions have focused on training in anti-terrorism, anti smuggling techniques, as well as traditional skills such as anti submarine warfare. In addition to the formal training, multiple receptions are held to allow the member nations to connect on a personnel level. This develops social networks that are important in the information age. While in port sailors also take part in community relation projects to develop ties with the local communities. The purpose of these projects is to demonstrate the good will of the United States. The table below gives the country participants in past UNITAS operations.

2009	Argentina, Brazil, Chile, Columbia, Dominican Republic, Ecuador, Mexico, Peru, Uruguay, Canada, and Germany
2008	Argentina, Chile, Colombia, Ecuador Mexico, and the United States
2007	Chile, Colombia, Ecuador, Mexico, Peru, Spain and the United States

2006	Chile, Colombia, Ecuador, Mexico, Peru, Spain and the United States
2005	Panama, Chile, Peru, Colombia, Ecuador, and the United States
2004	Argentina, Bolivia, Chile, Ecuador, Dominican Republic, Paraguay, Peru, Uruguay and the United States, and observers from Mexico
2003	Argentina, Brazil, Peru, Spain, Uruguay
2002	Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Great Britain, and the Netherlands
2001	Brazil, Colombia, Chile, France, Uruguay, and Spain
2000	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela Canada, Great Britain, and the Netherlands

Table 142: UNITAS Participants

B. Cooperation Afloat Readiness and Training (CARAT)

Cooperation Afloat Readiness and Training (CARAT) is an annual series of bilateral military exercises between the United States and various Southeast Asia nations. Participants historically include the navies of Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The exercises include at-sea maneuvering; command, control, and communications; naval gunnery; diving and salvage; visit, board, search and seizure drills; airborne maritime patrol; force protection/anti-terrorism; and medical and community projects.

While the focus of the each bilateral exercise depends on the goals of the participating countries, the general focus of the exercise is on interoperability of the various navies in areas such as operational planning, command and control, tactics, logistics support and community service projects. The purpose of the exercise series is to improve military readiness and interoperability with each CARAT partner in a variety of mission areas of mutual benefit.

CARAT began in 1995 with the concept of scheduling several previously existing bilateral exercises with Southeast Asia nations into one series of sequential exercises. Doing so resulted in a more efficient use of assets and forces. Over the years, the exercise has focused on many different aspects of maritime exercises from humanitarian relief to the fight against terrorism. This exercise enhances cooperation between the various navies and builds professional and personal relationships between each country's participating forces and the U.S. sea services.

In addition to the conduct of military exercises, humanitarian efforts and community relations were conducted within each series of exercise. This included activities by combined local and U.S. military teams of doctors, dentists, veterinarians, and engineers. Local medical personnel and other community service personnel worked closely with their U.S. counterparts to serve each participating community.

Approximately 1,400 U.S military personnel participate in the annual 6 week long exercise. The task configuration of the assets involved in the exercise depends on the focus of training for that year. On the average, five ships are involved in the exercise with additional assets added based on the type of exercise configuration.

CARAT exercises are sponsored annually by the Commander-in-Chief, U.S. Pacific Fleet, and scheduled by the Commander, U.S. Seventh Fleet.

2006 Task Group:

- Dock landing ship USS Tortuga (LSD 46)
- Guided missile destroyer USS Hopper (DDG 70)
- Guided missile frigate USS Crommelin (FFG 37)
- High endurance cutter USCGC Sherman (WHEC 720)
- Rescue and salvage ship USS Salvor (ARS 52).

Also included in CARAT 2006:

- One Navy SH-60B Seahawk helicopter
- One Navy P-3C Orion maritime surveillance aircraft
- Mobile Security Squadron Seven
- BQM-74E drone det
- Naval Mobile Construction Battalion One
- Naval Mobile Construction Battalion Forty

- U.S. Marine training team from 3rd Marine Division
- Naval Criminal Investigative Service
- Beachmaster Unit One
- Assault Craft Unit Five
- U.S. Army veterinarians
- 7th Fleet Band

2003 CARAT Task Group:

- Guided missile cruiser USS Vincennes (CG 49)
- Dock landing ship USS Harpers Ferry (LSD 49)
- Guided missile frigate USS Curts (FFG 38)
- Rescue and salvage ship USS Safeguard (ARS 50)
- 400-personnel Landing Force CARAT, a U.S. Marine Air Ground Task Force.

C. Southeast Asia Cooperation Against Terrorism (SEACAT)

SEACAT is a weeklong at-sea exercise designed to highlight the value of information sharing, cooperation and multi-national coordination within a scenario that gives participating navies practical maritime interception training opportunities. Participants include the navies of Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The first SEACAT was held in 2002.

The multifaceted exercises present participants with realistic situations involving criminal and terrorist threats requiring international coordination, communication and decision-making. SEACAT also provides participants with practical maritime interception training opportunities to enhance the maritime security and interoperability of the participating forces.

Commander Logistics Group Western Pacific/Commander Task Force 73, who operates from Singapore, is the U.S. Navy's executive agent for both CARAT and SEACAT.

2007 Assets:

- USS Tortuga (LSD 46)
- USS Crommelin (FFG 37)
- Destroyer USS Hopper (DDG 70)
- Coast Guard cutter USCGC Sherman (WHEC 720)
- Rescue and salvage ship USS Salvor (ARS 52)

- Military Sealift Command ship MV Sgt. William R. Button (T-AK 3012) is also taking part, in the role of a suspect vessel

2008 Assets:

- USS Tortuga
- USS Howard (DDG 83)
- USS Ford (FFG 54)
- USCGC Morgenthau (WHEC 722)
- U.S. military sealift command ships USNS Safeguard (T-ARS 50)
- USNS 1st Lt. Baldomero Lopez (T-AK 3010)
- USNS Cpl. Louis J. Hauge (T-AK 3011).
- U.S. P-3C from VP-16

D. Africa Partnership Station (APS)

The Africa Partnership Station (APS) is a collaborative strategy designed to work cooperatively with U.S. and international partners to improve maritime safety and security in West and Central Africa to achieve safety and security in the Gulf of Guinea as part of United States Africa Command's (USAFRICOM or AFRICOM) Security Cooperation program. The strategy of the U.S. Navy is to keep out undesirables by deploying a rotation of ships tasked with assisting West Africa's maritime forces to take control. The United States Africa Command (USAFRICOM or AFRICOM) is a Unified Combatant Command of the United States Department of Defense that is responsible for U.S. military operations and military relations with fifty-three African nations - an area of responsibility covering all of Africa except Egypt. Africa Command was established October 1, 2007 as a temporary sub-unified command under U.S. European Command, which for more than two decades was responsible for U.S. military relations with more than forty African nations. Africa Command was formally activated October 1, 2008, during a public ceremony at the Pentagon attended by representatives of African nations posted in Washington, D.C.

The idea for APS began in 2006 during a series of maritime conferences in West and Central Africa when African leaders stated their desire to improve maritime governance and to create a stable maritime environment. The coast of West Africa, known as the Gulf of Guinea, is one of the most dangerous waterways in the world.

Recent incidents include attacks by militants on Nigeria's oil industry not to mention a growing armada of cocaine smugglers, human traffickers, and illegal immigrants and rogue trawler men. Hence, the APS partners have created a set of shared goals, including improving maritime security, making sure African coastal nations are better able to protect their own resources and citizens, and increasing the African nations' capabilities and capacity. Working together, APS partners hope to achieve safety and prosperity in the Gulf of Guinea.

Since the APS is typically based aboard a ship, it does not require a permanent base in Africa. The ship functions as a mobile university, moving from port to port, providing training and long-term collaboration between American, European, and African nations. During each of these port visits, APS offers tailored training to build partnerships and achieve common goals through collaboration.

The first official APS mission was deployed in November 2007 for a period of six months. APS missions consist of joint exercises, port visits, hands-on practical courses, professional training and community outreach with the coastal nations of Africa. The focus is to build maritime capacity of the nations and increase their level of cooperation to improve maritime safety and security. The goal is to improve the ability of the nations involved to extend the rule of law out to sea. Their intent is to stop maritime crime and the movement of illegal goods at sea such as illegal fishing, human smuggling, drug trafficking, oil theft and piracy in the Gulf of Guinea region. APS also works to increase safety by teaching skills that enhance a nation's ability to respond to mariners in distress. APS provides a unique venue to share efforts being made by various agencies and non-governmental organizations from Africa, the U.S. and Europe.

In the first APS deployment from November 2007 to April 2008, the Chief of U.S. Africa Command assigned the USS FORT MCHENRY and HSV SWIFT to the APS initiative. The ships sailed to Spain to take on officers for the internal APS staff from several European partners — Spain, the United Kingdom, Portugal and Germany, among them — before heading to the Gulf of Guinea. Her full complement included representatives of U.S. and partner nations' government agencies and non-governmental organizations, all working together to help African nations increase their ability to

provide maritime security. In addition to the U.S. military, several U.S. agencies participate including the State Department, Department of Homeland Security, the U.S. Agency for International Development, National Oceanic and Atmospheric Administration and the U.S. Coast Guard. In between major deployments, there were mobile training team visits, maritime patrol aircraft exercises, and port visits by individual naval vessels. Countries visited included Senegal, Togo, Ghana, São Tomé and Principe, Gabon, and Equatorial Guinea.

USS NASHVILLE was underway to APS between February 2009 to May 2009. The USS Nashville is the largest APS ship in 2009 and will visit Senegal, Ghana, Gabon, Cameroon, and Nigeria, spending one to two weeks in each port. USS NASHVILLE's embarked staff has a large international contingent with military members from Nigeria, Cameroon, Senegal, Ghana, Gabon, Italy, Portugal, Cape Verde, Sierra Leone, Togo, Equatorial Guinea, Kenya, UK, France, Germany, Spain, Denmark and Brazil.

In February 2009, APS expanded to South and East Africa when the USS ROBERT G. BRADLEY visited Mozambique, Tanzania and Kenya. Other than officers from European countries such as France and the UK, there were 1,500 participants from Nigeria, Cameroon, Senegal, Ghana, Liberia, São Tomé e principe and Gabon. However, generally, very few people in Africa know about this initiative and how it affects their country or their personal lives. Based on many news reports regarding U.S. interests in Africa, many people have misconstrued that APS was created to protect U.S. oil interests in Africa, as this region is estimated to supply a quarter of US oil imports by 2015. Much of it will be pumped by US companies such as Exxon Mobil and Chevron operating off Nigeria, Angola and Equatorial Guinea. Through public outreach, media coverage, and talking with the locals about the mission, APS can become the prestigious initiative by the U.S. that it was founded to be.

To date, APS missions have trained thousands of foreign military personnel in subject areas like seamanship, search and rescue operations, law enforcement, medical readiness, environmental stewardship, and small boat maintenance.

10. SEA 15 PHASE ZERO GOALS

For the purpose of this project, SEA-15 reviewed the over arching military guidance that has been promulgated throughout the fleet. The documents of particular interest are the National Security Strategy 2005, National Defense Strategy 2008, the Quadrennial Defense Review 2006, the Naval Operations Concept 2006, Joint Publications 1, and Joint Publication 3. None of these documents defined what Phase Zero is in explicit terms. Reviewing and consolidating the above guidance SEA-15 developed a mission statement for a Phase Zero force:

> *A Phase Zero force will work closely with multinational, interagency and other partners to maintain or enhance stability, prevent or mitigate crises and set the conditions for access and responsive crisis intervention.*

The goals of the SEA-15 Phase Zero force are:

- To enhance the stability of a region
- To save resources and funding
- To reduce the loss of lives and equipment
- To build coalitions
- To increase probability of interdiction of drug trafficking from South America to U.S.

The idea of Phase Zero is to use "soft power" to build coalitions to avoid the need for conflict. Soft power includes a broad range of missions ranging from presence, disaster relief, community relations, infrastructure construction, networking, training, and financial spending. This list is by no means all inclusive; almost any non-kinetic mission could be included in soft power. While many of these missions have no direct military purpose, they serve and influence the stability of governments and populations. When conflict is unavoidable, the Phase Zero force will have laid the ground work for a successful operation.

The mission statement has several different areas of interest. The first requirement to be an interagency operation comes directly from Joint Publication Three and Five and is in keeping with the concepts of joint operations. The inclusion of

multinational and none government organizations is an extension of the Navy's thousand ship concept as expressed by Admiral Mullen.

> "No matter how large or small your navy or coast guard may be, we all face similar internal constraints like shrinking budgets, aging equipment, and populations that may not be attracted to military service. Our level of cooperation and coordination must intensify in order to adapt to our shared challenges and constraints. We have no choice in this matter, because I am convinced that nobody - no nation today - can go it alone, especially in the maritime domain." [291]

In his quote, Admiral Mullen expresses the belief that no nation can cover the entire ocean alone. The inclusion of others allows for the burdens, financial, political, and physical to be spread over a larger area. It also prevents the impression of the Phase Zero force being an imperial entity or only serving the political interest of the United States. This aids in the acceptance of the force. The use of multinational forces also is in line with the NOC and NSS goal of enhancing relationships with partner nations.

The National Military Strategy 2004 states "the United States must adopt a global posture and take action to prevent conflict and surprise attack." [292] The most likely source of a surprise attack is a act of terrorism perpetrated by a none state actor. The most obvious example of this is the September 11th attacks by Al Qaeda. A method for preventing this is to maintain and develop regional stability. Unstable or ungoverned regions such as Afghanistan and Somalia are breeding ground for dangerous none state actors. The reduction or elimination of these regions directly affects the security of the United States.

The requirement to maintain physical access is drawn directly from the NOC 2006. SEA-15 expanded this mission to include access to information. Information is a

[291] Chief of Naval Operations in remarks made to the 17th International Sea Power Symposium, Naval War College, Newport RI, September 21 2005.
[292] National Military Strategy of the United States, 2004, pg 2.

vital currency in the modern combat environment. Access to intelligence is as important as physical access. Through developing ties and relationships with other nations the force will ensure that the access is available when it is needed.

While the Phase Zero force is a non-kinetic force that uses soft power to achieve its goals, ultimately the military is a war fighting organization. If the Phase Zero force cannot achieve its goals of preventing crises it must prepare the way for a combat force. This idea has already been mentioned in relation to securing physical and informational access. However it is much more extensive and involves many other aspects of war fighting, diplomacy and presence. It involves having coalitions developed and working together cohesively and having up to date intelligence.

The NOC 2006 specifies crisis response as a primary mission of the Navy. By virtue of its presence and soft power influence it is appropriate to include crisis response in the mission statement of the Phase Zero force. The SEA integrated project team performed a functional decomposition to identify additional missions that contribute to accomplishing Phase Zero goals. The list of possible missions is not all encompassing, however it develops a well rounded force that meets the current goals of Phase Zero operations.

The missions that comprise Phase Zero operations are:

- Civil Support
- Train the local defense force
- Equip the local defense force
- Build relations with foreign nations
- Restore critical infrastructure
- Anti-smuggling operations
- Anti-terrorism operations
- Anti-illegal fishing operations
- Force protection against threats

- Anti-piracy operations
- Information sharing
- Freedom of navigation
- Non-combatant evacuation operations (NEO)

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E. NON-COMBATANT EVACUATION OPERATIONS

1. ROLES OF PERSONNEL & ORGANIZATIONS

US Ambassador:

NEO occurs at times when American citizens may become endangered in locations outside of the United States. This is usually due to civil unrest or war. However, it may also be due to a natural disaster. The U.S. Ambassador, who is the senior in-country authority, has the responsibility, according to law, to request a NEO. Once the request is made, the U.S. government will determine whether or not the evacuation should be done with civilian resources, such as the Civil Reserve Air Fleet (CRAF) or with military forces. Even if military forces conduct the evacuation, the Ambassador remains in charge of the evacuation. An Ambassador is a diplomatic agent of the highest rank. Variations of the title Ambassador includes senior DOS diplomatic agent or chief of mission (COM). [293]

The Ambassador is responsible for the preparation and maintenance of the Emergency Action Plan (EAP) which normally starts with an evacuation using scheduled airlines, chartered flights, or surface transportation before employing a military NEO. The military is often viewed as the last resort in a series of evacuation options. EAPs include the following information: evacuation sites; anticipated number of evacuees; assembly areas and major supply routes; command posts; key personnel; description of the Embassy communication system, transportation fleet, and warden system; quantity of Class I supplies on hand at the Embassy; and standard map products of the local area with annotations identifying critical landmarks. The emergency planning handbook is a consolidated source of guidance for Foreign Service posts for planning and dealing with certain emergency situations. In situations where evacuation operations in a hostile environment are required, the provisions of Joint Pub 3-18, "Joint Doctrine for Forcible Entry Operations," will apply.

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[293] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997
http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

Civil Reserve Air Fleet (CRAF):

The Civil Reserve Air Fleet is a United States mobility resource. Selected aircraft from U.S. airlines, contractually committed to Civil Reserve Air Fleet, support United States Department of Defense airlift requirements in emergencies when the need for airlift exceeds the capability of military aircraft. The airlines contractually pledge aircraft to the various segments of CRAF and are ready for activation when needed. The CRAF includes both passenger and cargo aircrafts serving the function of international long-range and short-range and national and aero-medical evacuation. [294]

US Military / Coast Guard:

NEOs usually involve swift insertions of a force, temporary occupation of an objective, and a planned withdrawal upon completion of the mission. Military forces could include sealift, airlift or even road evacuation. The geographic combatant commanders are responsible for planning and conducting NEOs to assist the DOS. Once requested, approved, and directed, the combatant commander will order supporting, assigned, and/or attached forces to conduct evacuation operations. It is imperative that the Ambassador's evacuation plan and the joint force commander's (JFC's) plan for the NEO be supportive, coordinated, and fully integrated. Although a single-Service or Service department may be tasked to conduct a NEO, a joint task force (JTF) may also be formed to conduct a NEO. When a JTF is formed, the commander, JTF (CJTF) is responsible for all phases of the military operation including intermediate staging bases (ISBs) and temporary safe havens. The size of the JTF depends on the number of evacuees, evacuation sites, assembly areas, and the tactical situation. During evacuation operations, it may be difficult or impossible to insert and establish the support functions for the JTF, but medical, dental, joint rescue, mortuary affairs, public affairs, psychological operations, civil affairs, special operations, and information operations must be planned, coordinated and implemented.

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[294] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf; http://en.wikipedia.org/wiki/Civil_Reserve_Air_Fleet

Due to its reputation as humanitarian service, the Coast Guard may be called upon to play a vital role in certain emergency evacuation situation. The relatively non-belligerent nature of Coast Guard makes them a suitable force option in cases where military presence may exacerbate a potentially hostile environment. [295]

US Organizations and Foreign Agencies:

NEOs are usually conducted in an environment where political concerns and constraints are key considerations. The Washington Liaison Group ensures the national-level coordination of planning and implementation of plans of the DOS and the combatant commanders for the protection or evacuation of noncombatants abroad. The Regional Liaison Groups ensure coordination of planning in the field and provide advice and guidance in planning and executing NEOs. The Emergency Action Committee is the focal point for DOS and Department of Defense evacuation site interface while briefing, coordinating, and planning for the evacuation.

The US Embassy representatives include the Ambassador, deputy chief of mission, security assistance officer, chief of station, Defense Attaché Office, administration officer, political officer, commercial and/or economic officer, consular officer, regional medical officer, regional security officer, public affairs officer, US Marine Corps security guard, Country Team, and other agencies outside the DOS. US military commands, private voluntary organizations, non-governmental organizations, and international organizations often require and provide assistance, and such assistance should be coordinated. [296]

2. OPERATION PROCEDURES

Employment and Evacuation Operation Procedures:

Once the Secretary of State approves an evacuation, the chief of mission (COM) has the authority to implement the plan in a crisis. As early as possible in the planning,

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[295] States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

[296] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

the JFC forms the advance party and requests permission to send it to the site of the operation. The advance party may consist of two elements: the forward command element (FCE) and the evacuation site party. The FCE coordinates with in-country DOS personnel and host country authorities and establishes a communication link among the CJTF, geographic combatant commander, and DOS. The evacuation site party conducts reconnaissance to evaluate, validate, and confirm assembly areas and evacuation sites. The CJTF, in conjunction with the Ambassador or his designated representative, determines the size and composition of the FCE and evacuation site part. [297]

Evacuee Processing:

The evacuation control center (ECC) supports the DOS, which conducts processing, screening, and selected logistic functions associated with emergency evacuation of noncombatants. Size and composition of the ECC will be determined by the number of evacuees, evacuation environment, and location of the evacuation area. The JTF's primary duty is to assist the COM in protecting and evacuating the evacuees. This duty may include providing security and other support in caring for the evacuees as requested. Shelter, safety, interpreters, local immigration, embassy, support liaison, and medical personnel should be present during processing. The three guiding principles for any ECC are accuracy (everyone is accounted for), security, and speed (processing is accomplished quickly and efficiently). [298]

Intermediate Staging Base (ISB) / Temporary Safe Haven Operations:

The use of an Intermediate Staging Base (ISB*)* during deployment provides the JFC many advantages over deploying directly from the home station. The ISB may be located in another country close to where the evacuation is taking place or may be any ship under US control. The ISB becomes more important as the distance from the home station and the likelihood of hostilities increase. When an ISB is located in a country

[297] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

[298] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

other than the United States, the DOS is responsible for coordinating with the government of that country. Since ISBs are typically airfields or seaports, the geographic combatant commander needs to be aware of on-hand information related to facilities and sites being considered as likely ISBs.

A temporary safe haven, designated by the DOS and controlled by the CJTF, is a location in an area or country to which evacuees may be moved quickly and easily; ideally, the safe haven would be in the United States. On occasion an intermediate safe haven may be needed, such as a US Navy ship, yet evacuees should be removed from the ship to land-based safe havens as quickly as possible. Coordination for the use of facilities, customs requirements, security, transportation, and billeting is required. A limited security force can provide necessary internal and perimeter security. [299]

3. MILITARY PLANNING CONSIDERATIONS

Military forces employed in a NEO may be comprised of units from more than one Military Department. Once ordered to support the combatant commander's decision to employ JTF, a CJTF will be designated to exercise overall control of operations (initial planning, deployment to an ISB, conduct all military aspects of the evacuation, and operations at the safe haven). The CJTF may also need to consider the possibility of employing multinational forces. The CJTF should consider a flexible force option that provides both early response to a developing situation and a capability to quickly expand should the operational environment become hostile.

Operational Environments:

Evacuation operations are characterized by uncertainty because of sudden changes in country's government, reoriented political or military relationships with the US, or a sudden hostile threat to US citizens from a force within or external to a host country. Operational environments can be broadly characterized into three main groups, namely:

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[299] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

- Permissive Environment: Under this condition, no resistance to evacuation operations is expected, and thus the operation would require little or no assembly of combat forces in country. JTF can expect host nation concurrence and possible support. The JTF's primary concerns may be logistic functions involving emergency medical treatment, transportation, administrative processing and coordination with DOS and other agencies involved in the evacuation. Minimum number of security forces should be used during the NEO.

- Uncertain Environment: An operational environment in which host government forces, whether opposed or receptive to the NEO, do not have total effective control of the territory and population in the intended area or country of operations. Because of the uncertainty, the CJTF may elect to reinforce the evacuation force with additional security units or a reaction force. The ROE developed are disseminated early to ensure that the JTF has had sufficient training and is proficient in application of the ROE. It is possible for a NEO conducted in such uncertain environment to be escalated to a hostile environment.

