Iraqi Navy: Capability Requirements and Force Structure Recommendations for 2015 and Beyond

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Abstract

This study, sponsored by Commander, US Naval Forces Central Command, identifies the future missions, concepts of operations, and capability requirements for the Iraqi Navy, and recommends a force structure for 2015 and beyond. This study was well received by the sponsor and the Iraqi Navy, and the Iraqi Minister of Defense has incorporated our recommendations into the navy's force structure plan for 2008-2020.

Contents

Executive summary

Commander, U.S. Naval Forces Central Command (COMUSNAVCENT), on behalf of the Multinational Security Transition Command – Iraq (MNSTC-I) and the Iraqi Navy, asked the Center for Naval Analyses (CNA) to identify capability requirements and to recommend a force structure for the Iraqi Navy for 2015 and beyond. The goal of this study is twofold: to provide Iraqi and Coalition personnel with a common assessment of capability requirements and force structure recommendations for the Iraqi Navy, and to provide the Iraqi Navy leadership with an analytic process for determining capability and force structure requirements to meet future needs.

The overall approach of this study included identifying key trends and factors that are likely to characterize the future Iraqi Navy operating environment; analyzing missions that the Navy may need to conduct; developing concepts of operations (CONOPS) for accomplishing those missions in the future environment; deriving operational tasks and capabilities to support the CONOPS; and assessing force structure options for providing the relevant naval capabilities.[1]

We identified four missions for the Iraqi Navy in 2015:

1. **Oil platform (OPLAT) protection**. The objective of this mission is to protect Iraq's two offshore OPLATs that provide Iraq's primary source of income.

[1] To conduct this assessment, CNA leveraged extensive field research in Iraq, interviews with high-level officers in the Iraqi Navy and officials in the Iraqi Ministry of Defense, participation in U.S./coalition and Iraqi staff talks and Stock Take meetings, discussions with MNSTC-I personnel, and extant CNA studies on determining future force structure requirements.

2. **Maritime security operations**. The objective of this mission is to preserve and protect the fair and legitimate use of Iraqi waters by mariners; to prevent smugglers and others from moving illicit materials through Iraqi waterspace; to prevent terrorist, insurgent, pirate, or other attacks from or within Iraqi waters; and to prevent use of the maritime environment as an aid to illegitimate activity ashore.

3. **Disaster response** (for man-made or natural disasters). The objective of this mission is to respond quickly to disasters that occur within territorial waters, or directly impact Iraqi maritime interests, by rapidly providing forces that are able to control the disaster scene and coordinate follow-on capabilities for consequence management.

4. **Territorial water (TTW) defense**. The objective of this mission is to defend Iraqi TTW from conventional and unconventional threats by deterring, defeating, or neutralizing enemies.

We then developed CONOPS in order to detail ways in which the Iraqi Navy can employ its forces to accomplish these missions. CONOPS are different for each mission, but each includes certain elements: employment concepts for forces involved; the operational tasks that maritime forces will need to execute; and how often they should be performed; the command, control, and communication (C3) needs; and related support requirements.[2] Once we assessed how the Iraqi Navy could employ its forces to execute its missions, we then determined which capabilities it will need to successfully operate in the Iraqi maritime operating environment.

[2] Support requirements do not include specific repair, maintenance, or logistical support information, as the baseline force structure does not include specific manufacturers or system configurations. Support requirements do include such factors as intelligence and information, fire coordination, coordination with other military services, and support from higher headquarters.

Capability requirements and force structure recommendations

For each CONOPS, we defined capability requirements in three broad areas: *observe* activities in the operating environment; *react* to activities or threats in an appropriate and timely manner; and *coordinate* Iraqi Navy actions with higher headquarters, other Iraqi Navy and Iraqi Marine units, other military forces, and the maritime community.

The capabilities required to *observe* focus on maintaining situational awareness within Iraqi TTW by continuously monitoring all relevant surface traffic. The Iraqi Navy must be able to identify all vessels the size of a dhow or larger in its TTW during both day and night operations, and in most weather or sea state conditions. It also needs the ability to observe activities beyond its TTW. In support of this capability, it must be able to conduct intelligence and surveillance activities and information operations.