- Hostile Environment: Personnel may be evacuated under conditions ranging from civil disorder or terrorists action to full-scale combat. The CJTF may elect to deploy a sizeable security element with the evacuation force or position a large reaction force, either with the evacuation force or at an intermediate staging base (ISB). In addition to normal functions associated with personnel evacuations (embarkation, transportation, medical, and services), the JTF may be required to conduct a forced entry, establish defensive perimeters, escort convoys, participate in personnel recovery operations, and perform the screening of evacuees. [300]

Intelligence:

The National Imagery and Mapping Agency provides selected US missions with specific maps, charts and other geographical material to support evacuation planning and operations. Both the Atlantic Intelligence Command and Joint Intelligence Center Pacific produce NEO intelligence support handbooks (NISH). NISH are all-source studies that directly support joint operational and tactical planning. They consist of annotated aerial imagery and ground photos of embassy grounds, helicopter landing zones, assembly

[300] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

areas, airfields, and seaports, along with encyclopedic data. Information includes post emergency communications listing and country profile. Weapon and ammunition; and force size requirements are based on threat assessment. Other considerations include medical, translator and linguistic requirements. [301]

Logistics:

The logistic support provided should be limited to the minimum essential support required for the evacuation. Considerations should include: characteristics of evacuation area (eg. availability of resources/facilities for support to the JTF such as facilities for storage & distribution of supplies, transportation means, airfields, fuel points, medical facilities & supplies, food, water and consumables); climate, weather and terrain; number of evacuees and their needs; potential threats to the evacuation; strength and composition of the JTF; time constraint and duration of operation; availability and suitability of host-nation support as an alternative to deploying US military logistic support. [302]

Psychological Operations:

PSYOPS can greatly facilitate NEOs in uncertain or hostile environments. PSYOP efforts can facilitate the passage of pertinent information to noncombatant evacuees, and PSYOP efforts and assets can execute programs and disseminate products that induce an attitude and/or behavior toward the NEO among the local populace. Prudent employment of PSYOP can prevent the degeneration of a permissive or uncertain environment into a hostile environment. [303]

Rules of Engagement (ROE):

The rules of engagement for NEOs reflect the limited military objective to be accomplished. NEO ROE limit the use of force to that force which is necessary to successfully complete the mission and provide for the self-defense of US military

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[301] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

[302] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

[303] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997 http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

personnel and defense of noncombatant evacuees. The use of force is normally a measure of last resort. When time and conditions permit, the hostile forces should be warned and given the opportunity to withdraw or cease threatening actions. Employment of PSYOP assets and capabilities should be considered toward this end. [304]

4. PAST OPERATIONS

- 1976 - Lebanon
- 1990 Operation Sharp Edge - Liberia:

Background Information:

In mid-1990's, increasing internal unrest threatened U.S. diplomats and civilians in Liberia. Since December 1989, civil war had raged between rival Liberian factions, and the safety of American citizens could no longer be guaranteed. Tension grew as rebel leader Prince Johnson said he would begin rounding up foreigners to force foreign intervention in his fight against Liberian President Samuel Doe. Johnson threatened to attack U. S. Marines at the embassy if the United States did not intervene on the rebel side.

Despite the efforts of a force of 11,500 sent by the Economic Community of West African States (ECOWAS) in 1990, and numerous subsequent diplomatic initiatives and peace conferences, fighting continued, fueled by exploitation of the country's natural resources by the faction leaders and shadowy international business associates. As the war spread from the interior toward the Liberian capital of Monrovia amid widespread death and destruction, the US responded to the deteriorating situation by dispatching its military forces to conduct NEO. The US decided not to intervene to contain the unfolding catastrophe.

Method of Evacuation / Operational Information: The US Navy dispatched four warships with 2,300 marines to evacuate Americans and other foreigners who were in the country. Elements of a Marine Expeditionary Unit embarked in the USS Saipan (LHA-2)

[304] United States Military Joint Publication 3-07.5, Joint Tactics, Techniques, and Procedures for Noncombatant Evacuation Operations, 30 September 1997http://www.dtic.mil/doctrine/jel/new_pubs/jp3_07_5.pdf

amphibious ready group provided support to the US Embassy and stood by to evacuate American citizens and others from 2 June to 5 August. They evacuated a total of 2,609 people between 5 August 1990 and 9 January 1991. Airlift evacuation was performed using CH-46 Sea Knight and CH-53 Sea Stallion helicopters. [305]

Other operational units involved:

- 22nd Marine Expeditionary Unit - 2 Jun to 5 Aug 1990
- 26th Marine Expeditionary Unit - 5 Aug to 9 Sept 1990
- FAST Company 5th Platoon of the Marine Corps - 9 Sept 1990 to 9 Jan 1991.
- 1991 Operation Eastern Exit - Somalia:

Background Information:

During 1980s the authoritarian regime of President Mahammad Siad Barre abandoned the previous government's policy of scientific socialism on Marxist-Leninist lines and implemented market-oriented structural reforms of economy, while consolidating personal political authority. Broad-based national opposition met escalating government repression and provoked armed revolt in 1988. The resulting civil war caused the eventual defeat of government forces and exile of Siad Barre in January 1991. Following the fall of the Siad Barre regime in January 1991, Somalia fell under an interim provisional government established by Executive Committee of United Somali Congress (USC) and headed by provisional president Ali Mahdi Mahammad. As of September 1991, the country was effectively under control of as many as twelve rival clans and sub-clans. The central government authority at Mogadishu challenged by Somali National Movement (SNM), which in June 1991 declared independent Republic of Somaliland in former territory of British Somaliland.

On 1 January 1991, the US Ambassador to Somalia requested military assistance to evacuate the Embassy. Americans and other foreign nationals had sought shelter in the Embassy compound that day as the reign of Somali dictator Siad Barre disintegrated into

[305] Operation Sharp Edge - Liberia, http://en.wikipedia.org/wiki/Marine_Expeditionary_Unit and http://www.globalsecurity.org/military/ops/sharp_edge.htm accessed on 15 June 2009

a confused battle for control of Mogadishu. The next day, Operation EASTERN EXIT was initiated.

Method of Evacuation / Operational Information:

Responding to the deteriorating situation, Operation Eastern Exit was conducted between 2 -11 January 1991, participating units included USS Guam (Amphibious Assault Ship, LPH9), USS Trenton (Amphibious Transport Ship, LPD14), 4th Marine Expeditionary Bde, Air Force AC-130 (intelligence gathering and fire support, and 9-man Navy SEAL team), 2 squadrons of CH-46 Sea Knight medium transport helicopters, 2 CH53-E Sea Stallion heavy transport helicopters, and ground combat elements (one rifle company, 81mm mortar platoon, one military police platoon, landing support and medical/dental detachment). Total of 281 noncombatants evacuated from the US Embassy in Mogadishu, Somalia. [306]

- 1994 Operation Tiger Rescue - Yemen:

Background Information:

Operation Tiger Rescue was the evacuation of United States citizens by the United States Air Force from Yemen following the outbreak of civil war in May 1994. Yemen had only recently been formed by the unification of North Yemen and South Yemen in 1990. After unification, North Yemen dominated the new country and the southern part of the country attempted to secede. While the south bore the brunt of the fighting, the capital of Sana'a came under missile and air attack. As fighting intensified, the United States State Department requested the immediate evacuation of U.S. citizens, both civilian and government employees, from Yemen.

Method of Evacuation / Operational Information:

Airlift evacuation using C130s of 41st Airlift Squadron. E3 AWACS and F15s were also used as supporting aircrafts for the NEO. [307]

- 1996 Operation Assured Response - Liberia:

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[306] "Operation Eastern Exit - Somalia" http://www.globalsecurity.org/military/ops/eastern_exit.htm accessed on 15 June 2009

[307] 1994 Operation Tiger Rescue - Yemen http://en.wikipedia.org/wiki/Operation_Tiger_Rescue

Background Information:

In 1996, the US Military assisted in safeguarding and evacuating Americans from Liberia when that nation's civil war reignited into factional fighting and general violence in Liberia. During the first week of April 1996, as a result of intense street fighting during the ongoing civil war in Liberia, about 500 people sought refuge on American Embassy grounds and another 20,000 in a nearby American housing area. On 6 April, the president approved the US ambassador's request for security, resupply and evacuation support.

Method of Evacuation / Operational Information:

Between 9 April and 18 June, a US Joint Task Force Operation Assured Response evacuated 2444 people (485 Americans and 1959 civilians representing 68 countries). The bulk of forces were from Special Operations Command Europe, and the last elements redeployed 3 August. Liberia was a very small scale operation. It could have turned in to a very large operation. Overnight about 180 soldiers came out of Southern European Task Force [SETAF] and evacuated almost 2,000 civilians out of Monrovia to safety. Air Force special operations forces led the evacuation effort, Operation Assured Response. Three Air Force KC-135 tankers (for refueling) and 2 C-130 transports were deployed to deliver critical medical supplies, food, water, fuel and communications gear. A Flying Ambulance Surgical Team was also deployed. On 9 April, in less than 72 hours after the decision to deploy U.S. forces, the first non-combatants were safely evacuated by MH-53 and MC130 helicopters under the cover of AC-130 gunships using Freetown, Sierra Leone and Dakar, Senegal as safe havens. In early April, after initial NEO, a Joint Task Force-Assured Response (JTF-AR) which included Air Force, Navy and Marine forces was established. With additional support from an HC-4 MC-53E helicopter detachment and other Navy-Marine Corps aircraft, embassy security and transportation were provided and 309 noncombatants were evacuated, including 49 U.S. citizens. The US Navy deployed the USS Ponce (Amphibious Transport Ship, LPD 15) within 10 days response time, carrying special-purpose Marine air-ground task force, to the coats of

West Africa in support of JTF-AR. The USMC elements, while supporting NEO in Liberia, also conducted similar operations in Bangui, Central African Republic. [308]

- 1996 Operation Quick Response - Central African Republic:

Background Information:

In response to civil unrest and rebellion by rogue military elements in Bangui, capital of the Central African Republic, USMC elements of Joint Task Force Assured Response, which was responding in Liberia, successfully provided security to the US Embassy and evacuated 448 people (including between 190 and 208 Americans). [309]

- 1997 Operation Noble Obelisk - Sierra Leone
- 1998 Operation Safe Departure - Eritrea
- 1998 Operation Shepard Venture - Guinea-Bissau:

Background Information:

On 10 June 1998, United States European Command deployed forces to Dakar, Senegal as part of contingency planning in response to the deteriorating situation in Guinea-Bissau. Joint Task Force (JTF) Shepherd Venture was formed to enhance the military's ability to ensure the security of U.S. citizens in the region.

Method of Evacuation / Operational Information:

JTF Shepard Venture - 130 personnel, 10 June 1998 to 17 June 1998. [310]

7. 2002 Operation Shepard Sentry - Central African Republic:

Background Information:

In October of 2002, the former Chief of Staff of the Armed Forces in the Central African Republic coordinated and directed rebel attacks in several locations in Bangui, CAR. The potential for increased rebel activity and the CAR government's inability to

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[308] 1996 Operation Assured Response - Liberia
http://www.globalsecurity.org/military/ops/assured_response.htm;
http://www.usmc.mil/news/publications/Documents/On%20Mamba%20Station%20--%20U.S.%20Marines%20in%20West%20Africa,%201990-2003%20PCN%2019000413300_PART_2.pdf

[309] http://www.acig.org/artman/publish/article_463.shtml

[310] http://www.acig.org/artman/publish/article_463.shtml

ensure the safety of the expatriate community, led the American Embassy Ambassador to request U.S. assistance.

United States European Command under the direction of the Chairman Joint Chiefs of Staff and at the request of the Department of State, agreed to send a EUCOM Security Assessment Team to Bangui, CAR. On October 30, 2002 the mission changed with an execution order for the NEO operation due to continued unrest in the region.

Method of Evacuation / Operational Information:

A total of 39 individuals were evacuated to a safe haven without incident, completing the NEO. [311]

8. 2002 Operation Autum Return - Côte d'Ivoire:

Background Information:

Cote d'Ivoire, a West African country of 16 million, was once touted as a pillar of stability in western Africa. Although the Cote d'Ivoire prospered for 33 years under President Felix Houphouet-Boigny, political, economic, and social strains became more pronounced under President Henri Konan Bedie, resulting in a coup against him on 24 December 1999. These strains increased under junta leader, General Robert Guei, resulting in his electoral defeat in October 2000. President Laurent Gbagbo inherited this volatility along with an economy in decline. On 19 September 2002, Guei led a revolt in an attempt to overthrow the government, but Gbagbo survived while Guei was killed in the clash. The political and military crisis led to fighting throughout the country that threatened hundreds third-country nationals and a significant number of American citizens, most notably students at the International Christian Academy located in Bouake. In response to the crisis, the American ambassador to Cote d'Ivoire, requested an evacuation of American citizens.

Method of Evacuation / Operational Information:

The USMC deployed C-130 Hercules transports, Sikorsky CH-53E Sea Stallion and UH-60L Blackhawk helicopters crewed by special forces to evacuate foreign

[311] http://www.acig.org/artman/publish/article_463.shtml

nationals from Korhogo. From 24 September to 4 October 2002, more than 300 American citizens and others were evacuated. [312]

9. 2003 Operation Shining Express - Liberia:

Background Information:

As violence in Liberia increased in mid June 2003, the UN, together with the US, had called on Liberian President Charles Taylor to step down from power. However, tensions continued to escalate in Liberia, military chiefs of the Economic Community of West African States (ECOWAS) pledged on 04 July 2003 to raise 3,000 troops from member countries for an intervention force to restore peace in Liberia. Attributing to financial and logistical constraints, the Chairman of ECOWAS requested the US to spearhead the peace efforts. The US responded by sending a 32-man military civil affairs assessment team to evaluate conditions for deployment of peacekeepers in Liberia but forces loyal to Liberian President Charles Taylor prevented the team from assessing security and humanitarian needs. In early July 2003, the US Ambassador to Liberia requested military aid in the event that embassy personnel and American citizens had to be evacuated from the country.

Method of Evacuation / Operational Information: Operation Shining Express includes special operations forces, Army, Navy, Air Force and Marine Corps and Reserve components. Operation Shining Express personnel are augmented security forces at the US Embassy in Monrovia and supported State Department officials who were conducting an orderly departure of US citizens wishing to leave the country. The USS Kearsarge (LHD3), then returning to the United States after serving in Operation Iraqi Freedom, was directed to join forces in support of Operation Shining Express, to aid in the potential evacuation of U.S. citizens from the country of Liberia. Force composition onboard the USS Kearsarge included elements from the 2nd Marine Expeditionary Brigade, a

[312] 2002 Operation Autumn Return - Côte d'Ivoire http://www.globalsecurity.org/military/ops/

company of light armored reconnaissance, a squadron each of medium and heavy marine helicopter and detachment of air logistics support. [313]

10. 2006 - Lebanon:

Background Information:

The 2006 Lebanon War, known in Lebanon as the July War, and in Israel as the Second Lebanon War was a 34-day military conflict in Lebanon and northern Israel. The principal parties were Hezbollah paramilitary forces and the Israeli military. The conflict started on 12 July 2006, and continued until a United Nations-brokered ceasefire went into effect in the morning on 14 August 2006, though it formally ended on 8 September 2006 when Israel lifted its naval blockade of Lebanon. The conflict began when Hezbollah militants purposely fired rockets at Israeli border towns as a diversion for an anti-tank missile attack on two armored Humvees patrolling the Israeli side of the border fence. Of the seven Israeli soldiers in the two jeeps, two were wounded, three were killed, and two were kidnapped and taken to Lebanon. Five more were killed in a failed Israeli rescue attempt. Israel responded with massive airstrikes and artillery fire on targets in Lebanon that damaged Lebanese civilian infrastructure, including Beirut's Rafic Hariri International Airport (which Israel alleged that Hezbollah used to import weapons and supplies), an air and naval blockade, and a ground invasion of southern Lebanon. Hezbollah then launched more rockets into northern Israel and engaged the Israel Defense Forces (IDF) in guerilla warfare from hardened positions.

Method of Evacuation / Operational Information:

The US began to evacuate some citizens from Lebanon on Jul 16, 2006 using Marine Corps CH-53E Sea Stallion helicopters (from the 24th MEU). A total of 42 US citizens voluntarily departed from the US Embassy in Beirut, Lebanon. In subsequent days, the US Navy continued to employ CH-53E helicopters (up to six) to ferry special needs people out of Beirut. Up till July 19, approximately 300 people per day were

[313] 2003 Operation Shining Express - Liberia
http://www.marines.mil/units/marforcom/iimef/2ndmeb/Pages/2003/USS%20Kearsarge%20joins%20Operation%20Shining%20Express.aspx

evacuated by air. On July 17, the Pentagon announced that it had chartered a cruise ship, Orient Queen, to evacuate US citizens. US sailors and Marines from the Iwo Jima Expeditionary Strike Group (ESG) and the 24th Marine Expeditionary Unit (MEU) were directed to assist in the NEO. The Iwo Jima Strike Group includes the amphibious ships Iwo Jima, USS Nashville (LPD 13) and USS Whidbey Island (LSD 41). USS Trenton (LPD 14) and High Speed Vessel Swift (HSV 2) have also joined the strike group. The commander of US Naval Forces Central Command indicated that people were evacuated on both US Navy ships (e.g. USS Nashville, carrying capacity up to 1,000 people) and chartered cruise ships (e.g. Orient Queen being escorted by USS Gonzalez (DDG 66)). About 7,000 Americans were to be evacuated July 19-20. There are estimated 25,000 Americans living in Lebanon. The US Navy employed Landing Craft Utility (LCU) for transporting evacuees from the Lebanon shore to the US Navy ships in the Eastern Mediterranean Sea. Each LCU can carry an estimated 300 personnel. On board the LCUs were also Marines which had been tasked to assist secure and orderly departure. The evacuees were then transported to safe havens in Turkey and Cyprus. On July 23, the total number of Americans evacuated from Lebanon reached 10,000. A total of 3,994 American citizens left Lebanon on the 22nd. Navy and contract ships lifted 1,815 from the embattled country on the 23rd. The USS Whidbey Island transported 792, and the contract carriers Orient Queen and Rahmah took 983 and 933 Americans, respectively, to Cyprus. The NEO, which began in mid Jul till early Sept 2006, evacuated a total of approximately 15,000 American citizens out of Lebanon. [314]

5. REGION OF OPERATION (FOR APPLICABLE SCENARIO)

Latin America is a region of the Americas where Roman Languages (i.e. those derived from Latin) – particularly Spanish and Portuguese – are primarily spoken. Latin America can be broadly categorized into the four main country groups:

[314] 2006 - Lebanon http://en.wikipedia.org/wiki/2006_Lebanon_War

Caribbean	Central America	South America	North America
Antigua & Barbuda Aruba Bahamas Barbados Cayman Islands Cuba Dominica Dominican Republic Grenada Guadeloupe Haiti Jamaica Martinique Puerto Rico St. Kitts & Nevis St. Lucia St. Vincent and the Grenadines Trinidad & Tobago Turks & Caicos Islands Virgin Islands	Belize Costa Rica El Salvador Guatemala Honduras Nicaragua Panama	Argentina Bolivia Brazil Chile Colombia Ecuador French Guiana Guyana Paraguay Peru Suriname Uruguay Venezuela	Mexico

Table 143: Latin America Country Groups

Based on recent US military operations, West/Central Africa and the Middle East have been identified as NEO hot spots. [315]

[315] http://lanic.utexas.edu/subject/countries/

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F. COUNTRY STUDIES

The following appendix discusses countries and various threats to regional stability and a Phase Zero force that existed at the time that this study was conducted.

1. ANTIGUA

Antigua and Barbuda are a pair of islands located in the Caribbean between the Caribbean Sea and the North Atlantic Ocean. It is South and East of Puerto Rico. At 2.5 times the size of Washington DC, they are one of the most prosperous nations, thanks to its tourism industry and offshore financial services. It benefits a great deal from tourism, marketing itself as a paradise in the Caribbean. Barbuda is less developed compared to Antigua. As such Barbuda is home to smaller and more exclusive resorts.

Functional Threats (types of threat operations in AO):

As with most islands in the Caribbean, Antigua and Barbuda are susceptible to tropical storms and hurricanes. Its most challenging environmental issue is managing the water resources on the islands, because of the scarcely limited fresh water sources. Rapid and almost complete deforestation also causes rainfall to run off, and thus further limit the water resources on the islands. Desalination has offered an alternative to the type of fresh water resources available. The islands are marketed as an offshore financial hub and are a popular place where money laundering activities occur. These activities are troubling because such monies may be the source of funding for threat organizations elsewhere.

Physical Threats (physical capabilities of Red Forces in AO):

Drug trafficking remains a major problem which troubles the government. Its nominal defense force, as well as law enforcement agencies, allows these illegal activities to proliferate at its shores. The mode of operation of the drug traffickers leverages on the extensive shorelines of the two islands, which are impossible to patrol and guard tightly. Narcotics typically exit by sea, bound for the U.S.

Threat Organizations:

There are no particular threat organizations which base their operations in the touristy islands of Antigua and Barbuda. Mostly, those organizations use the two islands as an alternative transit point for their illegal activities.

Chronological Threat Analysis:

- Historical Threats:

The twin islands are typically plagued by tropical storms and hurricanes in the months of July to October. Periodic droughts affect their livelihoods, which are primarily agriculture based. Bad weather also severely hampers the tourist sector, which is a major source of income for the country. It is more well known as an offshore financial center, and hosts internet gambling portals which are not considered illegal in the country.

- Current Threat Environment:

Under the current leadership of the Spencer government, corruption scandals came to a stop. Spencer took over office in March, 2004, after a landslide victory over the incumbent Lester Bird government, which was allegedly involved in a series of corruption scandals. In March, 2009, Baldwin Spencer again led his United Progressive Party to victory, albeit with a smaller majority victory as compared to that in 2004. His continued leadership will lend stability to the country, with the economy being his utmost priority. Since taking office, he has been successful in reducing the public debt to GDP ratio from 120% in 2004 to about 90% in 2009. Given this situation, Antigua is currently a reasonably stable nation.

- Anticipated Future Threats:

With the focus on economic and fiscal reforms, it is likely that the bulk of the efforts of the government will be focused on the economy and tourism, at the same time maintaining status quo with regards to its policy on illegal activities taking place in the country. As such, the threats facing Antigua and Barbuda are likely to continue, but are unlikely to escalate further.

2. ARGENTINA

In 1816, the United Provinces of the Rio Plata declared their independence from Spain. After Bolivia, Paraguay, and Uruguay went their separate ways, the area that

remained became Argentina. The country's population and culture were heavily shaped by immigrants from throughout Europe, but most particularly Italy and Spain, which provided the largest percentage of newcomers from 1860 to 1930. Up until about the mid-20th century, much of Argentina's history was dominated by periods of internal political conflict between Federalists and Unitarians and between civilian and military factions. After World War II, an era of Peronist populism and direct and indirect military interference in subsequent governments was followed by a military junta that took power in 1976. Democracy returned in 1983 after a failed bid to seize the Falkland (Malvinas) Islands by force, and has persisted despite numerous challenges, the most formidable of which was a severe economic crisis in 2001-2002 that led to violent public protests and the resignation of several interim presidents.

Argentina benefits from rich natural resources, a highly literate population, an export-oriented agricultural sector, and a diversified industrial base. Although it was one of the world's wealthiest countries 100 years ago, Argentina suffered during most of the 20th century from recurring economic crises, persistent fiscal and current account deficits, high inflation, mounting external debt, and capital flight. A severe depression, growing public and external indebtedness and a bank run culminated in 2001 in the most serious economic, social, and political crisis in the country's turbulent history. Then interim President Adolfo Rodriguez declared a default, the largest in history, on the government's foreign debt in December of that year, and abruptly resigned only a few days after taking office. His successor, Eduardo Duhalde, announced an end to the peso's decade-long 1-to-1 peg to the US dollar in early 2002. The economy bottomed out that year, with real GDP 18% smaller than in 1998 and almost 60% of Argentines under the poverty line. Real GDP rebounded to grow by an average 9% annually over the subsequent five years, taking advantage of previously idled industrial capacity and labor, an audacious debt restructuring and reduced debt burden, excellent international financial conditions, and expansionary monetary and fiscal policies. Inflation also increased, however, during the administration of President Nestor Kirchner, which responded with price restraints on businesses, as well as export taxes and restraints, and beginning in early 2007, with understating inflation data. Cristina Fernandez De Kirchner succeeded

her husband as President in late 2007, but was stymied by protesting farmers in her efforts to hike export taxes still further. Her government nationalized private pension funds in late 2008, which bolstered government coffers, but failed to assuage investors' concerns about the direction of economic policy.

Functional Threats (types of threat operations in AO):

Threats specific to Argentina are international disputes, terrorism, human rights, illicit drugs and trafficking in persons.

Physical Threats (physical capabilities of Red Forces in AO):

In South America, the tri-border confluence of Argentina, Brazil and Paraguay boasts a large melting pot of Middle Eastern ethnicity. Moreover, Hamas, Hezbollah and al-Qaeda extremists are all represented in the region, and Hezbollah has already left its murderous mark on South American soil. In 1992, they bombed the Israeli Embassy in Buenos Aires, killing 29 persons. In 1994, they struck again, killing 95 people at the Argentine Jewish Cultural Center. As a result, and due to extremists present in the tri-border region, Israel's Mossad intelligence agency has a large contingent in Argentina.

Threat Organizations:

It is clear that Hezbollah, Hamas and al-Qaeda have similar, even mutual, agendas regardless of their own identities and mindset. Consequently, they are a unified ideology of hatred and murder in the global terrorism arena. More specifically, terrorist acts are their stratagem and modus operandi by virtue of their extremist mindsets.

The terrorist has many faces, with each led by their respective organization's mission or jihad. Some elements operate as overtly political, and others are the muscle or brawn on the ground. Their agendas, ego and influence may often collide, but the networks and cells can and do cooperate, with Shi'a and Sunni joining together to accomplish common goals.

In Latin America the terrorism threat has to be assessed from the standpoint of a training and launching or deployment base of operations. Additionally, sinister acts are fueled by drug revenue, weapons, intricate knowledge of county-border distinctions and protocols for entry, smuggling routes and related homeland defense agendas or deficiencies.

Chronological Threat Analysis:

- Historical Threats:

Argentina continues to assert its claims to the UK-administered Falkland Islands (Islas Malvinas), South Georgia, and the South Sandwich Islands in its constitution, forcibly occupying the Falklands in 1982. In 1995, Argentina agreed no longer to seek settlement by force. Territorial claim in Antarctica partially overlaps UK and Chilean claims. The unruly region at the convergence of the Argentina-Brazil-Paraguay borders is a locus of money laundering, smuggling, arms and illegal narcotics trafficking as well as fundraising for extremist organizations.

An uncontested dispute between Brazil and Uruguay over Braziliera/Brasiliera Island in the Quarai/Cuareim River leaves the tripoint with Argentina in question. In 2006, Argentina went to the ICJ to protest, on environmental grounds, the construction of two pulp mills in Uruguay on the Uruguay River, which forms the boundary. Both parties presented their pleadings in 2007 with Argentina's reply in January and Uruguay's rejoinder in July 2008. The joint boundary commission, established by Chile and Argentina in 2001, has yet to map and demarcate the delimited boundary in the inhospitable Andean Southern Ice Field.

- Current Threat Environment

Argentina is a transshipment country for cocaine headed for Europe, heroin headed for the US, and ephedrine and pseudoephedrine headed for Mexico. Some money-laundering activity exists, especially in the Tri-Border Area. There is a great deal of law enforcement corruption. Argentina is also a source for precursor chemicals, and there is an increasing domestic consumption of drugs in urban centers, especially cocaine based and synthetic drugs.

Argentina is a source, transit, and destination country for men, women, and children trafficked for the purposes of commercial sexual exploitation and forced labor. Most victims are trafficked within the country, from rural to urban areas. Child sex tourism is a problem; foreign women and children, primarily from Paraguay, Brazil, and the Dominican Republic, are trafficked to Argentina for commercial sexual exploitation. Argentine women and girls are also trafficked to neighboring countries, Mexico, and

Western Europe for sexual exploitation. A significant number of Bolivians, Peruvians, and Paraguayans are trafficked into the country for forced labor in sweatshops, agriculture, and as domestic servants.

Despite some progress, Argentina remains on the CIAs Tier 2 Watch List for the third consecutive year for its failure to show evidence of increasing efforts to combat human trafficking. In particular, no progress has been made in terms of providing adequate assistance to victims and curbing official complicity with trafficking activity, especially on the provincial and local levels. The Argentine Congress has demonstrated progress by enacting much-needed and first-ever federal anti-trafficking legislation.

- Anticipated Future Threats:

Argentina has drawn increasingly close to Venezuela's anti-American dictator Hugo Chavez. Nearly $800,000 in Venezuelan money was smuggled into Argentina, likely for an illegal campaign contribution to Cristina Kirchner's successful presidential bid. Argentina's new president, Cristina Kirchner, has voiced a new claim to the Falkland Islands, stirring up a dormant territorial dispute that led to war in the 1980's with US ally Great Britain.

3. ARUBA

Aruba is an island in the Caribbean Sea, north of Venezuela. The land mass is slightly larger than Washington DC. The terrain is mostly flat with a few hills and scant vegetation. The geography of the region is flat, river-less island renowned for its white sand beaches. Its tropical climate is moderated by constant trade winds from the Atlantic Ocean, and the temperature is almost constant at about 27 degrees Celsius (81 degrees Fahrenheit). The location lies outside the Caribbean hurricane belt, so is rarely threatened by hurricanes. The population is about 103,065 people. The commonly spoken languages are Papiamento, Spanish, English and Dutch. Aruba is a member country of the Kingdom of the Netherlands. Tourism, gold mining and oil refining are the key industries of the small, open Aruban economy.

Aruba has no regular military forces. The Netherlands maintains a detachment of marines, a frigate, and an amphibious combat detachment in the neighboring Netherlands

Antilles (2009). Military defense is the responsibility of the Kingdom of the Netherlands. Aruba is a transit point for US and Europe-bound narcotics, with some accompanying money laundering activities. There is a relatively high percentage of population who consumes cocaine.

Functional Threats (types of threat operations in AO):

There is no significant threat presence in Aruba, except that it infrequently may be used as a transit point for drug smuggling activities as well as money laundering activities.

Physical Threats (physical capabilities of Red Forces in AO):

There is no significant presence of physical threat.

Threat Organizations:

The only threat for a Phase Zero force to consider is the possibility of transient members of narcotics trafficking organizations, but it is not reported to be prevalent in the region, compared to other Central and South American neighbors.

Chronological Threat Analysis:

- Historical Threats:

There is no significant historical threat observed. Aruba is member country of the Kingdom of the Netherlands, achieved full autonomy in internal affairs obtained in 1986 upon separation from the Netherlands Antilles. The Dutch Government is responsible for defense and foreign affairs.

- Current Threat Environment:

There is no significant threat presence in Aruba currently, except for sporadic use as a transit point for drug smuggling activities and money laundering.

- Anticipated Future Threats:

There is no significant anticipated threat.

4. BAHAMAS

The Bahamas, officially the Commonwealth of the Bahamas, is an independent, sovereign, English-speaking country consisting of two thousand cays and seven hundred islands that form an archipelago. It is located in the Atlantic Ocean southeast of the

United States; northeast to east of Cuba, Hispaniola (Dominican Republic & Haiti) and north to east of the Caribbean Sea; and west to northwest of the Turks and Caicos Islands. Its size is almost 14,000 km² with an estimated population of 330,000. Its capital is Nassau. It remains a Commonwealth realm.

Functional Threats (types of threat operations in AO):

Threats specific to the Bahamas are: piracy, crime, lack of law enforcement, cocaine smuggling route, bulk cash, arms smuggling and drug trafficking. The Bahamas are also culpable in the enablement of Illegal, Unreported and Unregulated (IUU) fishing. They are one of the top five offenders for the issuance of "flags of convenience", used by opportunistic poachers to disregard the Rule of the Sea.

Physical Threats (physical capabilities of Red Forces in AO):

Red Forces in Colombia possess numerous and reasonably modern small arms in order to control the human, drug and arms trade. The Bahamas are regularly threatened by storm and hurricane activity.

Threat Organizations:

In the Bahamas there is currently little to no organized threat facing Americans from domestic (Bahamian) terrorism, war or civil unrest. While the threat from transnational terrorism is high due to the country's porous borders, there do not appear to be any terrorist groups currently active in the Bahamas. Also, terrorist groups native to the western hemisphere do not typically operate in the Northeastern region of the Caribbean.

Chronological Threat Analysis:

- Historical Threats:

For decades, the country has been contending with the illicit transit of drugs and significant illegal immigration. These two illicit activities have created a platform for the other illegal activity, particularly the illegal trafficking in small arms.

- Current Threat Environment:

The urbanization situation was exacerbated by the large influx of illegal immigrants, mostly from Haiti and Jamaica, and compounded by drug trafficking, which introduced the element of violent crime.

With the closest island only 45 miles from the coast of Florida, The Bahamas often is used as a gateway for drugs and illegal aliens bound for the United States. The United States and The Bahamas cooperate closely to address these threats. U.S. assistance and resources have been essential to Bahamian efforts to mitigate the persistent flow of illegal narcotics and migrants through the archipelago. The United States and the Bahamas also actively cooperate on law enforcement, civil aviation, marine research, meteorology, and agricultural issues. The U.S. Navy operates an underwater acoustic research facility on Andros Island.

- Anticipated Future Threats:

The Caribbean route in transporting cocaine into US will still be used with the Bahamas being the transit point and Florida providing the key point of entry. The illicit transit of drugs and illegal immigration are assessed to stay. These two illicit activities will also continue to create a platform for trafficking in small arms.

5. BARBADOS

Located in the North Atlantic Ocean, northeast of Venezuela, Barbados gained independence from the British in 1966, following political and social reforms in the 1940s and 1950s. It is heavily dependent on tourism and manufacturing as its main source of income, although the sugar industry also contributes to a significant amount of the economic wealth. Its population of 285,000 people is one of the highest in the region (second only to the Bahamas) with offshore financial and information services being important foreign exchange earners. This is mainly attributed to political, economic and social stability in the past 10 years. Its workforce is also relatively well educated. However, its population also has a very high HIV/AIDS infection rates, over 1%.

Functional Threats (types of threat operations in AO):

Barbados is subjected to infrequent hurricanes and periodic landslides. Environmental threats include the pollution of the coastal waters from waste disposal by ships, soil erosion and illegal solid wastes disposal which contaminates the water sources in the country. Barbados is also one of the top five offenders for allowing poachers to fly flags of convenience and engage in IUU fishing.

Physical Threats (physical capabilities of Red Forces in AO):

Barbados is used as one of many transshipment points for narcotics bound for Europe and the US, even though the main operations of these threat groups are not reportedly based in Barbados.

Threat Organizations:

Currently, Barbados is not known to be used as a headquarters by any terrorist organizations. Narcotic traffickers use Barbados as a transit point rather than a center to conduct their operations.

Chronological Threat Analysis:

- Historical Threats:

Barbados is blessed geographically in that it seldom gets the main brunt of hurricanes which occur in the region. The last hurricane was in 1955. Other threats are minor in comparison with other countries in the Caribbean, but its use as a transshipment of cocaine and other drugs remains a problem.

- Current Threat Environment:

Barbados is relatively stable as a country, and does not have major problems in terms of crime or human trafficking. It is active in keeping crime rates low as well as drug trafficking to a minimum although its vast coastlines (being an island state) make it challenging to do so.

- Anticipated Future Threats:

It is unlikely that the threats occurring in Barbados will escalate by 2020. Good governing and affluence will continue to engage the population in productive activities, preventing the establishment of street gangs and wayward activities such as drugs and smuggling.

6. BELIZE

Different cultures are found elsewhere in Belize; Spanish-speaking Mestizos, who are of mixed Maya Indian and European ancestry, Creoles, who speak a Creole dialect of English and who are often of African and African-European extraction, and Garifuna, who are the descendants of Carib Indians and Africans. Nonetheless, the ethnic make-up

is changing, boosted by an amnesty for many immigrants from neighboring Guatemala, Honduras and Nicaragua. Belize, formerly known as British Honduras, was the UK's last colony on the American mainland.

Belize was the site of several Mayan city states until their decline at the end of the first millennium A.D. The British and Spanish disputed the region in the 17th and 18th centuries. It formally became the colony of British Honduras in 1854. Territorial disputes between the UK and Guatemala delayed the independence of Belize until 1981. Guatemala refused to recognize the new nation until 1992. Tourism has become the mainstay of the economy. Current concerns include an unsustainable foreign debt, high unemployment, growing involvement in the South American drug trade, growing urban crime and increasing incidences of HIV/AIDS.

In this small, essentially private-enterprise economy, tourism is the number one foreign exchange earner followed by exports of marine products, citrus, cane sugar, bananas, and garments. The government's expansionary monetary and fiscal policies, initiated in September 1998, led to sturdy GDP growth averaging nearly 4% in 1999-2007, though growth slipped below 3% in 2008 as a result of the global slowdown. Oil discoveries in 2006 bolstered the economic growth. Exploration efforts continue, though no new production is expected in 2009. Major concerns continue to be the sizable trade deficit and unsustainable foreign debt equivalent to nearly 90% of GDP. In February 2007, the government restructured nearly all of its public external commercial debt, which will reduce interest payments and relieve liquidity concerns. A key short-term objective remains the reduction of poverty with the help of international donors.

Functional Threats (types of threat operations in AO):

Threats specific to Belize are international disputes with Guatemala, illicit drugs and natural disasters. Belize is also listed by the Environmental Justice Foundation (EJF) as one of the top offenders for Illegal, Unreported and Unregulated (IUU) fishing. Belize has been engaged in the practice of issuing “flags of convenience”, in which a rouge fishing vessel purchases a short-term license to run up a Belize flag and fish near-range international waters, with disregard to the Rule of the Seas. This is the primary enabler

of IUU fishing, and the government of Belize profits from large volumes of these licenses, for which poachers pay hundreds to thousands of dollars per fishing run.

Physical Threats (physical capabilities of Red Forces in AO):

On 24 April, 2000, elements of the GAF penetrated deep into Belizean territory and, in a carefully planned operation, kidnapped four members of Belize's security forces and then purported to submit them to trial in Guatemalan courts for illegal entry. On 17 and 18 May, 2000, some 25 members of the Guatemalan Armed Forces illegally entered Belizean territory and approached two Belizean villages. Near the village of San Vicente, personnel of the Belize Ministry of Works were accosted by the Guatemalan soldiers and threatened with detention if they did not stop working on the road. The soldiers told them that Guatemalan territory extended as far east as the village of Pueblo Viejo, deep into Belizean territory, and that this would be reflected on the new Guatemalan maps.

Threat Organizations:

Other than Guatemalan Armed Forces, there are no known large scale threat organizations or terrorist sponsored groups operating inside of Belize.

Chronological Threat Analysis:

- Historical Threats:

In the past, Guatemalan dictatorships used the Belize issue to divert public opinion from internal problems. Since the transition to democracy began, this tendency has been on the decline.

- Current Threat Environment

The Organization of America States (OAS)-initiated Agreement on the Framework for Negotiations and Confidence Building Measures saw cooperation in repatriation of Guatemalan squatters and other areas, but Guatemalan land and maritime claims in Belize and the Caribbean Sea remain unresolved. The Line of Adjacency created under the 2002 referendum serves in lieu of the contiguous international boundary to control squatting in the sparsely inhabited rain forests of Belize's border region. Honduras claims Belizean-administered Sapodilla Cays in its constitution but agreed to a joint ecological park under the referendum.

Belize is one of many transshipment points for cocaine. There is some small-scale illicit production of cannabis, primarily for local consumption. Belize is also used as an offshore sector money-laundering activity, related to narcotics trafficking and other crimes.

- Anticipated Future Threats

Future threats continue to be territorial disputes with Guatemala. Nonetheless, although Belize rightfully recognizes no merit whatsoever in Guatemala's territorial claims, it is Belize's position that as a mark of good will, to live in peace and harmony with its neighbor, that it is willing to engage in negotiations that will help Guatemala to finally renounce its claim and engage with Belize and the region in co-operative action for development.

7. BOLIVIA

Bolivia is located in central South America, southwest of Brazil. The land mass is slightly less than three times the size of Montana. The terrain consists of rugged Andes Mountains with a highland plateau (Altiplano), hills and lowland plains of the Amazon Basin. The weather patterns vary with altitude; it is humid and tropical to cold and experiences low annual rainfall. The northeast area is subjected to flooding in the months of March and April. The clearing of land for agricultural purposes and the international demand for tropical timber are contributing to deforestation. Other environmental issues include soil erosion from overgrazing and poor cultivation methods, desertification, the loss of biodiversity and industrial pollution of water supplies used for drinking. The population is estimated to be about 9 million people. The major infectious diseases are food and waterborne related diseases. 95% of the population is Roman Catholic. The three official languages are Spanish, Quechua and Aymara. The large number of different cultures within Bolivia has contributed greatly to a wide diversity in fields such as art, cuisine, literature and music.

Bolivia is one of the poorest and least developed countries in Latin America. Key industries are mining, smelting, petroleum, tobacco, food and beverages. Bolivia is the world's third-largest cultivator of coca (after Colombia and Peru), the third largest

producer of cocaine, estimated at 120 metric tons potential pure cocaine in 2007, and is the transit country for Peruvian and Colombian cocaine destined for Brazil, Argentina, Chile, Paraguay, and Europe. Poverty, unemployment, drug trafficking and money laundering are some of the challenges faced today. In addition, the decline in commodity prices in late 2008, the lack of foreign investment in the mining and hydrocarbon sectors, and the suspension of trade benefits with the United States will pose challenges for the Bolivian economy in 2009.

Bolivian armed forces consist of the Bolivian Army, Navy and Air Force. There are 16 paved runways, 1045 unpaved runways and one inland port Puerto Aguirre on the Paraguay/Parana waterway. Bolivia enjoys free port privileges at maritime ports in Argentina, Brazil, Chile, and Paraguay.

Functional Threats (types of threat operations in AO):

The key threats in Bolivia are political stability, poverty, environmental issues, drug trafficking, money laundering, economic and racial tensions. Bolivia's government faces difficult problems of deep-seated poverty, social unrest, and illegal drug production. Racial and economic tensions remain between the Amerindian populations of the Andean west and the non-indigenous communities of the eastern lowlands. Bolivia's government is heavily dependent on foreign assistance to finance development projects. The weak border controls have led to the existing money-laundering activity related to the narcotics trade.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the drug traffickers and violence arising from racial tension. Poverty drives the Bolivian drug runners to take high risks to smuggle the drugs to neighboring countries.

Threat Organizations:

Threat organizations within Bolivia are primarily the drug cartels and their associates who assist with money laundering.

Chronological Threat Analysis:

- Historical Threats:

Since democratic civilian rule was established in 1982 in Bolivia, leaders have faced difficult problems of deep-seated poverty, social unrest, and illegal drug production.

- Current Threat Environment:

The current economic condition in Bolivia has gained much growth and stability. However, poverty in some areas, racial tension and drug trafficking remain a significant concern. Cocaine trafficking has risen sharply in recent years. Weak border controls still exist and are not effective in combating drug trafficking and money laundering activities. [316]

- Anticipated Future Threats

There have recently been anti-narcotics efforts by the Bolivian government to step up in eradication and alternative crop programs, seeking international help and cooperation. However, drug traffickers constantly change their routes and strategies. They have also diversified their risks by shipping smaller quantities of drugs with more people. It has become more of a social problem to deal with in terms of reducing consumption and improving poverty conditions.

8. BRAZIL

Brazil, officially the Federative Republic of Brazil, is a country in South America. It is the fifth largest country by geographical area, occupying nearly half of South America, the fifth most populous country, and the fourth most populous democracy in the world. Bounded by the Atlantic Ocean on the east, Brazil has a coastline of over 7,491 kilometers (4,655 mi). It is bordered on the north by Venezuela, Suriname, Guyana and the overseas department of French Guiana; on the northwest by Colombia; on the west by Bolivia and Peru; on the southwest by Argentina and Paraguay and on the south by Uruguay. Numerous archipelagos are part of the Brazilian territory, such as Fernando de Noronha, Rocas Atoll, Saint Peter and Paul Rocks, and Trinidad and Martim Vaz.

Brazil was a colony of Portugal from the landing of Pedro Álvares Cabral in 1500 until its independence in 1822. Initially independent as the Brazilian Empire, the country

[316] test

has been a republic since 1889, although the bicameral legislature, now called the Congress, dates back to 1824, when the first constitution was ratified. Its current Constitution defines Brazil as a Federal Republic. The Federation is formed by the union of the Federal District, the 26 States, and 5,564 Municipalities.

Functional Threats (types of threat operations in AO):

Threats specific to Brazils are: piracy, crime, lack of law enforcement, cocaine smuggling route, bulk cash, arms smuggling and drug trafficking.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the smugglers and drug-runners that take advantage of Brazil for trafficking. They possess numerous and reasonably modern small arms. In order to control the drug trade, drug-runners began to use heavy weaponry such as large-caliber arms. These were stolen from the army or brought in from Europe, particularly from the former Soviet Union, whose ex-bureaucrats were selling even anti-aircraft weapons at affordable prices.

Threat Organizations:

The Comando Vermelho was formed in 1979, when Brazil was still ruled by a military dictatorship. The organization gained control of the cocaine traffic in Rio de Janeiro and it grew rapidly as they expanded to include the European market. The organization had 6,500 armed men working directly in its operations and close to 300,000 individuals working indirectly. Primeiro Comando da Capital (PCC) is an anti-establishment Brazilian prison gang and criminal organization founded in 1993 by inmates of Taubaté prison in São Paulo. Since its inception, PCC has been responsible for several criminal activities such as prison breaks, prison riots, drug trafficking, highway robbery and terrorist activities. The PCC is a splinter group of the Comando Vermelho, operating primarily in the city of São Paulo and in the coastal region of the state.

Chronological Threat Analysis:

- Historical Threats

Carjacking has been common, particularly in major cities. Local citizens and visitors alike are often targeted by criminals, especially during public festivals such as the

Carnaval. More than 500,000 people have been killed by firearms in Brazil between 1979 and 2003, according to a new report by the United Nations.

Gang-related violence is also common throughout the Capital Brasilia. Most incidents have been directed at police, security officials and related facilities, but gangs have also attacked official buildings, set alight public buses and robbed several banks. An outbreak of violence began on the night of 12 May, 2006 in São Paulo, Brazil. It was the worst outbreak of violence which has been recorded in Brazilian history and was directed against security forces and some civilian targets. By May 14 the attacks had spread to other Brazilian states including Paraná, Mato Grosso do Sul, Minas Gerais and Bahia.

- Current Threat Environment:

Brazil has serious problems with crime, especially in São Paulo, Rio de Janeiro, Belo Horizonte, Curitiba, Salvador, Porto Alegre and Recife with very high homicides rates in the country. With roughly 23.8 homicides per 100,000 residents, muggings, robberies, kidnappings and gang violence are common. Police brutality and corruption are widespread.

Organized crime is well established in Rio de Janeiro and São Paulo, largely due to the major criminal organizations like Comando Vermelho, Amigos dos Amigos and Primeiro Comando da Capital. In 2006, 46,660 people were murdered in Brazil, a reduction when compared to 2005, during which 47,578 people were killed. The year of 2003 still holds the record for total number of murders in Brazil; that year alone 51,043 people were murdered.

Computer hacking and internet fraud have a strong presence in Brazil, with eight out of every ten of the world's hackers from Brazil.

- Anticipated Future Threats:

Express kidnappings, where individuals are abducted and forced to withdraw funds from ATM machines to secure their release, are common in major cities including Rio de Janeiro, São Paulo, Brasilia,Curitiba, Porto Alegre, Salvador and Recife. Petty crimes like pick-pocketing and bag snatching are common. Thieves operate in outdoor markets, in hotels and on public transport. The majority of kidnappings in Brasilia continue to be the “quick-nappings.

Cases of piracy occur in some coastal areas of Brazil. Brazil has a long coast line with hundreds of bays and rivers. Most of these are believed to be without pirates. The more dangerous activities seem to be centered around the Amazon river mouth and the regions of Santos and Forteleza.

9. BRITISH VIRGIN ISLANDS

The British Virgin Islands (BVI) consists of the main islands Tortola, Virgin Gorda, Anegada and Jost Van Dyke, along with over 50 smaller islands and enclaves. Tortola is by far the largest of all the islands and is home to more that 75% of the population. Only 16 of its islands are inhabited. The territories were awarded autonomy in 1967 by the British, but territorial rights remain under that of the U.K. Its tiny population of only 25, 000 relies heavily on tourism to support the economy, with 45% of its GDP coming from tourism alone. It is a major offshore financial hub of the Caribbean which also leads to a host of money laundering activities happening in the territories.

Functional Threats (types of threat operations in AO):

Drug trafficking and money laundering, whose purpose may be to support threat organizations elsewhere, are the most prevalent threats. Human illegal migration from the BVI to the US is common as citizens of the BVI enjoy British passport privileges under the 2002 British Territories Act. This migration problem has since been mitigated by tighter immigration regulations.

Physical Threats (physical capabilities of Red Forces in AO):

The BVI is susceptible to natural hazards such as hurricanes and tropical storms. Money laundering takes place within the finance industry and is difficult to track in the country. Drug trafficking through its shorelines does occur, but not rampantly. Therefore, the impact on Phase Zero operations may not be as great as the threats from other Caribbean Islands.