The capabilities required to *react* are numerous and varied. To fulfill its mission set, the Iraqi Navy must control access to sensitive areas/critical infrastructure; conduct regular presence patrols; conduct maritime interception operations and visit, board, search, and seizure (VBSS) operations; conduct search and rescue response; demonstrate an ability to employ fires; attack enemy targets; provide local air defense; and respond to or neutralize an improvised explosive device (IED) or naval mines.

The capabilities required to *coordinate* entail providing flexible and sustained C3 for operational forces. This includes C3 from ashore and afloat locations. Coordination capabilities include communicating with nonmilitary vessels; relaying location information among forces securely and accurately; collecting, analyzing, and sharing information among forces; sharing a common operational picture; reporting and receiving reports of incidents/disasters with local mariners; communicating with other regional military forces; coordinating with private entities to assist in disaster response efforts; and communicating with other Iraqi security services and/or the Iraqi Ministry of Defense.

Based on the missions, CONOPS, and capability requirements, we recommend a force structure for the Iraqi Navy. We do not recom-

mend specific equipment or manufacturers, but instead identifies types of ships and craft (e.g., patrol boats, RHIBs, and helicopters) and systems (e.g., fixed radars, FLIR, and MANPADs) that satisfy the Iraqi Navy's future capability requirements. Importantly, this force structure assumes that the Iraqi Navy will have completed its current procurement program of 15 patrol boats, four patrol ships, and two offshore support vessels (15/4/2) as planned. If the Iraqi Navy abandons or alters the 15/4/2 program, or alters the operational profile of the OPLAT protection[3] mission, our force structure recommendation will change.

For the projected 2015 Iraqi Navy mission set, this study recommends adding the ships, craft, systems, weaponry, and units listed in the box below.[4]

Ships/Craft

- 2 patrol boats capable of launching and recovering small armed boats and supporting VBSS teams
- 6 fast, armed shallow-draft boats for shallow water patrols and VBSS operations
- 3 harbor patrol craft (per port/harbor) for local security

Aircraft

- 3 armed helicopters

Surveillance equipment

- Fixed radars
- Automatic identification system (AIS)
- Forward-looking infrared (FLIR)

Weaponry

- Coastal artillery
- Variety of smaller weapons, such as man-portable air defense systems (MANPADS)

Units

- Specialized units for diving, mine countermeasures, and explosive ordinance disposal

Supporting equipment

- TOC or similar C2 facility at the OPLATs and afloat
- Radios for secure communications
- Marine barriers
- Warning signs

[3] This 15/4/2 force structure for the OPLAT protection mission is based on the current Iraqi Navy-Coalition Transition Roadmap. Our force structure recommendations are intended to supplement the 15/4/2 program.

[4] Notably, the requirement does not specify that the Iraqi Navy man and equip all of these capabilities, just that it have the ability to bring them to bear, and integrate and coordinate their employment. For example, IqAF aircraft and/or IqA units may be able to meet some of these capability and force structure requirements.

Introduction

The Iraqi Navy leadership has expressed a desire to implement an analytic process for determining capability and force structure requirements. The Iraqi Head of Navy (HON) has indicated that it is his goal to move the Iraqi Navy to a requirements-based planning process that aligns with the emerging guidance from the Iraqi Ministry of Defense (MOD). However, it appears that the Iraqi Navy currently does not have an analytic process to respond to emergent capability and force structure requirements.[5]

Commander, U.S. Naval Forces Central Command (COMUSNAVCENT), on behalf of the Multinational Security Transition Command – Iraq (MNSTC-I) and the Iraqi Navy, asked the Center for Naval Analyses (CNA) to determine capability requirements and recommend a force structure for the Iraqi Navy in 2015 and beyond. The goal of this study is twofold: to provide MNSTC-I with capability requirements and force structure recommendations for the Iraqi Navy, and to provide the Iraqi Navy with an analytic approach for determining capability and force structure requirements to meet its needs.