Threat Organizations:

The BVI does not harbor any specific terrorist or drug trafficking groups. Rather, these groups may infrequently use the BVI as a transshipment point for their members as well as goods to other parts of the U.K, Europe and the US.

Chronological Threat Analysis:

- Historical Threats:

Historically, the main threat that the BVI faces is from nature. Natural disasters threaten the livelihoods of more than half the of the population and can cripple the economy overnight. Other threats such as narcotics transshipment have been kept to minimum, even though it still occurs due to its favored location and political status as a British territory.

- Current Threat Environment:

Political and social stability and economic prosperity have ensured that its citizens are kept happy and occupied. As such, the BVI does not create a significant threat environment to our Phase Zero Operations.

- Anticipated Future Threats:

It is predicted that the political stability will continue in time to come, and the economy should recover from its current downturn which is linked to the European as well as US economies. The threat scenarios are unlikely to escalate in the near future as long as the good governance of the country continues.

10. CHILE

Prior to the coming of the Spanish in the 16th century, northern Chile was under Inca rule while the indigenous Mapuche inhabited central and southern Chile. Although Chile declared its independence in 1810, decisive victory over the Spanish was not achieved until 1818. In the War of the Pacific (1879-83), Chile defeated Peru and Bolivia and won its present northern regions. It was not until the 1880s that the Mapuche Indians were completely subjugated. After a series of elected governments, the three-year-old Marxist government of Salvador Allende was overthrown in 1973 by a military coup led by Augusto Pinochet, who ruled until a freely elected president was installed in 1990. Sound economic policies, maintained consistently since the 1980s, have contributed to steady growth, have reduced poverty rates by over half and have helped secure the country's commitment to democratic and representative government. Chile

has increasingly assumed regional and international leadership roles befitting its status as a stable, democratic nation.

Chile has a market-oriented economy characterized by a high level of foreign trade and a reputation for strong financial institutions and sound policy that have given it the strongest sovereign bond rating in South America. Exports account for 40% of GDP, with commodities making up some three-quarters of total exports. Copper alone provides one-third of government revenue. During the early 1990s, Chile's reputation as a role model for economic reform was strengthened when the democratic government of Patricio Aylwin, which took over from the military in 1990, deepened the economic reform initiated by the military government. Growth in real GDP averaged 8% between 1991 and 1997, but fell to half that level in 1998 because of tight monetary policies implemented to keep the current account deficit in check and because of lower export earnings. The latter was a result of the global financial crisis. A severe drought exacerbated the situation in 1999, reducing crop yields and causing hydroelectric shortfalls and electricity rationing, and Chile experienced negative economic growth for the first time in more than 15 years. In the years since then, growth has averaged 4% per year. Chile deepened its longstanding commitment to trade liberalization with the signing of a free trade agreement with the US, which took effect on 1 January 2004. Chile claims to have more bilateral or regional trade agreements than any other country. It has 57 such agreements with the European Union, Mercosur, China, India, South Korea, and Mexico, although not all of them are full free trade agreements. Over the past five years, foreign direct investment inflows have quadrupled to some $17 billion in 2008. The Chilean government conducts a rule-based countercyclical fiscal policy, accumulating surpluses in sovereign wealth funds during periods of high copper prices and economic growth, and allowing deficit spending only during periods of low copper prices and growth. As of September 2008, those sovereign wealth funds, which are kept mostly outside the country and separate from Central Bank reserves, amounted to more than $20 billion.

Functional Threats (types of threat operations in AO):

Threats specific to and most prevalent in Chile are international disputes and illicit drugs. Chile is also vulnerable to environmental issues such as drought and water and power resource crises.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats in Chile are associated with the small arms and other capabilities of the drug smugglers who traffic drugs through Chile. From a threat standpoint, Chile has a fairly stable government and economy, with limited physical threats to a Phase 0 force.

Threat Organizations:

Although small organizations have operated within Chile in the past, research did not uncover any major terror or crime groups currently affiliated with major backers of organized crime or terror.

Chronological Threat Analysis:

- Historical Threats:

Previously, several independant terrorist groups have acted sporadically within Chile. These are the pro-Cuban Movement of the Revolutionary Left, the United Popular Action Movement, the Lautaro Youth Movement, the Manuel Rodríguez Patriotic Front, and Maoist-oriented Manuel Rodríguez Patriotic Front. None of these were or are a serious threat to national security, but each is capable of occasional acts of terrorism.

- Current Threat Environment:

Chile and Peru rebuff Bolivia's reinvigorated claim to restore the Atacama corridor, ceded to Chile in 1884, but Chile has offered instead unrestricted but not sovereign maritime access through Chile to Bolivian gas and other commodities. Chile rejects Peru's unilateral legislation to change its latitudinal maritime boundary with Chile to an equidistance line with a southwestern axis favoring Peru. On October 2007, Peru took its maritime complaint with Chile to the ICJ. There is also a territorial claim in Antarctica on the part of the Chilean government, which partially overlaps Argentine and British claims. The joint boundary commission, established by Chile and Argentina in 2001, has yet to map and demarcate the delimited boundary in the inhospitable Andean Southern Ice Field (Campo de Hielo Sur).

Currently, the CIA lists Chile among the many transshipment countries for cocaine destined for Europe and the region. There is evidence of some associated money laundering activity, especially through the Iquique Free Trade Zone. Domestic cocaine consumption is on the rise, making Chile a significant consumer of cocaine in the South American continent.

- Anticipated Future Threats:

Chile has very few internal or external military threats, and any historical disputes with its neighbors have been relegated to diplomatic solutions. The Chilean procurement program is raising concerns among the country's neighbors, particularly Bolivia and Peru, which have resurrected arguments over borders, with both countries laying claim to Chilean territorial waters and its copper-producing areas. Copper mining rights and the subject territory were won by Chile in the War of the Pacific in the 19th century. The new Bachelet administration has renewed efforts to normalize relations, with the new Bolivian president Evo Morales showing some signs of reconciliation. Regardless of the nature of Chilean military procurements, they will continue to generate distrust among neighboring states.

11. COLOMBIA

Columbia is the only South American country with coastlines on both the North Pacific Ocean and Caribbean Sea. The Central American peninsula divides these two coastlines, so maritime transit between the North Pacific to the Caribbean requires use of the Panama Canal. The land mass of Colombia is slightly smaller than twice the size of Texas. The diverse geography ranges from tropical coastal areas and rainforests to rugged mountainous terrain. It has tropical weather patterns along the coast and eastern plains, cooler in highlands. The highlands are subjected to volcanic eruptions, and there are periodic droughts and occasional earthquakes. The current environmental issues include deforestation, soil and water pollution and quality damage from overuse of pesticides. The population is about 46 million people. 170,000 people in Colombia are living with HIV/AIDS, and the major infectious diseases are food and waterborne related diseases. 90% of the population is Roman Catholic. The official language is Spanish.

Unemployment and drug trafficking are significant challenges. Colombia is the key producer of coca derivatives and supplies cocaine to nearly all US markets and the majority of the international drug markets. Most of the heroin produced is destined for the US. A significant portion of narcotics proceeds are either laundered or invested in Colombia through the black market peso exchange.

Colombia has a national military force. The Army is organized into four divisions with twelve infantry brigades, Special Forces and logistic support brigades, four specialized battalions, and a mechanized cavalry regiment. The Navy is organized into four fleet commands with five marine battalions, the Coast Guard, and a naval air arm. Air forces are organized into three combat air commands; one tactical air support command, one military air transport command and one training command. There are 103 paved runways, 831 unpaved runways, two heliports and five major ports in the country. 4th Fleet maintains port operations in Colombia. The country of Colombia receives the third largest portion of foreign military aid provided by the U.S., and the U.S. has been actively involved in drug interdiction inside Colombia for nearly three decades.

The seaports handle around 80 percent of international cargo. In 2005 a total of 105,251 metric tons of cargo were transported by water. Colombia's most important ocean terminals are Barranquilla, Cartagena, and Santa Marta on the Caribbean Coast and Buenaventura and Tumaco on the Pacific Coast. Exports mostly pass through the Caribbean ports of Cartagena and Santa Marta, while 65 percent of imports arrive at the port of Buenaventura. Other important ports and harbors are Bahía de Portete, Leticia, Puerto Bolívar, San Andrés, Santa Marta, and Turbo. Since privatization was implemented in 1993, the efficiency of port handling has increased greatly. There are plans to construct a deep-water port at Bahía Solano.

The main inland waterways total about 18,200 kilometers, 11,000 kilometers of which are navigable by riverboats. A well-developed and important form of transport for both cargo and passengers, inland waterways transport approximately 3.8 million metric tons of freight and more than 5.5 million passengers annually. Main inland waterways are the Magdalena–Cauca River system, which is navigable for 1,500 kilometers; the Atrato, which is navigable for 687 kilometers; the Orinoco system of more than five navigable

rivers, which total more than 4,000 kilometers of potential navigation (mainly through Venezuela); and the Amazonas system, which has four main rivers totaling 3,000 navigable kilometers (mainly through Brazil). The government is planning an ambitious program to more fully utilize the main rivers for transport. In addition, the navy's riverine brigade has been patrolling waterways more aggressively in order to establish safer river transport in the more remote areas in the south and east of the country that are controlled by rebel groups.

Port Cartagena served as a major port for the trade of slaves, gold and shipping cargo. The Marine Terminal has the capacity to receive ships with a depth of up to 21 meters and 270.000 TIM. It can move more than fourteen million metric tons a year, representing 75% of the Cartagena traffic. There is plenty of local water taxi traffic going through the anchorage.

Colombia was of special interest to the Modeling Team, who, in the development of three mission scenarios, identified anti-drug smuggling as one of the three critical missions representative of a Phase Zero operation. To further narrow the scope of the model, three ports were selected in Colombia to be included in the model. Specific data about the ports of Cartagena, Tumaco and Buenaventura was provided by the Red Team to assist in modeling. A summary of physical and threat data is included in this country study.

Functional Threats (types of threat operations in AO):

There is strong presence of violence in many urban cities such as Bogota, Medellin, Barranquilla, and Cartagena. The level of violence in Buenaventura remains high. Small towns and rural areas of Colombia can be extremely dangerous due to the presence of narco-terrorists. Common crime remains a significant problem in many urban and rural areas.

Threats specific to Colombia are: natural disasters, food and water-borne disease, crime, kidnapping, political violence, political corruption, guerrilla, paramilitary activities, illegal migrants, drug trafficking and money laundering.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the FARC, drug traffickers and criminal organizations in Colombia. FARC has an estimated 9,000-12,000 armed members, gaining political support among the rural population. They possess numerous assault weapons, including AK-47 assault rifles, M60 machine guns, M16 rifles, RPG-7 rocket-propelled grenades, M79 grenade launchers, and land mines. It allegedly acquires weapons from Cuba and from rogue elements of the Venezuelan army. It also reportedly purchases weapons from international criminal organizations in Brazil and Mexico. [317]

Threat Organizations:

The most notable guerrilla group operating in Colombia, which engages in activities that could be considered terrorism, is the Revolutionary Armed Forces of Colombia (FARC). Colombia is also notorious for the presence of powerful drug cartels. There have been four entrenched and powerful cartels in Colombia: the Medellin Cartel, the Cali Cartel, the North Valley Cartel, and the North Coast Cartel. The first two have been nearly wiped out by the cooperative efforts of the Colombian and U.S. governments, and fragments of those groups have strengthened the latter two in the last decade, particularly the North Valley Cartel. Many other smaller criminal organizations are based in Colombia, laundering money and carrying out organized criminal activities.

Chronological Threat Analysis:

- Historical Threats:

The primary historical threat is the long conflict between government forces and anti-government insurgent groups, principally the FARC. The insurgency and political violence have been continuing for the past decades, affecting civilians, and large rural areas are under guerrilla influence.

- Current Threat Environment:

The current economic and political environment in Colombia has led to high crime rates and safe haven for drug trafficking. The continued existence of FARC and the criminal organizations is largely due to their mutually beneficial relationship. The

[317] http://www.military.com/Resources/ResourceFileView?file=FARC-Organization.htm

guerrillas provide lab and airfield security and assist in crop harvest for drug traffickers, in exchange for money and weapons.

- Anticipated Future Threats:

Despite efforts by the Colombian government in combating drug trafficking and criminal activities, the presence of the FARC and criminal organizations will still be prevalent. This is in addition to the political corruption the Colombian government is facing, which enhances FARC's political advantage and helps them gain support from the rural population. There is a need to identify the dynamics of this strategic alliance of the FARC and the criminal organizations, and devise a strategy to deal with it. Until this gap is filled, no positive change to current threats may be expected.

12. COSTA RICA

Costa Rica, officially the Republic of Costa Rica, is a country in Central America, bordered by Nicaragua to the north, Panama to the east and south, the Pacific Ocean to the west and south and the Caribbean Sea to the east. Costa Rica is located on the Central American isthmus, 10° north of the equator and 84° west of the Prime Meridian. It borders both the Caribbean Sea to the east and the North Pacific Ocean to the west, with a total of 1,290 kilometers (802 mi) of coastline (212 km / 132 mi on the Caribbean coast and 1,016 km / 631 mi on the Pacific.

Costa Rica also borders Nicaragua to the north (309 km / 192 mi of border) and Panama to the south-southeast (639 km / 397 mi of border). In total, Costa Rica comprises 51,100 square kilometers (19,730 sq. mi) plus 589,000 square kilometers of territorial waters. Costa Rica also comprises several islands. Cocos Island stands out because of its distance from continental landmass (24 km² / 9.25 sq mi, 300 mi (480 km) from Puntarenas coast), but Calero Island is the largest island of the country (151.6 km² / 58.5 sq mi).

Functional Threats (types of threat operations in AO):

Threats specific to Costa Rica are: human trafficking, arms smuggling and drug trafficking.

Physical Threats (physical capabilities of Red Forces in AO):

Smugglers possess numerous and reasonably modern small arms in order to control the human, drug and arms trade.

Threat Organizations:

Costa Rica is the Central American country with the longest history of democracy. Indigenous terrorist organizations are non-existent.

Chronological Threat Analysis:

- Historical Threats:

Costa Rica is a country of origin, transit and destination for trafficking in persons for sexual and labor exploitation, affecting women, men and children. As a country of origin, Costa Rican girls and women are trafficked to the USA, Canada and Europe for prostitution, through Central America and Mexico. As a transit country, trafficked victims are brought through Costa Rica from Nicaragua, Ecuador, Colombia, Peru, the Dominican Republic, Cuba and Asia en route to the USA and Canada.

- Current Threat Environment:

Organized crime and drug trafficking have invaded Costa Rica. High profile organized crime cases include Chinese smuggling rings and Colombian and Mexican drug cartels operating in Costa Rica. Organized sex trafficking in children is growing as well. It would appear that children have become a commodity for the tourist trade, and like any other business based on trade, there is the issue of supply and demand. Prostitution is legal in Costa Rica for those over 18, but billboards and signs throughout the San Jose airport serve as reminders that it is a serious crime to buy and sell the sexual services of children and minors.

- Anticipated Future Threats:

Crime rates are still low on a comparative basis; in 2007, the murder rate was 6.6 murders per 100,000, the lowest in Central America. However, violent crime is rising rapidly, with the government stating in early 2008 that robbery rates have risen by 700 percent since 1990, while drug-related crime is up 280 percent in the same period. Moreover, crime is becoming more visible.

Since 1989, legal gun sales have quadrupled in the country. It is estimated that 100,000 guns have been legally sold since that date, while the number of illegal guns coming into the country is unknown.

With a rise in car theft and mugging, families feel the need for self-defense. Shootings are reported on a daily basis, either as part of a robbery, or drunken disputes between friends and strangers. With the increase in civilians holding guns, simple fights are more likely to turn deadly.

13. CUBA

Cuba became independent from the United States in 1902, as a result of the of the Treaty of Paris, partly assisted by the Spanish-American war in 1898, which freed Cuba from Spanish rule. It is the largest country in the Caribbean, with a population of about 11.5 million people. Currently, Cuba is led by a one-party government headed by Raul Castro, who took over the reins from his ailing brother, Fidel Castro, in February, 2008. Since the fall of US-backed dictator Fulgencio Batista in 1959, Cuba has been subjected to US sanctions intended to topple the communist government of Fidel Castro. Withdrawal of former Soviet subsidies, as well as continued US sanctions, threw the country into a severe economic downturn in the 1990s, which still continues today. The people are plagued by low wages, and high prices of basic commodities. The economy survives from investments by Canadian, European and Latin American companies, mainly the sector of tourism. Communist rule in the country has somewhat limited the diversification of the economy as well as trade affluence for both the people and the county. She relies heavily on monies sent back from Cubans working and living abroad, mainly in the city of Miami. The Guantanamo Naval Base on the eastern tip of the island is leased and operated by the US Navy.

Functional Threats (types of threat operations in AO):

Cuba continues to publicly oppose the US led coalition of the War on Terror. It is reported that Cuba continues to provide a safe haven for members of ETA, FARC and the ELN, and maintains close links to other state sponsors of terrorism. The Cuban government does not attempt to track, block or seize terrorist assets and is known to

harbor US fugitives as a sign of resistance to the US policy towards Cuba. Cuba is also well known for its lack of respect for human rights. The government refuses to acknowledge or denounce the problem of human trafficking. Prostitution, corruption, black market operations and defectors are common sights within the country due to severe hardship under communism rule. Due to the promise of a better life elsewhere, illegal migration of Cubans into the US using homemade rafts, human smuggler entities, air flights or via the southwestern border continues to be a problem. Anti-US sentiment remains high within the country, although its peoples are more concerned with everyday issues of survival than making aggression against American property. Cubans are exposed to an intermediate risk of food and waterborne diseases such as bacterial diarrhea and Hepatitis A and the vector borne disease, dengue fever.

Physical Threats (physical capabilities of Red Forces in AO):

Illegal migration using homemade rafts and illegal border crossings into Florida are a perennial problem. In 2007 alone, more than 2,600 Cubans were caught attempting to cross the Straits of Florida. Droughts are common occurrences and Cuba averages one major hurricane every other year.

Threat Organizations:

Cuba continues to be a safe haven for terrorist groups such as ETA, FARC, and ELN with no signs of changing their policy against these terrorist groups, or enforcing their Law 93 against Acts of Terrorism.

Chronological Threat Analysis:

- Historical Threats:

Historically, Cuba has been plagued by natural disasters such as hurricanes and earthquakes. Communist rule since 1959 has imposed considerable hardship on its people and severely restricted the freedom of the people. Basic internet and mobile hand phone services are permitted only by special restricted access. Less than 2% of its population has access to the internet which restricts the dissemination of information severely. Domestic hardships have driven people to seek a livelihood (sometimes fatally) elsewhere through means of human smuggling, drug trafficking and prostitution. Its anti-

US sentiments also promote a safe haven for terrorist groups who operate relatively freely within the boundaries of Cuba.

- Current Threat Environment:

Cuba continues to be plagued by the threats aforementioned. The War on Terror has restricted the activities of the various terrorist groups in Cuba somewhat, but they are likely to continue to operate underground within the country.

- Anticipated Future Threats:

The threat environment within Cuba is unlikely to be abated by policy changes, due to no anticipated change in the government in the near future. The Castro government is likely to continue its anti-US stance and continue to be a state sponsor for terrorist activities. Although widespread crime is not a main concern due to the intolerant Communist government, human trafficking is likely to continue if not escalate due to worsening economic conditions. Even though Cuba is unlikely to become a nation of aggression against the US, any US military intervention into Cuba's domestic affairs or policies is likely to be met by huge resistance due to its relatively (as compared to other Caribbean countries) well-armed and rugged military force.

14. CURACAO

Curacao is an island in the Southern Caribbean. The nearest neighbor on the South American continent is Venezuela. It is normally grouped as one of the Lesser Antilles. Historically, the small island was under Spanish, and then Dutch control. Unlike other conquests, where the Spanish exterminated the entire population, they instead exported the indigenous residents to other colonies as forced labor. The Dutch used Curacao as a major transshipment point for the slave trade, a profitable venture that made the islanders very rich.

With the end of slavery in 1863, the island became impoverished and many residents and former slaves moved elsewhere in Latin America, seeking a living. The economy turned around again in the early 1900s with the discovery of oil. The Dutch controlled both the island and the associated oil refinery until the 1980s. Today, it is

owned by the local government and leased to Venezuela as a refinery, but is falling into disrepair.

Curacao is a popular tourist destination, with particularly attractive beaches and reefs which also attract scuba enthusiasts. Crime rates and threat levels remain acceptably low and resorts and cruise ships both operate successfully on the island.

Curacao enjoys the highest standard of living in the Caribbean. They have economic ties with many US and Venezuelan businesses, and, allegedly, their banking industry thrives by providing tax shelters for large US corporations.

Functional Threats (types of threat operations in AO):

There are no notable threats active in Curacao.

Physical Threats (physical capabilities of Red Forces in AO):

Curacao is situated south of the hurricane belt and a major hurricane has not made landfall there since recording began.

Threat Organizations:

No known organized crime or terror organizations are currently operating in Curacao.

Chronological Threat Analysis:

- Historical Threats:

The amenable natural harbor and popularity for trade under Dutch rule led to many problems with piracy.

- Current Threat Environment:

The economy and society are both fairly stable; yet the social infrastructure is showing trends of decline and erosion. The demographic has also been slowly changing, with many more affluent citizens immigrating back to the Netherlands.

- Anticipated Future Threats:

Near proximity to Venezuela, the only South American state recommended as a "Sponsor of Terror" by the US State Department, and the presence of many American and EU tourists, may have some potential to attract terror activity in the future.

15. DOMINICAN REPUBLIC

The Dominican Republic lies in the eastern two-thirds of the island of Hispaniola, between the Caribbean Sea and the North Atlantic Ocean, east of Haiti. The land mass is slightly more than twice the size of New Hampshire. The geography consists of rugged highlands and mountains with fertile valleys interspersed, and it shares the island of Hispaniola with Haiti. It has tropical maritime weather patterns, little seasonal temperature and rainfall variation. The location lies in the middle of the hurricane belt and is subject to severe storms from June to October, as well as occasional flooding and periodic droughts. The current environmental issues include water shortages, soil erosion into the sea, which damages coral reefs, and deforestation. The population is about 9 million people. The HIV/AIDS adult prevalence rate is about 1.1% in the Dominican Republic. Other major infectious diseases are food and waterborne related diseases. 95% of the population is Roman Catholic. The official language is Spanish. Unemployment, money laundering, human and drug trafficking are significant challenges the country faces. The country has been viewed primarily as an exporter of sugar, coffee, and tobacco, but in recent years the service sector has overtaken agriculture as the economy's largest employer, due to growth in tourism and free trade zones. Although the economy is growing at a respectable rate, high unemployment and underemployment remain an important challenge. The population also suffers from marked income inequality. The Dominican Republic is a source, transit, and destination country for men, women, and children trafficked for the purposes of commercial sexual exploitation and forced labor, as well as a transit shipment point for South American drugs destined for the US and Europe.

The Dominican Republic has armed forces consisting of the Army, Navy and Air Force. There are 15 paved runways, 19 unpaved runways, and five ports (Boca Chica, Caucedo, Puerto Plata, Rio Haina, Santo Domingo) in the country.

Functional Threats (types of threat operations in AO):

The key threats identified are human and drug trafficking, money laundering, social issues of poverty, income inequality and illegal immigration. Haitian migrants cross the porous border into the Dominican Republic to find work and illegal migrants

from the Dominican Republic cross the Mona Passage each year to Puerto Rico to find better work. The Dominican Republic is a source, transit, and destination country for men, women, and children trafficked for the purposes of commercial sexual exploitation and forced labor. A large number of Dominican women are trafficked into prostitution and sexual exploitation in Western Europe, Australia, Central and South America, and Caribbean destinations. A significant number of women, boys, and girls are trafficked within the country for sexual exploitation and domestic servitude. It has become a trans-shipment point for South American drugs destined for the US and Europe, and a trans-shipment point for ecstasy from the Netherlands and Belgium destined for US and Canada. In addition, there is also substantial money laundering activity, in particular by Colombian narcotics traffickers.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the human and drug traffickers in the Dominican Republic. Generally, the traffickers possess small and heavy arms. The lack of gun control makes such possession easy. The AIDS rate in Dominican Republic is also high with a prevalence rate of 1.1%.

Threat Organizations:

There are many organizations operating within the Dominican Republic for the purpose of kidnapping, trafficking and sales of humans for the purpose of sex or labor. Smuggling organizations also traffic in several types of narcotics, along routes to both the US and Europe.

Chronological Threat Analysis:

- Historical Threats:

Historical threats have been primarily linked to social issues induced by poverty and illegal immigration.

- Current Threat Environment:

The Dominican Republic is a source and a transit country for human and drug trafficking. Money laundering via the Dominican Republic is favored by Colombian drug cartels for the ease of illicit financial transactions. In 2004,it was estimated that 8% of all cocaine smuggled into the United States had come through the Dominican

Republic. The Dominican Republic responded with increased efforts to seize drug shipments, arrest and extradite those involved, and combat money-laundering. However, it fails to show evidence of increasing efforts to combat human trafficking, particularly in terms of not adequately investigating and prosecuting public officials who may be complicit with trafficking activity, and inadequate government efforts to protect trafficking victims. The government has taken measures to reduce demand for commercial sex acts with children through criminal prosecutions, but these measures have not as yet proven to be effective.

- Anticipated Future Threats:

Illegal immigrants and human and drug trafficking issues will continue to exist in the near future. The government needs to step up measures and efforts in combating these issues more effectively.

16. ECUADOR

Ecuador is a representative democratic republic in South America, bordered by Colombia on the north, by Peru on the east and south, and by the Pacific Ocean to the west. It is one of only two countries in South America (with Chile) that does not have a border with Brazil. The country also includes the Galápagos Islands in the Pacific, about 965 kilometers (600 mi) west of the mainland. Ecuador has three main geographic regions, plus an insular region in the Pacific Ocean. La Costa, or “the coast”, comprises the low-lying land in the western part of the country, including the Pacific coastline. La Sierra, or "the highlands", is the high-altitude belt running north-south along the center of the country, its mountainous terrain dominated by the Andes mountain range. La Amazonía, also known as El Oriente ("the east"), comprises the Amazon rainforest areas in the eastern part of the country, accounting for just under half of the country's total surface area, though populated by less than 5% of the population. The Región Insular is the region comprising the Galápagos Islands, some 1,000 kilometers (620 mi) west of the mainland in the Pacific Ocean.

Functional Threats (types of threat operations in AO):

Threats specific to Ecuador are: crime, cocaine smuggling route, bulk cash smuggling route, corruption, domestic drug-use, and Colombian drug trafficking.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the smugglers and drug-runners that take advantage of Ecuador for trafficking. They possess numerous and reasonably modern small arms, including IR equipped assault weapons. They have begun to use small submersibles, about 50 feet in length, to transport drugs. For surface transport, small boats, also about 50-60 feet long, are employed most commonly.

Threat Organizations:

Ecuadorian groups sympathetic to the FARC. The Grupo de Combatientes Populares (GCP) and the Milicias Revolucionarias del Pueblo (MRP) conduct terrorist acts in the country. The GCP and the MRP have detonated hundreds of pamphlet bombs and other improvised explosive devices outside Ecuadorian government buildings and in close proximity to U.S. government facilities.

Chronological Threat Analysis:

- Historical Threats:

Ecuador is a significant transit country for cocaine originating in Colombia and Peru, with over half of the US-bound cocaine passing through Ecuadorian Pacific waters. Other prevalent threats are: importer of precursor chemicals used in production of illicit narcotics; attractive location for cash-placement by drug traffickers laundering money because of dollarization, a weak anti-money-laundering regime; increased activity on the northern frontier by trafficking groups and Colombian insurgents.

- Current Threat Environment:

Murder, rape, kidnapping, carjacking, armed assault and burglary are becoming a normal part of everyday life throughout the country.

- Anticipated Future Threats:

In addition to a rise in violent crime, criminal acts involving weapons are also increasing. Fortunately, in the majority of these cases, the weapon is used for intimidation purposes only; cooperative victims are seldom injured. Gratuitous violence is rare throughout the country.

17. EL SALVADOR

El Salvador is a country bordering the North Pacific Ocean, and geographically situated between Guatemala and Honduras. It is the smallest Central American country, occupying only 21,040 square kilometers, and the only one without a coastline on the Caribbean. In 1992, the government and leftist rebels signed a treaty which brought to an end a 12 year civil war. The treaty provided for military and political reforms. The country has hydropower, geothermal and petroleum as natural resources, with 31% of the land being used for agriculture. With a population of 7.2 million people, the median age in the country is about 22.5 yrs old, which signals a relatively young population with a life expectancy of 72 years. 0.8% of its adults are infected with HIV/AIDS, which translates to about 35000 people.

Functional Threats (types of threat operations in AO):

Threats such as natural disasters afflict the nation state consistently. Crime is blatant in the country, with relatively little law enforcement. Drugs traffic through the country as a transshipment point to other parts of the Americas. The economy, although the 3rd largest in the Caribbean, relies heavily on monies sent back from Salvadorians working in Continental USA.

Physical Threats (physical capabilities of Red Forces in AO):

El Salvador is susceptible to volcanic activity, earthquakes and hurricanes. She is plagued with environmental threats such as deforestation, soil erosion, water pollution and soil contamination from illegal disposal of toxic wastes. These toxic wastes are not tightly controlled by the local government. Infectious diseases are prevalent in the country, with a high degree of risk of being infected by bacterial diarrhea, Hepatitis A, Typhoid fever, dengue fever, and leptospirosis. 0.8% of its population is afflicted with the HIV/AIDS disease.

Threat Organizations:

El Salvador continues to be a transshipment point for cocaine. Small amounts of marijuana are produced for reportedly local consumption. There is significant use of cocaine in the country itself. Known organized crime or drug traffickers are unavailable

from open literature as there is no one particular group who dominates. Rather, the threat organizations consist of several small groups operating independently.

Chronological Threat Analysis:

- Historical Threats:

In 1980, El Salvador went into a civil war sparked by the inequality between the small and wealthy elite population which dominated the government and the economy, and the overwhelming majority of the population whom were poor and destitute. Over 12 years, 75,000 lives and two billion dollars were lost, until the UN-brokered peace treaty to bring political and military reforms was signed in 1992. The country has been ravaged frequently by natural disasters such as hurricanes and earthquakes.

- Current Threat Environment:

Teens continue to be attracted to street gangs to lead a life of crime and lawlessness. Today, it remains one of the most crime-ridden countries in the Americas. The streets are ruled by violent gangs known as "maras", and the relatively weak law enforcement agencies do little to secure the streets. Natural disasters are a common occurrence, with the most recent Hurricane being Mitch in 1998, and several earthquakes in 2001 which left at least 1200 people dead and more than a million homeless. Government aid to help the people recover from these disasters was limited and inefficient.

- Anticipated Future Threats:

The new left-wing (first time since 1992) government to be led by Mauricio Funes will take office in June, 2009, and he had campaigned on a platform of change for El Salvador. He won by the slimmest of margins, 2% vote majority. It will be the first time a Marxist guerrilla linked FMLN (Farabundo Marti National Liberation Front) party will be leading the country since fighting the US-backed government during the civil war in the 1980s. Economic policy change and greater political and economic ties with the U.S. is anticipated in the near future. Although economic change seem promising, whether the status of law enforcement within the country will take a turn for the better remains to be seen. If lawlessness continues, it is unlikely that economic policies will have a

significant effect on the economy of El Salvador, and the current threats will continue to prevail.

18. GUYANA (BRITISH GUINEA)

Officially called the Cooperative Republic of Guyana, Guyana was formerly known as British Guinea. It was originally a Dutch colony in the 1600s, and then a British colony, settled in 1840. It is situated on the North Atlantic coast, with Suriname to the East and Venezuela to the West, and is bordered to the South by Brazil. It is the fourth smallest South American state, about the size of Idaho. English is the official language. The mountainous rainforest in the South of the country is alleged to have been the inspiration behind Doyle's "Lost World" novel. Guyana has many climates, including marshland, savannah, mountains, and most importantly, the largest unspoiled rainforest on the continent.

The demographic distribution in Guyana is 51 percent Indo-Guyanese (descended from immigrants from India), 42 percent Afro-Guyanese (of African or partial African descent), 4 percent Amerindian (descended from indigenous population), and less than 3 percent European or Chinese. English is the official language and is spoken by almost all Guyanese. Some Amerindian languages are spoken, as well as Portuguese near the Brazilian border. Approximately 96 percent of adult population was considered literate in the 1990s.

Agriculture and mining make up the majority of the GDP, and steady growth in these industries has kept the economy reasonably stable in recent years.

Functional Threats (types of threat operations in AO):

The dominating threats in Guyana are drug smuggling, human trafficking and crime, particularly murder, armed robbery and kidnapping. Sporadic social unrest often leads to mobs and rioting. Disease and natural disasters also present a threat.

Physical Threats (physical capabilities of Red Forces in AO):

The largest physical threat in Guyana comes from armed bandits equipped with sub-machine guns, AK47's and handguns. The promoters of such violence get their supplies of weapons regardless of actions taken by the authorities to control the

acquisition of weapons. Illegal gun-running is commonplace where the state machinery is overwhelmed by crime, a situation similar to that found in Jamaica, Haiti, Trinidad and Suriname.

The portion of the adult population infected by AIDS is severe, at 2.5%, and many other diseases are prevalent. Flash flooding is the primary natural disaster afflicting Guyana. Other physical threats are a result of political and social unrest, leading to outbreaks of violence.

Guyana is a source, transit, and destination country for men, women, and children trafficked for the purposes of commercial sexual exploitation and forced labor. Most trafficking appears to take place in remote mining camps in the country's interior. Women and girls are trafficked from northern Brazil and there are suggestions that Guyanese women and girls are trafficked for sexual exploitation to neighboring countries while Guyanese men and boys are subject to labor exploitation. Human trafficking victims are transported from Guyana en route to Caribbean destinations. Guyana has done little to reduce the demand for commercial sexual exploitation of children and adults.

Guyana is also a transshipment point for drugs en route to the US and Europe, mostly for drugs moving out of Venezuela.

Threat Organizations:

There has been no evidence of prominent criminal or terrorist organizations operating within the country. Among the criminal population are deportees from North America, with the capacity to mobilize illegal guns and other weapons and operate a sophisticated networking system in their reign of criminal terror.

Much violence in Guyana stems from the divisions along party lines, which mirrors ethnic divisions in the population. Other organized threats are not state affiliated, but small groups which profit from smuggling humans and other contraband.

Chronological Threat Analysis:

- Historical Threats:

In the past, Guyana has had border disputes with both Suriname and Venezuela, which have been arbitrated successfully.

Jim Jones and the People's Temple cult operated from Jonestown in Guyana, until the mass suicide that Jones and his cult are infamous for. Congressman Leo Ryan was also murdered in Guyana when he came to investigate the People's Temple.

Guyana experienced bitter, costly fratricidal warfare in the pre-independence years of the 1960s, when some 176 persons fell victim to the guns, bombs and other weapons of the purveyors of racial and political hatred. At the best of times, Guyana is not a country whose 83,000 square miles can easily be policed, not even along its densely populated coastland. There are miles of farmlands and cattle lands stretching from the main highway, and these parallel the sea defenses from the Atlantic Ocean.

Political and racial divisions are deep. There is an unfortunate mix of 35 percent poverty and 15 percent unemployment. The common crimes of narco-trafficking and gun-running, strident anti-government attacks from the main opposition People's National Congress (PNC) and on the police blend with that party's rhetoric to make the country "ungovernable". These problems all combine to convey the depth of the crisis.

The American CIA has a long history of involvement in and preservation of the stability of Guyana, and sees it as a valuable ally and safe haven in South America.

Political rioting and violence have been common since the 1970s, even prompting former President Carter to proctor national elections in 1992.

- Current Threat Environment:

The American intelligence community maintains an interest in Guyana, particularly with its proximity to the socialist state of Venezuela.

The electricity infrastructure is very obsolete and electricity is unreliable and expensive. A Phase 0 force operating in Guyana must be able to provide reliable power independently. The same is true for water and sanitation.

Disease is an acute problem in Guyana, with malaria ranked as the number one cause of death in the country.

- Anticipated Future Threats:

The current levels of social violence and the threats from drug and human smuggling have been at a steady level for many years. The current government does not

show any promise for making changes in these areas, and lacking intervention, the current threat environment is likely to carry forward for some time.

Guyana will see an increase in criminal activities concentrated on the East Coast of Demerara and Georgetown. There has also been an increasing trend in kidnapping and extortion. Serious crime has continued to affect urban centers. More specifically, Georgetown has experienced an increased rate of crime that includes home invasions, kidnappings, car-jacking and shootings. Moreover, there has also been a significant increase in criminal activity such as assaults, armed robberies, and random shootings in public places in urban districts of Guyana, particularly in Buxton and Georgetown. Without a strengthening of the rule of law, there is no indication that this increase in crime will abate.

19. GUYANE (FRENCH GUINEA)

Bordered by Suriname to the West, and sharing a southern and eastern border with Brazil, Guyane, also called French Guinea, is what the French refer to as a DOM (an overseas "Department", translated from French). It is one of 26 regions that make up the French republic, and trades with the Euro, as France does. The greatest population density lives along the northern Caribbean coast, and a more sparse population dwells in the dense rainforest that makes up the majority of the country. The nations holds claim to a number of nearby islands. Hydrodynamic power is generated at a dam and artificial lake in the North, and this facility is a critical structure in the country. Guyane was settled by the French as a penal colony in the 1800s. The southern jungle region has been disputed with Brazil in the past, but the border not currently disputed. A large number of immigrants from Laos live in Guyane, and nearly a third of today's population is naturalized from Laos, Haiti and other nations. There have been some calls, as recently as the 1980s, for more independence from France.

Functional Threats (types of threat operations in AO):

Threats specific to Guyane are an upsurge in illegal fishing which threatens the economy, as fishing provides the primary export, and rising unemployment. Guyane is very dependent on the European economy, as there are few opportunities for farming or

other commerce in the dense jungle and rainforest. Deforestation may become an emerging threat in the future.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats to Guyane are from illegal immigration, unregistered gold prospectors and IUU fishing of its waters. Natural resources such as gold, forest timber and game fish may be threatened by the rise in uncontrolled activities such as these.

Threat Organizations:

Nearly all the threats to Guyane are unaffiliated opportunists seeking to profit from the poor oversight of precious natural resources. No mention was found in our research of well organized crime or terror groups.

Chronological Threat Analysis:

- Historical Threats:

The greatest historical threats have arisen from border disputes, and the social instability that comes from increased unemployment. Social and economic issues have been tempered by ties with France.

- Current Threat Environment:

French Guinea is one of the more stable states in region of the Caribbean and South America. The current threats are largely from poachers, illegal fishing, and an economic structure that is nearly entirely dependent on France and Europe.

- Anticipated Future Threats:

Unless tighter controls are emplaced on the natural resources of Guyane, groups of poachers and other opportunists may lay waste to the fish, forests and gold mineral deposits, further crippling the tenuous economy.

20. GUATEMALA

Guatemala is located in Central America, bordering the North Pacific Ocean between El Salvador and Mexico and bordering the Gulf of Honduras (Caribbean Sea) between Honduras and Belize. The land mass is slightly smaller than Tennessee. The terrain consists of mostly mountains with narrow coastal plains and rolling limestone plateau, with no natural harbors on the west coast. It has tropical weather patterns, hot

and humid in lowlands, and cooler in highlands. There are numerous volcanoes in the mountains, with occasional violent earthquakes. The Caribbean coast is extremely susceptible to hurricanes and other tropical storms. The current environmental issues include deforestation in the Peten rainforest, soil erosion and water pollution. The population is about 13 million people. The HIV/AIDS adult prevalence rate is about 0.8% in Guatemala. Other major infectious diseases are food and waterborne related diseases. The main religions include Roman Catholic, Protestant, indigenous Mayan belief systems. Spanish and Amerindian languages are the main languages. The distribution of income remains highly unequal with more than half of the population below the national poverty line. Other ongoing challenges include curtailing drug trafficking and rampant crime.

Guatemala armed forces consist of the Army, Navy and Air Force. There are 12 paved runways, 390 unpaved runways, and three ports (Puerto Quetzal, Santo Tomas de Castilla) in the country.

Functional Threats (types of threat operations in AO):

This developing country is still facing social problems such as poverty and immigration. The distribution of income remains highly unequal with between 30 to 50 percent of the population living below the poverty line and just over 3.2% unemployed. Guatemala is a source, transit, and destination country for Guatemalans and Central Americans trafficked for the purposes of commercial sexual exploitation and forced labor, and a major transit country for cocaine and heroin. Its proximity to Mexico makes Guatemala a major staging area for cocaine. Money laundering is a serious issue, with corruption adding on to the severity of problem. Guatemala has the second highest crime rate in Latin America.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the human and drug traffickers in Guatemala. Generally, the traffickers possess small arms and grenades.

Threat Organizations:

Threat organizations within Guatemala are mostly human and drug trafficking organizations, and other criminal organizations that contribute to high domestic violent crime rates.

Chronological Threat Analysis:

- Historical Threats:

During the second half of the 20th century, Guatemala experienced a variety of military and civilian governments, as well as a 36-year guerrilla war which created about a million refugees. The end of the civil war removed a major obstacle to foreign investment, and Guatemala since then has pursued important reforms and macroeconomic stabilization. However, concerns over security, the lack of skilled workers and poor infrastructure have continued to hamper foreign participation.

- Current Threat Environment:

Guatemala is a source, transit, and destination country for Guatemalans and Central Americans trafficked for the purposes of commercial sexual exploitation and forced labor. Human trafficking is a significant and growing problem in the country. Thus far, Guatemala has failed in its efforts to combat trafficking in persons, particularly with respect to ensuring that trafficking offenders are appropriately prosecuted for their crimes. While prosecutors have initiated trafficking prosecutions, they continue to face problems in court with application of Guatemala's comprehensive anti-trafficking law. Although the government made modest improvements to its protection efforts, assistance remained inadequate overall.

Guatemala is also a major transit country for cocaine and heroin and its proximity to Mexico makes Guatemala a major staging area for drugs, particularly cocaine. Money laundering continues to be a serious problem, in addition to corruption.

- Anticipated Future Threats:

The existing current threats such as money laundering, corruption, human and drug trafficking issues will still be prevalent. To date, the efforts put in by the government in combating these problems are not adequate and effective.

21. HAITI

The nation of Haiti has a land mass slightly smaller than the size of Maryland. It shares a 360 km border with the Dominican Republic. It has tropical weather patterns and mostly mountainous terrain. Haiti is subject to a number of natural disasters, among them hurricanes, earthquakes, flooding and occasional drought. Issues of soil erosion and deforestation are prominent. The population of about 9 million people is desperately poor, with 80 percent of the population living below the poverty line and 70 percent unemployment. 120,000 people in Haiti are living with AIDS. 95% of the population is black. The official language is French, but Creole is also spoken.

Haiti does not have an organized state military. There are only four paved runways and one port in the country. 4th Fleet does not maintain port operations in Haiti. The UN has 8,000 peacekeepers conducting Phase Zero stability efforts in Haiti.

Functional Threats:

Threats specific to Haiti are: natural disasters, food and water-borne disease, crime, lack of law enforcement, political violence, cocaine smuggling route, bulk cash smuggling route, corruption, domestic drug-use, and "favored nation status" for Colombian drug trafficking.

Physical Threats:

Physical threats relate primarily to the capabilities of the smugglers and drug-runners that take advantage of Haiti for trafficking. They possess numerous and reasonably modern small arms, including IR equipped assault weapons. They have begun using small, home-made submersibles, about 50 feet long, to transport drugs. For surface transport, small boats about 50-60 feet long are employed most commonly. Small aircraft is seldom used for transporting drugs now because of the effectiveness of E-3 surveillance.

Threat Organizations:

Colombian drug cartel traffickers have long preferred Haiti. According to News blog "Strategypage", Al Qaeda is taking advantage of lawless conditions in Haiti to establish small cells close to the United States.

Chronological Threat Analysis:

- Historical Threats:

Haiti was a major smuggling route for slavery, and became the first black republic after winning independence in 1804. Its greatest historical threats have been poverty induced crime and corruption, natural disasters, and internal instability leading to military takeovers and a breakdown in the rule of law. Haiti is the perfect environment for smugglers of all kinds because of its lawlessness and location in the central Caribbean.

- Current Threat Environment:

The current economic and political environment in Haiti has led to a continuation of drug use, crime, smuggling, violence and, possibly, safe haven for terrorist groups. This is despite the fact that world powers have long realized that Haiti is in this vulnerable situation, and despite the presence of UN peacekeepers.

- Anticipated Future Threats:

Without intervention, no change for the better may be anticipated in Haiti. There have been some discussions among world leaders to forgive much of Haiti's national debt and help stabilize the economy, but direct intervention by the US military would be closely scrutinized by other nations.

Recommendations for future threat mitigation are: add support to the current UN stability mission, increase the number of Special Operations forces in country to curtail terror organizations seeking a near-US base; and continue to develop tools and methods to combat the illicit drug trade through Haiti.

22. HONDURAS

Honduras has El Salvador, Nicaragua and Guatemala for neighbors, and has had border disputes with El Salvador. It has a large Northern coastline interfacing the Caribbean, and a smaller section of Southern coastline on the Pacific. The Northeastern shoreline, also called the "Mosquito Coast", is virtually uninhabited. The coastal plains areas are narrow and much of the country is temperate mountain ranges. Nearly 500km of waterways are navigable by small craft only. Independent from Spain since 1821, it is a democratic republic and the primary race is a European Amerindian mix. It is among a handful of countries where women typically stay in school longer and have a higher

literacy rate than men. Honduras is the second poorest Central American economy and is highly dependent on exports to the United States, so slowing economic conditions in the U.S. have an immediate effect on the economy of Honduras. Unemployment is about 30%.

Functional Threats (types of threat operations in AO):

Honduras is a drug trafficking node, and there have also been reports of corruption and money laundering. Guerilla groups, mainly Sandinistas and Salvadoran leftists shelter and train in the Honduran mountains. The threat from Hurricanes and natural disasters is significant, and Honduras is not well-equipped for humanitarian response.

The Environmental Justice Foundation (EJF) lists Honduras as one of the top three offenders for Illegal, Unreported and Unregulated (IUU) fishing. Two of the three worst offenders are in the 4th Fleet AO.

Physical Threats (physical capabilities of Red Forces in AO):

Like many nations in the Southern Command area, Honduras is prone to extreme weather and is located in "Hurricane Alley". In 1998, Hurricane Mitch killed nearly 6,000 people and devastated the country's infrastructure and economy. Honduras is also prone to earthquakes and killer mudslides. Unregulated deforestation is diminishing natural resources very quickly and polluting many drinkable water sources as a result. The risk of infection from malaria, typhoid and dengue fever are very high in Honduras

Threat Organizations:

Organizations operating in Honduras are mostly politically motivated contras employing guerilla tactics. Sandinistas and Salvadoran exiles are more prevalent. Drug gangs are mostly a transient problem. Non-affiliated groups also kidnap people, particularly children, to profit from ransom.

Chronological Threat Analysis:

- Historical Threats:

Historical threats are border disputes, drug running, governmental corruption, poverty and crime, and natural disasters.

- Current Threat Environment:

Former land disputes have been successfully mediated, and U.S. involvement over the last thirty years has helped to reduce the amount of small-plane drug traffic, although were vigilance lifted in that area, the cartels would quickly re-establish Honduran routes. The current threat environment is the great need for humanitarian aid after disasters strike. Phase Zero aid workers would need to exercise good force protection measures to avoid disease and prevent becoming the target of kidnappers.

- Anticipated Future Threats:

The success of the Honduran economy is closely tied to the U.S. economy, as Honduras is a primary exporter of coffee and bananas. A U.S. economic downturn would cause greater economic instability, an increase in unemployment and related crime.

23. JAMAICA

When the Spanish settled Jamaica in the 15th century, they completely exterminated the indigenous population, and replaced them with black slaves. When the English later took control of the island, they established an agricultural economy based on slave labor. When abolition came, the former slaves became independent landowners and farmers, and formed the basis of today's demographic. Jamaica was not fully independent from England until 1962.

The population of 2.8 million people lives on the narrow coastal plains of an island a little smaller than Connecticut. The remainder of Jamaica is comprised of mountainous tropical forest.

Functional Threats (types of threat operations in AO):

Crime and violence associated with rival political parties has steadily increased since Jamaica became independent in the 1960s.

Environmental threats endanger the natural resources of Jamaica. Deforestation, oil spills, water and air pollution and coral reef devastation are all present and increasing.