In this study, we did not examine the specific logistics, maintenance, and sustainability requirements to support the recommended force structure. These requirements largely depend on the specific ships, craft, and weaponry in the force structure, and could vary significantly depending on the specific model of each system or craft acquired by the Iraqi Navy. Because the sourcing options for Iraqi

[5] Under Saddam Hussein's regime, the Iraqi Navy acquisition process appears to have been determined in Baghdad with little or no coordination with the Navy leadership. Saddam sought a navy that showcased technology and power, and a force structure that demonstrated these characteristics. As a result, the Iraqi Navy force structure was not requirements based, but instead was determined by the whims of Iraq's non-navy leadership.

Navy systems and platforms are essentially unbounded (future acquisitions could be sourced from virtually any company in the world) and the Iraqi Ministry of Defense's acquisition process is still developing, we avoided focusing on specific models of each ship or craft. Instead, we identified the types of ships and craft that will meet the Iraqi Navy's needs. Once the Iraqi Navy and MOD choose the specific platforms and equipment to meet the identified capability requirements, it will be possible to identify logistics, maintenance, and sustainability requirements for that particular force structure.

Sources

For this study, CNA conducted extensive field research in Baghdad and Umm Qasr, and with deployed Iraqi and coalition forces in the Northern Arabian Gulf. We attended conferences, staff talks, and Stock Take meetings with the Iraqi Navy and NAVCENT staff at NAVCENT headquarters in Bahrain. We gathered information through interviews and discussions with senior members of the Iraqi Navy, including the HON in Baghdad and the Operations Commander at Umm Qasr Naval Base (UQNB). During our visits with the HON and at UQNB, we participated in formal and informal discussions with officers and enlisted personnel in the Iraqi Navy, who provided valuable insights into their operating environment. We also participated in conferences and discussions with U.S. and coalition personnel in NAVCENT, the Naval Transition Team (NaTT) in Umm Qasr, and the NAVCENT Liaison Naval Officer and MNSTC-I personnel in Baghdad.

CNA also held a roundtable with civilian and uniformed subject matter experts (SMEs) to develop the capability requirements and force structure recommendations for the territorial water (TTW) defense mission. The roundtable involved SMEs from the Navy Expeditionary Combat Command (NECC), the Special Forces community, the intelligence community, and CNA. We also used academic papers, media reports, statements by public officials, and extant studies on the Iraqi Navy, capability requirements, and force structure recommendations.

Analytic approach

To analytically derive the Iraqi Navy's future capability requirements and recommend a force structure, we posed three questions:

- What will the operating environment look like in the future?
- What will the Iraqi Navy need to be able to do in the future?
- What forces will the Iraqi Navy need to have in the future?

In answering these questions, we were able to discern what the Iraqi Navy's capability requirements may look like in the future and develop a force structure recommendation to meet these requirements.

What will the operating environment look like in the future?

To begin this study, we characterized the Iraqi Navy's operational environment by positing assumptions about the future of Iraq, describing potential characteristics of the future operating environment, and identifying the resource constraints that the Iraqi Navy may face in 2015. First, we posited two assumptions about the future of Iraq and the role of coalition forces. These two assumptions are critical elements on which the study is predicated. If either of these assumptions changes, the capability requirements and force structure recommendations in this study will need to be re-examined.

Next, we described potential characteristics of the future operating environment based on current data and trend-line projections in key areas (e.g., maritime traffic, oil production, and other regional military forces). While these characteristics are important to understanding the future threats that Iraq may face in the maritime environment, and the equities and interests of potential competitors or adversaries in the region, our force structure analysis is not predicated solely on these characteristics. In other words, this is not a threat-based assessment. Instead, we adopted a capabilities-based approach. It focused on defining what the Iraqi Navy will need to be able to do in order to accomplish its missions, rather than speculating on the specific decisions or actions of potential competitors or adversaries.

To characterize the likely future operating environment, we researched current regional naval force structures and the rates at which their capabilities change, reputable predications of oil production, and the rate at which container and commercial traffic changes in the region. We also examined statements by Iraqi officials about future development plans and considered how they may affect the operating environment.

Next, we identified resource constraints that the Iraqi Navy may face in 2015. While it is difficult to predict these constraints, the Iraqi Navy will most likely face some resource constraints that will affect its ability to acquire and operate its desired force structure. A current CNA assessment of the Iraqi Navy's development helped us identify those aspects of development that may have a long-term impact on the Iraqi Navy's resource availability in 2015.[6]

This process of positing assumptions, describing characteristics, and identifying constraints allowed us to "set the scene" in order to consider the activities, interests, equities, and threats that the Iraqi Navy may need to consider in the future operating environment.