Small-scale incidents of piracy have begun to be reported in Jamaica, with the most recent confirmed incident taking place in 2005.

Jamaica is a major transshipment point for human trafficking as well, moving women, men and children to Europe and other countries for exploitation in the sex trade or as forced or indentured labor.

Physical Threats (physical capabilities of Red Forces in AO):

Poverty, violent crime and drug trafficking are the more serious threats present in Jamaica. Jamaica is also in the center of the Hurricane belt, and is prone to severe weather for roughly half of every year. Physical threats, then, are associated with the small arms employed by the crime organizations, and with natural hazards.

Threat Organizations:

Jamaica hosts many powerful organized crime groups who deal in the human and drug smuggling trades and money laundering.

Chronological Threat Analysis:

- Historical Threats:

The two greatest historical threats to Jamaica were piracy and disease. The British stepped in to severely intervene and their punishing stance towards piracy did much to rid the Caribbean of the threat. Now that the U.K. has granted independence to the island and added them to the Cooperation of the West Indies, it remains to be seen if this threat will re-emerge. Jamaica is in a perfect strategic location, nearly equidistant to the Panama Canal, the US, and major shipping lanes for departure to Europe.

- Current Threat Environment:

The threat environment in Jamaica today is one of contrasts. Large portions of the coastline are relatively safe and crime-free, and have become popular tourism and cruise destinations. The wealthier ruling class also manages to distance itself from much of the social unrest and effects of poverty. However, the grasp of power is tenuous, and political and criminal factions continue to strive for dominance, while the remainder of the population lives with poverty and social insecurity. A Phase Zero force operating in Jamaica must be aware of the local environment, and alert for the threats of crime, disease, drug smuggling, money laundering and natural disasters.

- Anticipated Future Threats:

Because of its location in the center of the Caribbean, piracy could reemerge as a threat by 2020 or 2050, especially if the rule of law and political stability are not improved. The current threats associated with crime and drugs will only increase as well.

24. MARTINIQUE

Martinique is a relatively stable region, and hosts one of the 4th Fleets 31 port operations. It is a small island department of the French government, in the Caribbean.

Functional Threats (types of threat operations in AO):

Martinique exhibits no major threats to a Phase Zero force, and has below average crime.

Physical Threats (physical capabilities of Red Forces in AO):

There are no notable physical threats to be encountered in Martinique. Even the volcanic mountains that dominate the topography are extinct and inactive.

Threat Organizations:

There are no known threat organizations present in Martinique.

Chronological Threat Analysis:

- Historical Threats:

No information could be located about this. Martinique did host slaves at one point, but has not been the scene of war, disease, natural disasters or other typical historical threats.

- Current Threat Environment:

The only travel danger warnings that could be found about Martinique are sun exposure, falling coconuts and the high cost of living.

- Anticipated Future Threats:

No particular threats seem to be emerging. The only possible future concern may be that terrorism is unpredictable and indiscriminate, and the twin conditions of tourism and affluence might cause terrorists to target this location.

25. MEXICO

Mexico is situated atop Central America, and has borders east and west with the Caribbean Sea and the Gulf of Mexico. Their southern neighbors are Guatemala and Belize, and the U.S. is on its northern border, as well as the North Pacific. Mexico is about three times the size of Texas. Much of the terrain is desert, with only 12% arable. The northern border with the U.S. is long and porous, and has been the source of much political, economic and social upheaval, as well as increasing violence at the border and in infamous border towns such as Juarez. Immigration enforcement into the U.S. is virtually impotent, and estimates of the numbers of unauthorized border crossings vary widely depending on the political goals of the organization publishing the numbers. Noting whether the word "illegal" or "undocumented" is used to describe these crossings is a good clue to the political bias, more conservative or liberal, respectively. Many would-be immigrants die attempting to cross, either from exposure or at the hands of unscrupulous "coyotes" hired to smuggle them across. Estimates, in our research, of successful crossings range from "thousands" to more than 3 million each year. By some accounts, 0.03 percent of the population shifts to the U.S. each year. Mexico itself faces severe immigration problems on its south border, as impoverished Guatemalans and Central Americans pour into Mexico looking for work or for passage to the U.S.

The economy of Mexico has see-sawed in the last few decades. They went into a critical recession in 1994, and were making an impressive recovery until 2007-2008, when the U.S. economical downturn caused a domino effect in Mexico.

Mexico is prone to earthquakes, and is squarely in the path of storm activity from both oceans, subject to tsunamis, cyclones and hurricanes. The more impoverished southern region has fewer resources for disaster recovery, not to mention having less stable infrastructure to begin with.

Water is a major environmental factor. Water sources are scarce, about 731 cubic meters per year per capita. Northern waters are polluted by large population centers, and access to fresh water in the south is very tenuous. For a population of over 111,200,000, this is a very important stability and support issue. It will become more critical in the next few decades, as the birth rate is more than five times the death rate in Mexico.

The illegal drug industry has great impact on Mexico, because drug lords from South and Central America favor Mexico as the easiest medium for moving narcotics into the U.S. "Black tar" heroin and marijuana are also grown domestically in Mexico and moved into the U.S. Unless the border becomes more secure, this trend will continue, making smuggling of both contraband and human "cargo" the most critical issue facing a Phase 0 force in or near Mexico.

Mexico was of special interest to the Modeling Team, who, in the development of three mission scenarios, identified anti-drug smuggling as one of the three critical missions representative of a Phase Zero operation. To further narrow the scope of the model, three ports were selected in Mexico to be included in the model. Specific data about the ports of Ensenada, Manzanillo and Salina Cruz was provided by the Red Team to assist in modeling. A summary of physical and threat data is included in this country study.

Functional Threats (types of threat operations in AO):

The types of threats present in Mexico are: drug smugglers, human smugglers, illegal immigration, gangs, crime, natural disasters, and possible domino effects from lack of water and other necessary resources.

Physical Threats (physical capabilities of Red Forces in AO):

The small arms carried by smugglers are similar to those employed by U.S. ground forces in conventional ground combat. In fact, many of the weapons carried by smugglers and coyotes are the very same weapons, smuggled into Mexico from the United States. It is the numbers of these weapons rather than sophistication in weaponry that is the issue. There is ready access to machine guns, with and without night scopes, grenades, handguns, and shoulder fired anti-armor and anti-aircraft launchers.

Smugglers have been developing small submarines to carry drugs, but as of yet, none of the captured mini-subs have been outfitted with any weaponry. They are very crude; many do not even have latrine facilities that would reduce space available for drugs and contraband.

Threat Organizations:

Local urban gangs, as well as cartel sponsored gangs can be found in most border and port cities. Competing coyote groups vie for the profit from escorting illegal immigrants, and often form co-operations with drug gangs in order to use the immigrants as packhorses to move drugs over the border. Unfortunately, because of widespread corruption in public offices, police and military officers present as a threat as well, usually in the form of small-scale extortion and bribes.

No organized terror groups are reportedly based in Mexico, and Mexico continues to be an ally in the war against terror.

Chronological Threat Analysis:

- Historical Threats:

Mexico has faced several severe economic depressions in the last decades. Because of its shared border with the United States, it has been the primary conduit for the movement of illegal drugs. The drug industry has created many fall-out threats, such as money laundering, smuggling gangs and an increase in crime. The threat of thinning resources, especially water, has steadily developed, especially in the more urbanized north.

- Current Threat Environment:

The current threat environment is characterized by the drug trade, and by illegal immigration. Mexico struggles with immigration difficulties on its southern border with Belize and Guatemala. Mexico also has several environmental and health vulnerabilities. Rural areas have a low standard of health care, and population densities, such as Mexico City, make the population susceptible to outbreaks of disease. Mexico has been identified as the epicenter of the so-called “swine flu virus”, which is currently listed as a severity of 5 out of 6 on the CDC pandemic scale.

- Anticipated Future Threats:

Drugs and immigration will be on the radar for many years to come. Even if the US adopts a stronger anti-immigration policy, it will take years to improve border control conditions.

Possibly of greater importance in the future, tensions over water resources could cause a strain to the US-Mexico relationship, and create severely poor living conditions in Mexico's poorest areas.

26. NICARAGUA

Nicaragua is situated in Central America, and has coastlines with the North Pacific Ocean and Caribbean Sea to the West and East, respectively, and shares a northern border with Honduras and a southern border with Costa Rica. Nicaragua was initially a Spanish colony, and then resisted English occupation during the period when the UK ruled most of the Caribbean region.

Today, Nicaragua is considered a poor nation, and experiences 47% underemployment, meaning that although 97% of the adult population has jobs, their wages are not suitable to make a living.

Functional Threats (types of threat operations in AO):

Nicaragua is inside the hurricane belt. In 1998, Hurricane Mitch caused widespread devastation, from which the country in only now recovering. Although AIDS is not very prevalent, other infectious diseases are rampant, and risk of infection is high.

Physical Threats (physical capabilities of Red Forces in AO):

Threats in Nicaragua include: hurricanes, rebel guerillas, illicit drug smuggling, flooding, mudslides, volcanoes, deforestation, water pollution, and disease. Water pollution is critical, because Nicaragua contains the largest fresh water source in Central America.

Threat Organizations:

The Marxist Sandinista guerilla group came to power following a civil war at the end of the 1970s. Organized drug lords and drug gangs operate in Nicaragua, moving both drugs and weapons.

Chronological Threat Analysis:

- Historical Threats:

Both natural and human threats have ravaged Nicaragua. It is prone to a great number of natural disasters, and has also been a hotbed of Marxism, political and social schisms, and guerilla activities.

Nicaragua has had recently settled territory disputes with Colombia, Costa Rica and Honduras.

- Current Threat Environment:

Nicaragua has had a relatively recent civil war, and disgruntled Marxist groups still pose a threat in the country. The most recent democratic election was won by a member of the Sandinista Contras.

- Anticipated Future Threats:

The issues that have plagued Nicaragua in the past, and are only just under the surface today, could break out into new threats at any time. Marxist rebels, high crime and underemployment, international disputes and real and perceived government corruption may be setting the stage for civil unrest to reemerge at any time.

Illicit drug use and drug smuggling are likely going to continue to erode stability, as long as demand remains high and enforcement remains ineffective.

27. PANAMA

Panama is located in Central America, bordering both the Caribbean Sea and the North Pacific Ocean, between Colombia and Costa Rica. The land mass is slightly smaller than South Carolina. The terrain interior is mostly steep with rugged mountains and upland plains. The geography lends itself to a strategic location on the eastern end of the isthmus forming a land bridge connecting North and South America. More importantly, Panama controls the Panama Canal, which links the North Atlantic Ocean via the Caribbean Sea with the North Pacific Ocean. It has tropical maritime weather patterns and is hot, humid and cloudy with a prolonged rainy season. There are occasional severe storms and forest fires in the Darien area. The current environmental issues include water pollution from agricultural runoff, which threatens fishery resources, deforestation of tropical rain forest, land degradation and air pollution in urban areas.

Depletion of natural resources through mining and soil erosion threaten the siltation of the Panama Canal.

The population is about 3.4 million people. 1% of the people in Panama are living with HIV/AIDS, and the major infectious diseases are food and waterborne related diseases. The religion of 85% of the population is Roman Catholic. The official language is Spanish. Panama is one of the fastest growing economies in Central America. Because of its key geographic location, Panama's economy is mainly service based, depending on services such as banking, commerce, tourism and trading.

Human and drug trafficking remain significant challenges. Panama is a source, transit, and destination country for women and children trafficked for the purpose of commercial sexual exploitation. Panama is also a major cocaine trans-shipment point and a primary money-laundering center for narcotics revenue.

Panama has no regular military forces. The Panamanian public forces include the Panamanian National Police, the National Air-Naval Service and the National Border Service. There are 54 paved runways, 63 unpaved runways, two heliports and three ports (Balboa, Colon, Cristobal) in the country.

Functional Threats (types of threat operations in AO):

There is evidence of the presence of organized illegal narcotics operations from Colombia who operate within the remote border region with Panama. The specific key threats in Panama are human and drug trafficking, money laundering and official corruption. Panama is a major cocaine trans-shipment point and primary money laundering center for narcotics revenue and money-laundering activity is especially heavy in the Colon Free Zone. Human trafficking is also a severe issue whereby the majority of victims are Panamanian women and children trafficked within the country into the sex trade. Rural children in Panama may also be trafficked internally to urban areas for labor exploitation. To aggravate the problems further, official corruption leads to failure in prosecuting, convicting, and sentencing human traffickers for their crimes.

The Environmental Justice Foundation (EJF) lists Panama as one of the top three offenders for Illegal, Unreported and Unregulated (IUU) fishing. Two of the three worst offenders are in the 4th Fleet AO. Panama has been engaged in the practice of issuing

"flags of convenience", in which a rouge fishing vessel purchases a short-term license to run up a Panamanian flag and fish near-range international waters, with disregard to the Rule of the Seas. This is the primary enabler of IUU fishing, and the Panamanian government profits from large volumes of these licenses, for which poachers pay hundreds to thousands of dollars per fishing run.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the human and drug traffickers in Panama. The AIDS rate in Panama is also high, with a prevalence rate of 1%.

Threat Organizations:

The most significant threat organizations in Panama are those associated with the drug cartels and trafficking rings, and those groups who engage in human abduction and trafficking.

Chronological Threat Analysis:

- Historical Threats:

The primary historical threat was attributed more to the Panama's nationalist protest movement. In 1964, riots broke out in the Canal Zone. Panamanian protestors who carried out their protest movement near the Canal Zone were fired upon by United States soldiers stationed there as part of the US Southern Command. Violence escalated in the areas bordering the Canal Zone with scenes of bloodshed, fires, and looting. Panama was also the scene of the U.S. Operation Just Cause, which removed Manuel Noriega from power in the late 1980s. Ownership and control of the Panama Canal has transferred from the U.S. to Panama, under a contract agreement enacted by the Carter Administration.

- Current Threat Environment:

Because the U.S. no longer exerts control over the Panama Canal, the stability in Panama, particularly in the Canal Zone, is critical for a Phase Zero force, which may need to utilize this key infrastructure. Panama has thus far maintained close security ties to the United States. A bilateral military assistance pact and Panama Canal treaties are in place between the United States and Panama. The two countries pledged themselves to

the joint defense of the Panama Canal. However, current threats exist within Panama with severe human and drug trafficking issues. Panama fails to show evidence of increasing efforts to combat human trafficking, particularly with respect to prosecuting, convicting, and sentencing human traffickers for their crimes, and for failing to provide adequate victim assistance. Panama is also a major cocaine trans-shipment point, and money laundering continues to be a serious problem in addition to official corruption.

- Anticipated Future Threats:

Barring a change in policy, the existing threats such as money laundering, corruption, human and drug trafficking issues will still be prevalent. To date, the efforts put in by the government in combating these problems are not adequate or effective. Panama plans to expand the Canal in the coming years, with completion expected in 2014-2015. This would double the Canal's capacity and may result in it being more attractive as a trans-shipment point for drug trafficking if no effective border controls are put in place.

28. PARAGUAY

Paraguay, which is roughly the size of the US state of California, is a land-locked country in the very heart of the South American continent. It has borders with Bolivia, Argentina and Brazil, and is home to nearly seven million people.

Functional Threats (types of threat operations in AO):

Paraguay is most susceptible to flooding, and also has environmental issues such as deforestation, water pollution and poor waste disposal infrastructure. The AIDS rate is low, the same 0.6% that is found in the US. Other major infectious diseases also pose only an intermediate threat.

The communications infrastructure is very minimal, and cell phones have supplanted other forms of communication, outnumbering land lines ten to one. A Phase Zero force will need to come equipped with its own communications, and not rely on the existing equipment.

Physical Threats (physical capabilities of Red Forces in AO):

Threats in Paraguay come from the protective measures employed by those involved with drug crops and shipments, money laundering and extremist group fundraising.

Threat Organizations:

Small extremist groups, particularly in the tri-border region with Argentina and Brazil, are active in fundraising, recruitment and protests.

Chronological Threat Analysis:

- Historical Threats:

Historically, Paraguay has been held in the sway of communism, and has engaged in many bitter wars with its neighbors, as well as a civil war in the 1940s. Towards the end of the 19th century, Paraguay lost over two thirds of its male population to the devastation of war. Paraguay has spent the first half of this century working to rebuild and strengthen its economy, and to undo the damage of decades of human rights abuses. Democracy in Paraguay is only 20 years old, and former military extremists still exist within the country, although they currently hold little sway over public opinion.

- Current Threat Environment:

Political corruption has led to economic stagnation in this mostly agricultural democracy. Small extremist groups are present. As much as half of the population lives in poverty, and poverty is often the harbinger of social instability.

- Anticipated Future Threats:

Corruption of public officials could weaken the tenuous hold democracy has held in Paraguay for two decades, leaving room for social or military uprisings. An atmosphere of dissatisfaction may make room for the advancement of already-existing extremists. An economically unbalanced treaty with Brazil, dealing with the use and sale of hydroelectric power, expires in 2023, and is already the source of much discontent and heated debate. Brokering the peace between these two countries could be a necessity.

29. PERU

Peru is a country rich in natural resources of copper, silver, lead, zinc, oil and gold. Politically, it has alternated between military dictatorship and democracy in past

years. It is deeply divided politically and economically. President Alberto Fujimori headed Peru from 1990 to 2000, before resigning suddenly following allegations of a series of scandals involving his top aide. During Fujimori's tenure, he did much to bring under control destabilizing factors such as terrorism, drug trafficking, hyper-inflation and border disputes. However, he also created constitutional crises and his efforts to remain in power eroded democratic institutions. Following new elections in 2000, Alejandro Toledo was elected as President. He promised to wage a "head-on war on poverty", but struggled to improve the lives of the poor; nor did he manage to create a million jobs over five years. Currently, President Alan Garcia, who campaigned in 2006 on promises to tackle poverty and boost economic growth, leads the Popular Revolutionary Alliance (APRA) to govern Peru. On taking office, as a show of commitment, he announced a cut in his own salary and has thus far shown a robust macroeconomic performance scorecard. In a country of 28.2 million people, a small Spanish descended elite controls most of the wealth and power in the country. The rest of the country, who make up mostly indigenous Peruvians numbering in the millions, live in continued poverty. Peru is also one of the biggest producers of coca, the raw material for cocaine, and most of the pickers of these coca plants are children in the north-east and south-east areas. Peru is among the top three providers of cocaine, and is also a major offender when it comes to human trafficking, because many children are trafficked to Peru for forced labor in the coca fields.

Functional Threats (types of threat operations in AO):

Corruption and poor social and economic planning feature high on the threat list. Just recently, in October 2008, the entire Apra Cabinet resigned after members of the party were implicated in a corruption scandal. Leadership's preoccupation with political power struggles have resulted in neglect of the economy and basic infrastructure in the country. This has led to Peru's clash with guerrilla insurgencies. In the 1980s and 1990s, Peru waged a brutal civil war against Maoist rebels, which left 69,000 people dead. Although the two main guerrilla groups of Shining Path (the Sendero Luminosa) and Tupac Amaru have largely been decimated, violence in the form of murders and gang warfare has taken its place. This violence has been linked to the drug trade. The media

has also been a target of violence. Reporters are subjected to great risk of certain "death" if they report unfavorably of corruption, drug-trafficking and activities of Shining Path rebels.

Physical Threats (physical capabilities of Red Forces in AO):

Recently, the Peruvians have come under fire from environmental and human rights campaigners over plans to auction off parcels of the Amazon to oil and gas companies. The country is also plagued by natural disasters such as earthquakes, tsunamis, flooding, landslides and mild volcanic activity. Environmental issues include deforestation, overgrazing leading to soil erosion, desertification and air pollution in Lima and pollution of rivers and coastal waters from municipal and mining wastes. Peruvians have an extremely high risk of being afflicted by major infectious diseases. Food and waterborne diseases such as hepatitis A, typhoid fever and bacterial infections are common. Also common are vector borne diseases such as dengue fever, malaria, and yellow fever. Leptospirosis has in this year, 2009, begun to surface as a disease of concern.

Threat Organizations:

Even though the number of Shining Path and Tupac Amaru members has dwindled, pockets remain within the country, consolidating and recruiting. Smaller street gangs also roam the streets of Peru, establishing their own territory through their own form of "warfare" and violence.

Chronological Threat Analysis:

- Historical Threats:

The civil war from 1980-2000 has shaped the government somewhat to what it is today. It is gradually moving away from the authoritarian regime of the Fujimori era, towards democracy and equality. However, the social divide is still very evident today. Also, coastal cities in Peru are much more affluent than inland cities, and wealth distribution has historically been very unbalanced.

- Current Threat Environment:

Up until 1996, Peru was the largest producer of coca leaf, the source for cocaine. But she was taken over by Columbia, not necessary a good thing, when its cultivation

declined to 36,000 hectares. Processed coca (cocaine) is shipped out of Peru to international markets, as well as to Brazil, Chile, Argentina and Bolivia for use in the Southern Cone. Increasingly, there are transshipments to Europe and Africa, as well as a rise in domestic drug consumption. Guerrilla cells continue to exist, albeit in smaller numbers within the country, to consolidate and recruit. Street violence and crime remains a threat in urban areas.

- Anticipated Future Threats:

The present government seems to be more focused on economic development rather than curbing the rising drug usage and crime in the country. Until such problems reach a critical trigger point, and the government decides to do something, if anything, the current threats will continue to proliferate at a steady pace. Threats which will likely continue and possibly increase by 2020 are crime, drug smuggling, lack of communications infrastructure in large portions of the country, diseases, natural disasters, environmental issues and terrorism. And groups who engage in domestic terror acts have declined, but are making concentrated efforts at reconsolidation and recruitment, and so well may emerge as a greater threat in the future.

30. PUERTO RICO

Puerto Rico is composed of an archipelago that includes the main island of Puerto Rico and a number of smaller islands and keys, the largest of which are Vieques, Culebra, and Mona. The main island of Puerto Rico is the smallest by land area and second smallest by population among the four Greater Antilles (Cuba, Hispaniola, Jamaica, and Puerto Rico).

The majority of Puerto Ricans are descendants from the Spanish settlers that settled Puerto Rico in the 16th century. A large number are from Spain, and other Latin American nations. African, Mestizo, Mulato, and Native Americans also formed a significant part of the Puerto Rican population.

Puerto Ricans had median household income of $17,741 for 2008. Puerto Rico's public debt has grown at a faster pace than the growth of its economy, reaching $46.7 billion in 2008. The island unemployment rate is 12% as of January, 2009.

Functional Threats (types of threat operations in AO):

The threat most specific to Puerto Rico is crime; however, drug traffic is responsible for most of the violent crimes in Puerto Rico. As a major smuggling route, drug-related violence is mostly related to drug lords shooting each other over control of drug points. There are increasing numbers of illegal migrants from the Dominican Republic, who cross the Mona Passage to Puerto Rico each year looking for work. This trend is steadily increasing.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats relate primarily to the capabilities of the smugglers and drug-runners that take advantage of Puerto Rico. They possess numerous and reasonably modern small arms and assault weapons.

Threat Organizations:

There has been no evidence of prominent criminal or terrorist organizations operating within the country. Among the criminals are deportees from North America, with their capacity to mobilize illegal guns and other weapons, and operate a sophisticated networking system in their reign of criminal terror. Organized crime is not known to exist in Puerto Rico in the sense of Mafia families or other similarly organized groups.

Chronological Threat Analysis:

- Historical Threats:

During 1994, Puerto Rico was declared a zone of great incidence of drug traffic, a political action that represents additional federal aid from the United States of America to fight drug traffic crime. Passionate crimes are frequent. Many of them are a direct result of the machista traditions of Latin Americans.

- Current Threat Environment:

Murder, rape, kidnapping, carjacking, armed assault and burglary are becoming a normal part of everyday life throughout the country.

- Anticipated Future Threats:

Murder, rape, kidnapping, armed assault and burglary are increasing throughout the country. In addition, criminal acts involving weapons are also increasing.

Fortunately, in the majority of these cases, the weapon is used for intimidation purposes only; cooperative victims are seldom injured.

31. ST KITTS, ST LUCIA, ST MAARTEN

These Caribbean islands have a similar, reasonable level of stability, and all are popular tourist destinations for Americans and Europeans. Much of the economy and employment of these countries depends on tourism. St Kitts was once a booming sugar cane growing and processing island, but with US subsidies of corn crops and the replacement of many cane sugar products with corn syrup products, the cane industry has all but vanished in the Caribbean.

Functional Threats (types of threat operations in AO):

These islands are more stable than many Central American nations, and crime rates are below or near average for the 4th Fleet region. Drugs are trafficked to and through the islands, as sporadic transshipment points, and tourists themselves may be targeted for the sale of drugs.

The islands are all at the lower part of the Hurricane belt, so although there is potential for severe tropical weather, the likelihood of these storms occurring is lower than average for the Caribbean.

Physical Threats (physical capabilities of Red Forces in AO):

There are no above average physical threats in St Kitts, St Lucia, or St Maarten.

Threat Organizations:

No threat organizations are currently known to be operating in or based out of these islands. Due to the size of the islands, and their popularity for tourism, terror training cells would not likely go unnoticed. Drug trade and traffic is minimal and sporadic, and drug organizations are not based in these islands.

Chronological Threat Analysis:

- Historical Threats:

The islands have weathered several economic slides and comebacks throughout history. Slave trade, followed by agriculture and sugar processing, followed by tourism,

have driven the economic and financial health of the islands, and the transition periods between these trades has led to some issues with poverty and unrest.

- Current Threat Environment:

The current threat environment is low, if relaxed.

- Anticipated Future Threats:

The presence of many American and European tourists could possibly make these destinations attractive targets for terror groups in the future. Also, the economies of the islands are tied closely to European and Western economic stability, so troubled financial times would have a rapid domino effect to these nations.

32. SURINAME

Suriname is located on the northern coast of the South American continent. It shares borders with Guyana (British Guinea) to the West, Guyane (French Guinea) to the East, and Brazil to the South. Formerly a Dutch settlement, the port city of New Amsterdam is located at a harbor on the North Atlantic Ocean, which favors trade. Since its independence from the Netherlands in the 1970s, power has changed hands between military, socialist and democratically elected regimes, and the governing authority is currently democratic. The smallest independent government in South America, Suriname has less than half a million citizens, many of African or Indian descent.

Mining, and some offshore drilling, are the mainstays of the economy, and so changing markets have great impact on the GDP and financial stability of Suriname. The country struggles with both high taxes and inflation, and unemployment is currently at about 10%.

Functional Threats (types of threat operations in AO):

Suriname faces environmental threats related to deforestation and mining. The HIV rate is high per capita (based on Latin American average), at 2.4%. There are no specific natural disasters to which Suriname is prone.

Physical Threats (physical capabilities of Red Forces in AO):

Physical threats to a Phase Zero force are those commonly associated with smugglers, namely small arms, gangs and guerilla tactics.

The prevalence of both AIDS and other diseases within the country requires careful force protection measures to reduce likelihood of infection.

Threat Organizations:

Small scale drug and money laundering organizations are currently operating in the country. News coverage of rebel groups making threats against infrastructure do not even give the small groups names, and tend to treat them dismissively.

Chronological Threat Analysis:

- Historical Threats:

Democratic rule has only been in place for 20 years. Prior to that both socialist and military regimes seized power by force. A previous attempt at a democratic state failed.

- Current Threat Environment:

The oil rich waters off of the Suriname coast have led to territory disputes with their neighbors to the east and west, which have as yet not been settled, although Suriname has appealed to the UN.

Suriname has a growing problem with smuggles moving both arms and drugs bound for Europe. The Brazil-Suriname-Netherlands drug conduit is fairly well established and increasing. Suriname is listed as a Tier 2 country for the trafficking of persons.

- Anticipated Future Threats:

Current international disputes regarding oil and mineral rights have the potential to escalate and create larger scale conflicts in the future. Further devastation of the Suriname rainforests may have impacts on water quality and the economy. The increase in cybercrime in Suriname should also be noted and monitored. Reports in Caribbean newspapers indicate that Japan and Suriname are forging a cooperation to establish a whaling company. This partnership may lead to possible IUU fishing issues, as Japan is alleged to already be highly culpable for the illegal hunting of whales.

The movement of illicit drugs, weapons and humans is increasing, and should this trend increase, both contraband smuggling, and the fall-out effects of crime and money laundering, are bound to become greater problems for a 2020 Phase Zero force.

33. TRINIDAD

Trinidad is one of many islands colonized by the British for sugar cane production. It is a small island with less than 200 miles of coastline. Emancipation of the slave labor on the sugar plantations, and decreasing demand for sugar cane products caused economic setbacks. Oil was discovered in the early 20th century, which boosted the financial standing of the country, but that leveled out in the 1960s when the British handed over control and independence to the islanders. Tourism and oil production continue to be the biggest boons to the economy of Trinidad and of nearby Tobago. The US Navy 4th Fleet maintains port operations on Trinidad. Many international businesses take advantage of Trinidad for monetary investment. The unemployment rate is one of the lowest in the Caribbean, at about 5%.

There has been tension with Barbados regarding fishing rights and boundaries, but an initial agreement was reached in 2006.

Functional Threats (types of threat operations in AO):

Crime is a growing problem that the government is currently having difficulty controlling. Some small scale cannabis production and shipment of drugs does take place in Trinidad, but it is considered a minor threat.

Physical Threats (physical capabilities of Red Forces in AO):

The threat from crime is great, and growing. There are few natural disasters since Trinidad is located outside the hurricane belt, but there are some serious environmental problems, mainly water pollution and oil contamination of the coasts and reefs.

Threat Organizations:

Although crime is on the rise in Trinidad, the criminal element is not consolidated into an organization, nor are there major drug gangs or cartels based in the country.

Chronological Threat Analysis:

- Historical Threats:

Historical threats include minor disputes regarding fishing rights, depressed economies and an up-tick in crime.

- Current Threat Environment:

Employment, social stability, and economic health are all in Trinidad's favor, but despite all these successes, the government has been unable to turn back a rise in crime.

- Anticipated Future Threats:

Because some desirable fishing game are in the waters around Trinidad and Tobago, there is a potential for the increase of IUU fishing in the future. And if crime continues to increase unabated, it could have a negative impact on the tourism industry and the willingness of foreign corporations to invest.

34. URUGUAY

Nearly three and a half million people live in this second smallest South American country. It is equivalent in size to the US state of Washington, and is bordered by Argentina, Brazil, and the South Atlantic. The natural harbor near the capital of Montevideo helps make Uruguay an excellent trade center. Uruguay also has fertile lowlands, suitable for both crops and livestock.

Functional Threats (types of threat operations in AO):

The current political stability in Uruguay was long fought and hard won, and the relative peace is in a fledgling stage.

There are some environmental concerns, in that the sanitation infrastructure is inadequate. Severe winds, like the California Santa Ana winds, present seasonal difficulties, along with other unpredictable weather and flooding.

Physical Threats (physical capabilities of Red Forces in AO):

Flooding and severe winds pose an intermittent threat.

Threat Organizations:

Although it has been largely put down, the Marxist Party guerillas, Tupamaros, have been active in the country since as recently as the 1980s. Civilian rule has only been in place since the 1980s as well, and former military leaders who exercised a lengthy rule in Uruguay, have reluctantly ceded control, but are still present. Military cells are not threats in themselves, but should another power void present itself, others could be caught in the crossfire as military leaders strive for control.

Chronological Threat Analysis:

- Historical Threats:

Uruguay has shown both economic and political resilience. GDP and growth from exports have been very positive over the last decade, and recovered quickly from a brief downturn in 2002, when Venezuela and Argentina made bank-runs on deposits in Uruguay. Politically, Uruguay has vacillated between civilian, military and socialist rule, but the current ruling civilian government is strong.

- Current Threat Environment:

The current political environment is stable, and economic conditions have also been steadily improving. The international community is involved in arbitrating some minor land disputes with both Venezuela and Argentina, but these issues don't seem likely to escalate.

Uruguay is a small scale transshipment point for drugs en route to Europe through Montevideo, and some money laundering associated with the drug trade exists. There are also some reports of corruption and abuse of power by law enforcement.

- Anticipated Future Threats:

The trend in Uruguay has been for the better, and if the government continues to improve the economic and social conditions in the country, there are no large-scale foreseeable threats to contend with in 2020. Uruguay does border Venezuela, which does have issues with terrorism.

35. US VIRGIN ISLANDS

The US Virgin Islands are relatively stable, and the 4th fleet maintains port operations there. It is located along a key shipping lane from the Panama Canal. The population is only about 100,000 people, who are US citizens without electoral representation. Tourism is the staple of the economy, as the islands host over 2.5 million vacationers a year.

The largest oil refinery in the world, a critical piece of infrastructure, is located in the Virgin Islands. Other infrastructure is modern. In 2005, cell phone usage surpassed hard-wired telephone communication.

Functional Threats (types of threat operations in AO):

These small, tropical islands, located east of Puerto Rico, have few anthropomorphic threats, but are subject to forces of nature, such as hurricanes, earthquakes drought and flooding. Neither AIDS nor other disease is particularly prevalent.

Physical Threats (physical capabilities of Red Forces in AO):

Lack of fresh water is a recurring issue, as the weather, particularly rainfall, occurs in sporadic patterns. A Phase Zero force would need to make considerations for providing their own potable water, and might even find this an issue for population support, if taken to the extreme.

Threat Organizations:

No notable crime, drug or terror groups are known to be operating in the US Virgin Islands at this time.

Chronological Threat Analysis:

- Historical Threats:

The transition from sugar cane to corn sucrose products proved difficult for the economy of the islands, but they have rebounded, and tourism, oil refinement and rum distillation, have solidified the economic base.

- Current Threat Environment:

The US is responsible for defense of the US Virgin Islands, but there have been no serious threats or intrusions on its sovereignty in the recent past. Drug related issues are much less severe in the Virgin Islands (both US and UK) than much of the rest of Central America and the Caribbean.

- Anticipated Future Threats:

There are no marked emerging threats at this time. It can be expected that for the most part, the stability of the US Virgin Islands may be linked to the economic and social stability of the US.

36. VENEZUELA

Venezuela was one of three countries that emerged from the collapse of Gran Colombia in 1830, the others being Ecuador and New Granada, which later became

Colombia. For most of the first half of the 20th century, Venezuela was ruled by generally benevolent military strongmen, who promoted the oil industry and allowed for some social reforms. Democratically elected governments have held sway since 1959. Hugo Chavez, president since 1999, seeks to implement his "21st Century Socialism," which purports to alleviate social ills while at the same time attacking globalization and undermining regional stability. Current concerns include a weakening of democratic institutions, political polarization, a politicized military, drug-related violence along the Colombian border, increasing internal drug consumption, overdependence on the petroleum industry with its price fluctuations and irresponsible mining operations that are endangering the rain forest and indigenous peoples.

Venezuela remains highly dependent on oil revenues, which account for roughly 90% of export earnings, about 50% of the federal budget revenues, and around 30% of GDP. A nationwide strike between December 2002 and February 2003 had far-reaching economic consequences. Real GDP declined by around 9% in 2002 and 8% in 2003, but economic output since then has made a strong recovery. Fueled by high oil prices, record government spending helped to boost GDP by about 9% in 2006, 8% in 2007, and nearly 6% in 2008. This spending, combined with recent minimum wage hikes and improved access to domestic credit, has created a consumption boom but has come at the cost of higher inflation, roughly 20% in 2007 and more than 30% in 2008. Imports also have jumped significantly. Declining oil prices in the latter part of 2008 undermined the ability of the Venezuelan government to continue the high rate of spending. In 2008, President Hugo Chavez continued efforts to increase the government's control of the economy by nationalizing firms in the cement and steel sectors. In 2007, he nationalized firms in the petroleum, communications and electricity sectors. In July 2008, President Chavez implemented by decree a number of laws that further consolidate and centralize authority over the economy through his plan for "21st Century Socialism".

Functional Threats (types of threat operations in AO):

Threats specific to Venezuela are international disputes, illicit drugs and human trafficking.

Physical Threats (physical capabilities of Red Forces in AO):

In Latin America, Shia Hezbollah and Sunni Hamas have developed sophisticated but little studied financial structures, largely through the unregulated exchange houses and free trade zones in specific parts of the region, including Panama's Colon Free Trade Zone, Isla Margarita in Venezuela, Ciudad del Este in Paraguay, the Aruba Free Trade Zone and others. The overarching structure that enables both groups to work alongside each other is the international Muslim Brotherhood, the one pan-Islamist group that has for several decades served as a bridge between the two factions. Hugo Chavez's state-sponsored support of terror groups such as the Revolutionary Armed Forces of Colombia (FARC) has led to congressional calls to designate Venezuela as a state sponsor of terrorism.

Threat Organizations:

Colombian-organized illegal narcotics and paramilitary activities penetrate Venezuela's shared border region. The FARC organization has safe haven within the country, as does the International Muslim Brotherhood. Venezuela has long been a favored location for international terror agents to seek refuge. Several of those responsible for slaying 12 Israeli athletes at the 1972 Munich Olympics were later tracked to Venezuela.

Chronological Threat Analysis:

- Historical Threats:

The huge public spending and accumulation of internal and external debts by the government and private sector during the Petrodollar years of the 1970s and early 1980s, followed by the collapse of oil prices during the 1980s, crippled the Venezuelan economy. As the government devalued the currency in order to face its mounting local and non-local financial obligations, Venezuelans' real standard of living fell dramatically. A number of failed economic policies and increasing corruption in government and society led to rising poverty and crime. Worsening social indicators and increasing political instability resulted in two major coup attempts in 1992.

In the February 1992 coup, Hugo Chavez, a former paratrooper, attempted to overthrow the government of President Carlos Andrés Perez as anger grew against the president's economic austerity measures. Chavez was unsuccessful and was placed in

jail. In November 1992, another unsuccessful coup attempt occurred, organized by other revolutionary groups in the Venezuelan Armed Forces and those that remained from Chavez's previous attempt.

In 1998, Chavez was elected president as a reaction against the established political parties and the corruption and inequalities their policies created. His reform program, which he calls the "Bolivarian Revolution", is aimed largely at redistributing the benefits of Venezuela's oil wealth to the lower socio-economic groups by using it to fund programs such as health care and education. Agricultural land redistribution has also been undertaken on a small scale. His program has encountered great resistance by the previous establishment. In April 2002, it removed him via a coup d'état. However, he was returned to power after two days as a result of popular demonstrations in his favor and action by loyal sections of the military. He also survived a management-led strike and lockout in the state oil company, PDVSA, in December 2002, and a recall referendum in August 2004.

- Current Threat Environment:

Venezuela is involved in a large number of border disagreements with its neighbors. Venezuela claims all of the area west of the Essequibo River in Guyana, preventing any discussion of a maritime boundary. Guyana has expressed its intention to join Barbados in asserting claims before the United Nations Convention on the Law of the Sea (UNCLOS) that Trinidad and Tobago's maritime boundary with Venezuela extends into their waters. There is a standing dispute with Colombia over the maritime boundary and the Venezuelan-administered Los Monjes islands near the Gulf of Venezuela. In 2006, an estimated 139,000 Colombians sought protection in 150 communities along the border in Venezuela. The US, France, and the Netherlands recognize Venezuela's granting full effect to Aves Island, thereby claiming a Venezuelan EEZ/continental shelf extending over a large portion of the eastern Caribbean Sea. Dominica, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines protest Venezuela's full effect claim.

Venezuela is a source, transit, and destination country for men, women, and children trafficked for the purposes of commercial sexual exploitation and forced labor.

Venezuelan women and girls are trafficked within the country for sexual exploitation, lured from the nation's interior to urban and tourist areas. Child prostitution in urban areas and child sex tourism in resort destinations appear to be growing. Venezuelan women and girls are trafficked for commercial sexual exploitation to Western Europe, Mexico, and Caribbean destinations as well.

Venezuela is on the CIA Tier 2 Watch List, up from Tier 3, as it showed greater resolve to address human trafficking through law enforcement measures and prevention efforts in 2007. Stringent punishment of offenders and victim assistance remain lacking at this time.

There is the presence of some small-scale illicit production of opium and coca for the processing of opiates and coca derivatives. However, large quantities of cocaine, heroin, and marijuana transit the country from Colombia, bound for the US and Europe. There is significant narcotics-related money laundering activity, especially along the border with Colombia and on Margarita Island. An active eradication program exists, primarily targeting opium, but there are increasing signs of drug-related activities by Colombian insurgents on border.

- Anticipated Future Threats:

According to information source “worldthreats.com”, Venezuelan President Hugo Chavez’s alliance with Iran raises fears that Venezuela could become a base for Hezbollah activity. Venezuela also serves as the corridor for a full third of the Colombian cocaine smuggled to the U.S. and Europe.

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F. PORTS DATA

The following appendix shows data on ports that a Phase Zero Force operating within the Latin American region may visit.

1. PORTS DATA OF COLOMBIA

A. Port of Cartegena [318]

Background:

The port of Cartagena, Colombia is a state owned port, managed by the Port Authority. Maintenance of a police presence at the port facility is included in the listed duties of the Port Authority, but there was no specific mention of drug enforcement, boarding operations or inspections other than those of labeled hazardous cargo.

The Port Authority of Cartagena is founding member and participates as full member of the association Med Ports Community. Med Ports Community is a platform made up of the ports of Tarragona, Baleares, Cartagena, Salerno, Bastia, Sète, Livorno and Toulon. This lobby of ports tries to promote the cooperation between Spain, France and Italy and promote the cooperation between the public and the private sectors. Another of its main aims is the development of sabotage (short sea shipping) between countries in the European Union.

Port Physical Characteristics:

There are terminals dedicated to different types of cargo and activities: liquid bulk, fruits and vegetables (including an inspection station), general cargo, container cargo, and the Yacht Club. The port is certified by Lloyd's register standards for containers, solid bulk and container goods. (ISO 9001)

All of the port premises have a perimeter closure with restricted access, at different security levels depending on the terminal, and controlled by the Surveillance and Port Police Service. There is a CCTV installation equipped with 43 cameras and is connected through a fiber optic network that covers the entire port service area. Each access control has a CCTV of its influence area, centralizing the system in the Control Centre. There is a permanent digital recording of the entire CCTV system.

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318 http://www.apc.es/general/apc02.asp

Port Activities:

A large portion of port traffic deals with shipping to and from the Mediterranean, particularly trade with Spain. In 2005, the port had 34 cruise calls. In February of 2009, construction of a large cruise terminal began, indicating that cruise ship volume will likely increase in the region unless economic factors offset this trend.

Cargo Volume:

The cargo volume has an increase of 15% from 23.2 million tons of cargo in year 2004 to 26.7 million tons or cargo in year 2005. Currently, liquid bulk accounts for over 20 million tons of annual cargo, or at least 80% of the shipping.

Goods according to its presentation (Ton.)

Liquid bulk	1.621.952	1.546.682	4,87%	3.208.995	3.630.027	-11,60%
Solid bulk	218.523	459.427	-52,44%	473.955	1.081.091	-56,16%
By special installation	34.426	79.726	-56,82%	60.359	159.640	-62,19%
W/out special installation	184.097	379.701	-51,52%	413.596	921.451	-55,11%
General goods	22.532	48.023	-53,08%	70.964	125.528	-43,47%
Conventional	4.931	12.553	-60,72%	27.551	58.828	-53,17%
In containers	17.601	35.470	-50,38%	43.413	66.700	-34,91%
TOTAL GOODS ACCORDING TO ITS PRESENTATION	1.863.007	2.054.132	-9,30%	3.753.914	4.836.646	-22,39%

Other goods (Ton.)

Local interior traffic	0	-	-	0	150	-100,00%
Supplies	4.768	7.501	-36,44%	7.678	12.508	-38,62%
Fish	85	105	-19,05%	165	329	-49,85%
TOTAL OTHER GOODS	4.853	7.606	-36,20%	7.843	12.987	-39,61%
TOTAL PORT TRAFFIC	1.867.860	2.061.738	-9,40%	3.761.757	4.849.633	-22,43%

Other movements

Passengers in transit	1.166	-	-	3.295	0	
Vessels. Number	93	108	-13,89%	188	235	-20,00%
Vessels. Tons. G.R.T.	2.036.628	2.138.210	-4,75%	4.221.586	4.934.256	-14,44%

Figure 50: Port of Cartagena Data

Weather Conditions (Average Annual):

The port website reports prevailing wind as S-SW and predominate winds as S-SE; no average speeds are given.

Significant wave height for a 50-year return period is 6.3 meters. Maximum tide movement is 6.5 meters. Height at LLW compared to port zero is -4.3 meters and height

at HHW compared to port zero is +0.22 meters. This means that the depth of the channel at low tide is 11.5 meters. [319]

B. Port of Tumaco

Background:

Situated on the Pacific coast in Tumaco Bay, near the border with Ecuador, smaller vessels enter the harbor, while the larger tankers use the offshore berth. The water depth, depending on mean tide, varies from 11 to 15 feet, with anchorage limited to 30 to 35 feet.

In the late 1980s, transport by water was still very important to Colombia. Shipping operated out of five key ports: Santa Marta, Barranquilla, and Cartagena on the Caribbean coast and Buenaventura and Tumaco on the Pacific coast (ita.com). Tumaco, positioned west of the Panama Canal, handles a disproportional amount of traffic for its size.

Tumaco is the main Pacific Ocean port in south-west Colombia's volatile Nariño department. The region is an epicenter of combat between the national armed forces, irregular armed groups and criminal gangs involved in the trafficking of cocaine. 260 people were murdered during the first nine months of this year in the Tumaco area, which numbers some 160,000 people in urban and rural zones. This represents a yearly average of 200 homicides per 100,000 people, far above the national figure of 38 murders per 100,000 inhabitants in 2006 (afro-colombia.org).

Although this port is located south of the four major Colombian cartels, drug lords in Peru and Bolivia, which follow Colombia in cocaine production, often move their drugs over land into Colombia before moving them over maritime channels. Tumaco is a good example of the small, out of the way port, with little or no government presence, which might easily be exploited to smuggle drugs.

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[319] http://www.apc.es/general/apc03.asp accessed on 21 May 2009

"Colombian Secret Police (DAS) officials, acting on a tip that sparked a six-month investigation, discovered a virtually complete submarine built by drug-traffickers in an apparent scheme to smuggle illicit drugs to the United States. The homemade submarine, hidden in a port in Tumaco, near the Colombian border with Ecuador, was capable of carrying up to 10 tons of cocaine, worth as much as $300 million on U.S. streets. "The ingenuity of drug traffickers is amazing," Eduardo Fernandez, head of the DAS in Valle de Cauca told The Associated Press. "They will do anything to avoid the Coast Guard." Fernandez said the submarine could have been used to carry cocaine offshore where it would be transferred to speed boats and transported to the United States. Although no arrests were made, authorities suspect the notorious Norte de Valle cartel was behind the submarine's construction. U.S." [320]

Port Physical Characteristics:

Tumaco is a very small port compared to the other two Colombian ports in the scenario. It is an open roadstead port, with a turning area and the ability to accommodate vessels up to 500 feet in length. There is limited to no security at this port, and no U.S. representation.

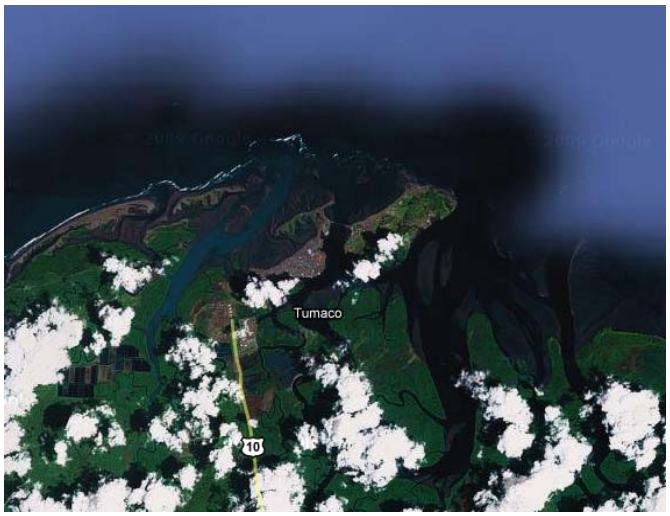

Figure 51: Port of Tumaco

Port Activities:

[320] http://www.usofficeoncolombia.com/InfoBrief/032805.htm accessed on 21 May 2009

The port is capable of servicing liquid tankers, mostly for export. Tug and refueling services are available, but maintenance and repair is not.

Tumaco is also very relevant as the terminus of one of the five major oil pipelines traversing Colombia. The Transandino line carries crude from the Orito field in the Putumayo Basin. The port also provides liquid export service for Ecuador, its neighbor to the south.

Cargo Volume:

Small tankers and cargo vessels do use this port, including small liquid tankers that travel to the U.S. East Coast. Statistics regarding traffic density were not available in detail for this port. The greatest percentage of vessel traffic to and from the portion of the Colombia coastline that is south-west of the Panama Canal is through Buenaventura. The second largest port is at Cartagena, but requires transit through the canal in order to reach the west coast of Mexico or the U.S. [321]

The port is associated with a 27-meter-deep crude-oil-exporting private terminal 3.2 nautical miles offshore that is able to serve ships of up to 50000 dwt.

[321] http://www.worldportsource.com/ports/portCall/COL_Port_of_Tumaco_1669.php accessed on 21 May 2009

a. Weather Conditions (Average Annual)[322]

	Max:	Avg:	Min:	Sum:
Temperature:				
Max Temperature	**75** °F	**62** °F	**55** °F	
Mean Temperature	**60** °F	**54** °F	**52** °F	
Min Temperature	**53** °F	**47** °F	**44** °F	
Degree Days:				
Heating Degree Days (base 65)	14	11	6	146
Cooling Degree Days (base 65)	0	0	0	0
Growing Degree Days (base 50)	10	4	2	48
Dew Point:				
Dew Point	**73** °F	**48** °F	**39** °F	
Precipitation:				
Precipitation	**0.00** in	**0.00** in	**0.00** in	**0.00** in
Snowdepth	-	-	-	-
Wind:				
Wind	**16** mph	**2** mph	**0** mph	
Gust Wind	-	-	-	
Sea Level Pressure:				
Sea Level Pressure	**30.48** in	**30.36** in	**29.82** in	

Figure 52: Weather Conditions Tumaco

C. Port of Buenaventura

Background:

Buenaventura is a Colombian port city with a metropolitan population equivalent to Los Angeles. Buenaventura is the main port of Colombia in the Pacific Ocean. Buenaventura has been a hotbed of drug trafficking, violence, and the presence of guerrilla and paramilitary groups. Reported homicides have doubled over the last two years to where the murder rate is now 24 times that of New York City. In an attempt to counter the violence, the Colombian government has set up a special marine unit in the worst area of the city.

Buenaventura exports coffee and sugar from the Cauca River valley, wood from southwest Colombia's coastal forests, and gold and platinum from the north. It receives

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322 http://www.wunderground.com/cgi-bin/findweather/hdfForecast?query=colombia&searchType=WEATHER, "Weather Underground", accessed 10 Apr 2009

oil by pipeline from Puerto Berrio, and it is served by the Puerto Berrio-Popayan railroad. [323]

Port Physical Characteristics:

Most of the port information regarding Buenaventura is not translated. This general information was found on the "nuevamodacolombia" site:

GENERAL FACTS

- **Access Channel**
  Longitude: 30 kilometers, 18 nautical miles
  33 IALA system lightning buoys
- **Access Channel Depth**
  Low tide: 9.8 meters
  High tide: 13.2 meters
- **Pier Sites Depth**
  Low tide: 10 meters
  High tide: 13.5 meters
- **Closest Airport**
  International: to 150 kilometers
  Local: to 15 kilometers
- **Service Attention Administrative**
  From Monday to Friday
  7:30 a.m. to 12:00 m. and
  2:00 p.m. to 6:00 p.m.
- **Documents Reception**
  From Monday to Friday 8:00 a.m. to 6:00 p.m.
  Saturdays 8:00 a.m. to 2:00 p.m.
- **Operatives**
  From Monday to Sunday during 24 hours
  365 days per year

Figure 53: Port Characteristics Buenaventura

Lifting crane capacity is up to 100 tons. The facilities can move 18 to 28 containers an hour. [324]

Anchorage information from the World Port Source:

[323] http://www.worldportsource.com/ports/COL_Port_of_Sociedad_Portuaria_Regional_de_Buenaventura_122.php accessed on 21 May 2009

[324] http://www.nuevamodacolombia.com/articulos/buenaventura-port-maritime-terminal.php accessed on 21 May 2009

Entrance Restrictions			
Tide:	Yes	**Swell:**	No
Ice:	No	**Other:**	Yes
Overhead Limit:	Yes		
Water Depth			
Channel:	16 - 20 feet 4.9 - 6.1 meters	**Anchorage:**	31 - 35 feet 9.4 - 10 meters
Cargo Pier:	31 - 35 feet 9.4 - 10 meters	**Oil Terminal:**	31 - 35 feet 9.4 - 10 meters
Mean Tide:	3 feet		
Pilotage			
Compulsory:	Yes	**Advisable:**	Yes
Available:	Yes	**Local Assist:**	

Figure 54: Anchorage Information Buenaventura

Port Activities:

The port has trade alliances in place with Houston, Barcelona, Corpus Christi and Miami. Shipping density is extreme in the port and natural occurrences like mudslides or severe weather can cause lengthy backups. A mudslide in 2006 closed a major road leaving the port and clogged operations for over two months.

According to "Maritime Security" by Michael McNicholas, Port Buenaventura is also plagued by pirates. Ships are vulnerable during the slow, 3-hour trek through the channel into the inner anchorage, and acts of piracy are very common. Pirates also boldly plunder ships while they are anchored in the harbor.

Specifics on port shipping density are hard to find, and satellite photos are almost all cloud obscured due to the prevalent rains in the area year round. The following Google Earth view was captured on 14 April 2009:

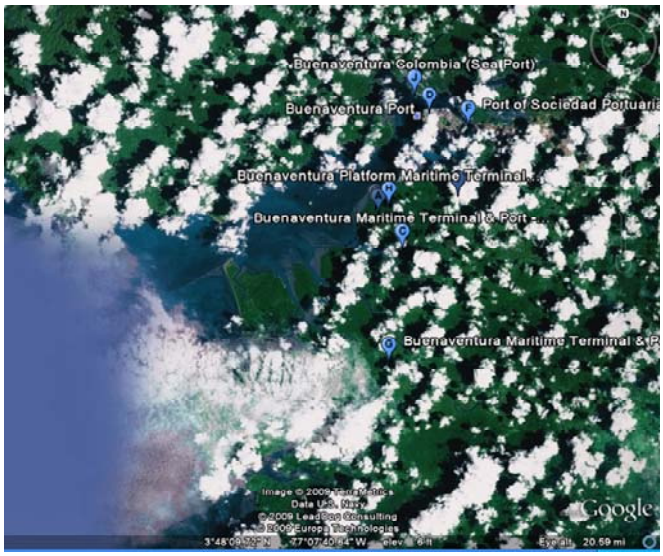

Figure 55: Google Earth Buenaventura [325]

Cargo Volume:

2007 estimate from a research paper by Ricardo Aricapa:

- Tons: 11 million
- Ships: 1,600

The Port of Buenaventura handles a wide range of cargoes, including containers and solid and liquid bulks. It receives crude from a major pipeline. The container terminal can serve vessels of up to 100 DWT. Terminal storage has capacity for handling 10.5 thousand containers per day.

Facilities for solid bulks include silos with capacity for storing 160 thousand tons and handling 5.5 thousand tons per day. The solid bulk terminals include sheds covering almost 35 thousand square meters and warehouse of about 58 thousand meters. It also has covered parking for 300 vehicles.

In 2007, the Port of Buenaventura imported almost 2.9 million tons of solid bulk cargoes, over 577 thousand tons of general cargo, and 278 thousand tons of liquid cargo. The Port of Buenaventura exported over 519 thousand tons of coal, more than 136 thousand tons of general cargo, and about 70 thousand tons of solid bulk. Over 1200 vessels moved through the Port of Buenaventura including 843 container vessels, 166 vessels carrying bulk cargoes, 106 with general cargoes, 102 carrying roll-on/roll-off

[325] http://earth.google.com/ accessed on 14 April 2009

cargoes, and 67 tankers. Handling over 457 thousand TEUs (8.9 million tons) of containerized cargo in 2007, almost 183 TEUs (6.6 million tons were imports, over 180 thousand TEUs (2.3 million tons) were exports.

Weather Conditions (Average Annual):

Buenaventura is one of the rainiest cities in the world with 6000-7000 mm precipitation annually. [326]

Custom Search on weather.uk.msn.com:

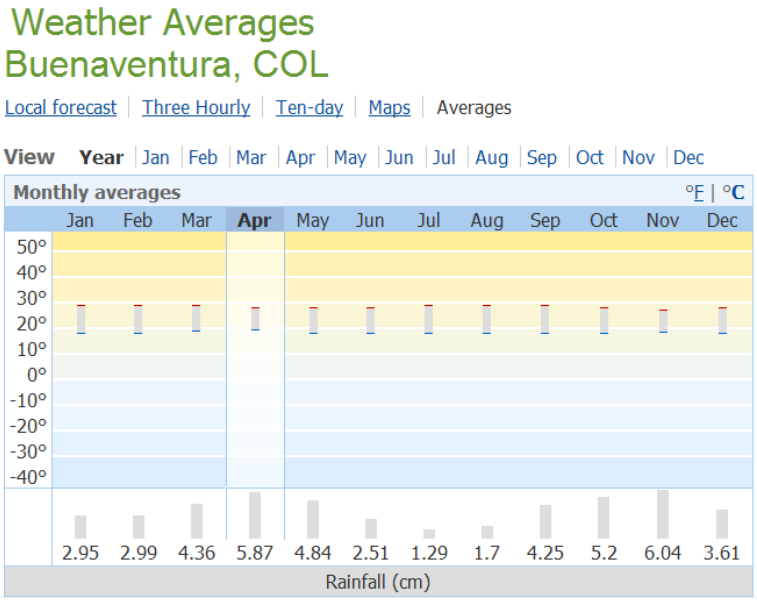

Figure 56: Weather in Buenaventura [327]

[326] http://en.wikipedia.org/wiki/Buenaventura,_Colombia accessed on 26 May 2009

[327] http://weather.uk.msn.com/local.aspx?wealocations=wc:COXX0007&q=Buenaventura%2c+COL accessed on 26 May 2009

2. PORTS DATA OF MEXICO

A. Port of Ensenada

Background:

Breakwater built in 1956, ratified as Main Seaport in 1974 and Naval Base inaugurated in June 1998. [328]

Port Activities:

Asian businesses have recently built up in Mexico, accounting for 70,000 containers a year in cargo traffic.

Round trip cargo shipping to Southern California is the strongest shipping market for Port Ensenada, with 15% annual increases presently.

Accompanying this file are two spreadsheets from the Ensenada Port Authority: one is the cargo volume for the last day reported (Monday) and the overall traffic statistics for 2008. May and August showed the highest traffic volume.

Cargo Volume:

Unit: TEU, for 20-ft equivalent unit, based on standard 20 ft by 8 ft cargo container (heights not standardized)

These numbers include both regional and international cargo traffic and have shown a pretty linear trend over at least 5 years:

- 2005 – 79003
- 2006 – 127941
- 2007 – 166000
- 2008 – 201200
- 2009 – 241000
- 2010 – 272800
- 2011 – 302000

[328] http://puertoensenada.com.mx/english/statistics.htm accessed on 26 May 2009

Port Physical Characteristics:

Figure 57: Port of Ensenada_1

There are five major shipyards associated with the port, a cruise ship terminal, two commercial and one sport fishing piers, three bulk material and mineral terminals, and several public terminals, along with a maritime customs office.

The improved channel depth as of September 2008 is 16m. [329]

Weather Conditions (Average Annual):

Custom Search on Wunderground.com: [330]

[329] http://www.lloydslist.com/ll/news/ensenada-digs-deep-for-box-opportunities/1222705937252.htm;jsessionid=A2F1727F0447337F50BB35FD745074C8 accessed on 26 May 2009

[330] http://www.wunderground.com/cgi-bin/findweather/hdfForecast?query=Mexico&searchType=WEATHER; "Weather Underground", accessed 14 Apr 2009

	Max:	Avg:	Min:	Sum:
Temperature:				
Max Temperature	**98** °F	**73** °F	**55** °F	
Mean Temperature	**85** °F	**64** °F	**46** °F	
Min Temperature	**72** °F	**54** °F	**34** °F	
Degree Days:				
Heating Degree Days (base 65)	19	4	0	1545
Cooling Degree Days (base 65)	20	3	0	1092
Growing Degree Days (base 50)	35	13	0	4797
Dew Point:				
Dew Point	**66** °F	**48** °F	**-1** °F	
Precipitation:				
Precipitation	**1.65** in	**0.02** in	**0.00** in	**7.55** in
Wind:				
Wind		**48** mph	**5** mph	**0** mph
Gust Wind		**146** mph	**20** mph	**16** mph
Sea Level Pressure:				
Sea Level Pressure		**30.34** in	**29.98** in	**29.50** in

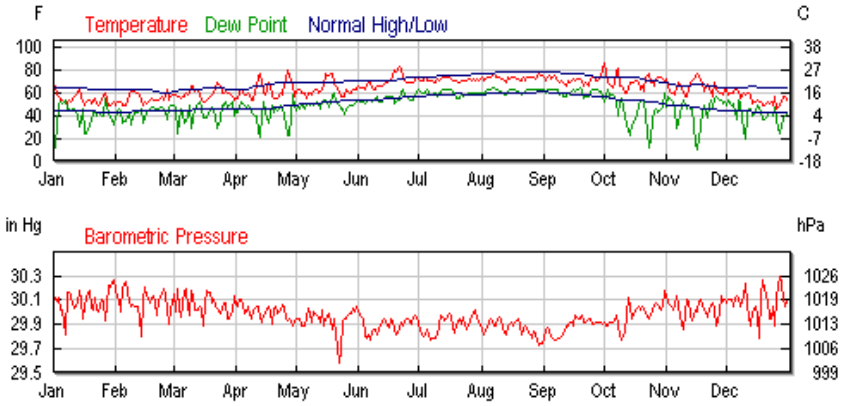

Figure 58: Port of Ensenada

B. PORT OF MANZENILLO

Background:

The Port is situated in the State of Colima, in the Republic of Mexico, at the geographic coordinates: North Latitude: 19 deg, 03 ft, 30 in and 104 deg, 18 ft, 30 in.

Manzanillo is the most centrally located port of the three selected for the smuggling scenario.

In 1993, operation and oversight of the port was privatized.

Figure 59: Port of Manzenillo

Manzanillo is the main connection between the Pacific and the most important industrial and commercial corridor in the country, made up of the northern, western and central zones, where the states of Aguascalientes, San Luis Potosí, Jalisco, Guanajuato, Querétaro, Zacatecas, Nuevo León, Coahuila, Morelos, Estado de México and the Federal District are located. Given its strategic position, it's ideal for international commerce with the United States, Canada, Central and South America and the countries that make up the Pacific Rim. [331]

Port Physical Characteristics:

Port area is 437 hectares. Channels and turning basins depth ranges from 14 to 16 meters.

Port Activities:

A tuna fishing enterprise operates out of the port, with four boats. The port is also capable of handling (at least) 4th generation cargo containers, and exports from several regional businesses (iron ore, consumables, food).

Twenty-six shipping lines regularly visit the port. There are 14 terminals, with one dedicated to tourism. The ports proximity to 6-lane highways, rail lines and airstrips would make it an attractive target for persons trying to move illegal cargo.

Cargo Volume:

Unit: TEU, for 20-ft equivalent unit, based on standard 20 ft by 8 ft cargo container (heights not standardized)

Manzanillo handles 90% of the containerized cargo moved on the Mexican Pacific.

[331] www.puertomanzanillo.com.mx accessed on 26 May 2009

Data was available for 2007 and 2008 and is as follows:

- 2007: 1,409,614 TEU
- 2008: 1,409,782 TEU

Cruise ship traffic: 38 ships made regular ports of call in 2007, but only 30 in 2008. The decrease may be attributed to a depressed US economy, rising crime rates in Mexico, or both. Both of those conditions remain.

Gross tonnage moved through port: 21,096,709 in 2007 and 22,294,864 in 2008.

- Total number of ships making call in 2007: 1,907
- Total number of ships making call in 2008: 1,871

a. Weather Conditions (Average Annual)

From Wunderground.com: [332]

Monthly Normals												
	January	February	March	April	May	June	July	August	September	October	November	December
High Temperature (F)	81	79	78	79	81	85	86	86	85	85	84	81
Low Temperature (F)	66	65	65	67	70	75	75	75	75	74	71	68

Table 144: Manzenillo Weather

C. Port of Salina Cruz

Background:

The Port of Salina Cruz is classified as a deep-water and coastal shipping port. Of the three ports studied for the Anti-smuggling scenario, this port has the closest proximity to Colombia.

Figure 60: Port of Salina Cruz

[332] http://www.wunderground.com/global/MX.html?MR=1 accessed on 26 May 2009

The port is situated where the greatest concentration of trades is located, across eight states, and deals primarily in trade business with China, Canada and the United States. Only one shipping company, the Mediterranean Shipping Company, provides these services.

The city of Santa Cruz is home to one of the major oil refineries in the Mexican Pacific, which means that the transportation infrastructure to support the refinery is in place and that the port of Santa Cruz has a good amount of liquid petroleum traffic, as well as standard cargo. [333]

Port Physical Characteristics:

The port is in proximity to land transportation routes, both rail and highway. The Mexican Navy has a major shipyard, as well as qualified personnel and equipment to safeguard the port of Salina Cruz (10th Navy). The container terminal has 24-hour lighting and surveillance.

It has a total surface of 150.64 hectares, of which 71.39 hectares are the access canals, basin and berthing zones.

The access canal to the port is oriented to the north, with a length of 70 meters, a bottom width of 82 meters, and a depth of up to 13 meters. The outer harbor is located close to the access canal and is 750 meters long. It is used for anchorage, and it has a 400-meter diameter for turning and an average depth of up to 12 meters. The dimensions of the typical ship are only 197 meters long by 32 meters wide. The companionway canal links the outer harbor with the inner basin; its axis is oriented northward, and it is 70 meters long, 50 meters wide, and 10 meters deep. Finally, the inner basin is located to the north of the port, and is surrounded by repair projects being done by the Navy shipyard; fishing docks; and berths, specifically those for Zones I and II, which allow berthing of ships up to 180 meters long and 28 meters wide, with a depth of 10 meters.

Port Activities:

The port has a general commercial wharf as well as a commercial fishing zone that encompasses eight piers and docks. A Maritime Terminal includes fueling

[333] http://www.apisal.com.mx/web/php/eng/seccion-01.php?eCodSeccion=20201 accessed on 26 May 2009

operations and the handling of liquid petroleum for transport. The Mexican government controls the Naval Sector, which has facilities for ship maintenance and repair and two graving docks.

Cargo Volume:

With only one international shipping company using the port, the shipping and cargo schedule is predictable. The table below is the most recent shipping schedule from the Port Authority.

Weather Conditions (Average Annual):

From Wunderground.com: [334]

Monthly Normals												
	January	February	March	April	May	June	July	August	September	October	November	December
High Temperature (F)	89	90	92	94	95	93	94	95	93	92	91	90
Low Temperature (F)	68	68	71	74	75	74	75	75	74	73	72	70
Precipitation (in)	0.35	0.16	0.12	0.08	2.48	11.26	5.31	7.80	11.81	2.60	0.94	0.35

Table 145: Salina Cruz Weather

[334] http://www.wunderground.com/global/MX.html?MR=1 accessed on 26 May 2009

G. GLOSSARY OF ACRONYMS

AACER - affordable adaptive conformal electronic-scanning-array radar
ACL - mandatory access control
ACLS - access control lists
ADS - active denial system
AFSB - afloat forward staging base
AIS - automatic identification system
AO - area of operation
APS - Africa Partnership Station
APU - auxiliary power unit
AQD - additional qualification designator
ARS - alternative remittance systems
ASW - Anti-submarine Warfare
ATFP - Anti-Terrorism Force Protection
C4ISR - Command, Control, Communications, Computers, Intelligence, and Surveillance
CA - Civil Affairs
CARAT - Cooperation Afloat Readiness and Training
CDC - The Center for Disease Control
CJTF - Commander Joint Task Force
CMA - comprehensive maritime awareness tool
CMO - Civil Military Operations
CMR - Civil Military Relations
CNIES - Cooperating Nation Information Exchange System
COE - current operating environment
COIN - counter insurgency
COP - common operating picture
CPI - consumer price index
CRAF - Civil Reserve Air Fleet
DAU - Defense Acquisition University
DCS - direct commercial sales
DDG - guided missile destroyer
DSCA - Defense Security Cooperation Agency Strategic Plan 2006-2011
EAP - emergency action plan
ECC - evacuation control center
EDA - European Defence Agency
EEZ - exclusive economic zone
EPI – Environmental Performance Index
FAA - Foreign Assistance and Arms Export Act of 1961
FCE - forward command element
FFG - guided missile frigate
FLIR - forward looking infrared
FMS - foreign military sales

FOC - flags of convenience
FON - Freedom of Navigation
FORESTER - foliage penetration reconnaissance, surveillance, tracking, and engagement radar
FOV - field of view
FRC – Fast Response Cutter
FTR - Future Transport Rotorcraft
GAO - General Accounting office
HADR - Humanitarian Assistance and Disaster Relief
HMMWV - High Mobility Multipurpose Wheeled Vehicle
HSV – high speed vessel
HTS - high temperature superconductor
IAP - indigenous autonomous processor
IEDs - improvised explosive devices
ISB - intermediate staging base
IUU - Illegal, Unregulated and Unreported fishing
IW - Information Warfare
JITI - just in time information
JSS - joint support ship
JTF - Joint Task Force
LCAC - Landing Craft Air Cushioned
LCS - littoral combat ship
LCU - landing craft utility
LDF - local defense forces
LFAS - low frequency active SONAR systems
LHA - landing helicopter assault ship
LHD - landing helicopter dock ship
LNG - liquefied natural gas
LPD - landing platform dock
LRAD - long range acoustic device
LR-HEMI - long range human electro-muscular incapacitation
LRIT - long range identification and tracking
LSD - landing ship dock
LTTE - Liberation Tigers of Tamil Eelam
MCM - mine counter measures
MCS - monitoring, control and surveillance systems
MDA - maritime domain awareness
MEDUSA - mob excess deterrent using silent audio
MIO - maritime intercept operations
MOE - measures of effectiveness
MOP - measures of performance
MSP - maritime security partnerships
MSSIS - Maritime Safety and Security Information System
NAIS - Nationwide Automatic Identification System

NBC - nuclear, biological, and chemical
NEO - Non-combatant Evacuation Operations
NGO - non-governmental organization
NIC - National Intelligence Center
NOAA - National Oceanic and Atmospheric Administration
NOC - Naval Operations Concept
NWDC - Navy Warfare Development Command
PASS - Plasma Acoustic Shield System
PDE - pulse detonation engine
PEP - pulsed Energy projectile
PERMAP - perception mapping
PIKL - pulsed impulsive kill laser
PO&S - procurement, operating and support cost
POA 2007 - Partnership of the Americas 2007
POLP - Principle of Least Privilege
PVOs - private voluntary organizations
PWM - pulse width modulation
QDR - Quadrennial Defense Review
REA - rapid environmental assessment
RFMOs - regional fisheries management organizations
RHIB - rigid hull inflatable boat
RMAC - regional maritime awareness capability
ROE - rules of engagement
SAS - synthetic aperture sonar
SEA - Systems Engineering and Analysis
SEACAT - Southeast Asia Cooperation Against Terrorism
SLOC - sea lines of communication
SOFs - special operations forces
SOP - standard operating procedures
SSLPV - semi-submersible low profile vessel
SUA - Suppression of Unlawful Acts against the Safety of Maritime Navigation
T-AKE - dry cargo ship
T-AO - underway replenishment oiler
TDSI - Temasek Defense Systems Institute
TESS - tactical electric solar system
TQG - tactical quiet generator
TSC - Theater Security Cooperation
TSV – theater support vessel
TWPS - tactical water purification system
UAVs - unmanned aerial vehicles
UNCLOS - United Nations Convention on the Law of the Sea of 1982
UNITAR - United Nations Institute for Training and Research
USATEC - Army's Rapid Equipping Force and the Testing & Evaluation Command
VADER - vehicle and dismount exploitation radar

VAMOSC -Visibility and Management of Operating and Support Cost
VTOL - vertical takeoff and landing
WMD - weapons of mass destruction

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Washington, DC 20350-2000

23. OPNAV N86
2000 Navy Pentagon
Washington DC 20350-2000