What will the Iraqi Navy need to be able to do in the future?

We examined several operational factors to determine what the Iraqi Navy will need to be able to do – how it should be prepared to act – in the future operating environment.

First, we derived the future **missions** of the Iraqi Navy. We interviewed Iraqi Navy, MOD, MNSTC-I, and coalition leadership to gain their perspectives on the role of the Iraqi Navy beyond the counter-insurgency (COIN) mission. We were given access to coalition and Iraqi plans and planning guidance. We leveraged our understanding of the future operating environment and the interests, equities, and threats that might arise from within that operating environ-

[6] At the request of NAVCENT, CNA conducted a baseline assessment of the Iraqi Navy's capabilities in 2007. CNA Research Memorandum document D001684.A2.Final, *Iraqi Navy: A Baseline Assessment*, January 2008.

ment. We also examined mission sets of navies with similar operating environments.

Second, we described **concepts of operations** for the Iraqi Navy. Specifically, we assessed the navy's potential use of its forces within its TTW, the command and control (C2) structure of the forces, the periodicity and/or persistence of operational requirements, and the navy's operational goals. We informed these CONOPS with research on how the Iraqi Navy employs its forces today, as well as how Iraq has employed maritime forces in the past. We also examined how U.S. and coalition forces undertake similar missions.

The periodicity and persistence of the employment of forces (how frequently and for how long forces will have to be available to conduct operations in support of the mission) is a key factor in determining the CONOPS and, later, the size of the Iraqi Navy's force structure. We determined this based on our evaluation of the future operating environment and the nature of the mission itself.[7]

We also identified the operational tasks that the Iraqi Navy will need to be able to execute in order to carry out the CONOPS. As with the CONOPS themselves, the operational tasks were developed with consideration of the operational environment, the Iraqis' priorities and preferences, and the doctrine, tactics, techniques and procedures (TTP) that U.S. and coalition forces use in similar circumstances.

Third, we determined the **capability requirements** for executing the CONOPS. We did so by assessing the capabilities the Iraqi Navy will need in order to *observe* activities in its operating environment and analyze threats, to *react* to activities in an appropriate and timely manner, and to *coordinate* its actions with other entities, such as commercial ships and foreign military vessels. Throughout the assessment, we used this "*observe, react, coordinate*" framework to identify the Iraqi Navy's capability requirements.

[7] Expected volume of traffic in the TTW, for example, is based upon our economic assumptions (presented in the next section).

We were able to determine the capability requirements for the first three missions (OPLAT protection, maritime security operations, and disaster response) by examining the Iraqi Navy's operational environment, the CONOPS, and the operational tasks, and deriving the capabilities required to execute the CONOPS and operational tasks in Iraqi TTW. We also leveraged extant U.S. naval doctrine, such as the Joint Capabilities Area and the Universal Naval Tactical Task List. However, the TTW defense mission is broader and more complex than the other missions, involving many different kinds of defense scenarios. To delve into the complexity of this mission and its capability requirements, we developed a series of scenarios to examine prospective challenges to Iraq's maritime interests and the security of its TTW. We then held a roundtable where subject matter experts developed capability requirements and force structure recommendations to address three TTW defense scenarios.

The first scenario posited a threat of attack on Iraq by a moderate-sized, conventional naval force. In this scenario, the Iraqi Navy's objective was to *deter and disrupt* this attack. The second scenario posited an attack by a smaller naval force with some conventional and some unconventional capability. In this scenario, the Iraqi Navy's objective was to *defeat* the attack. The third scenario posited an attack by a small, unconventional force, such as a terrorist group or a non-state actor. In this scenario, the Iraqi Navy's objective was to *identify and neutralize* the attack.

These three scenarios allowed us to examine a range of capabilities to deter and defeat different types of enemies and to identify those capabilities required for executing the TTW defense mission.

This process for deriving capability requirements for each mission allowed us to comprehensively examine all of the capability requirements for the Iraqi Navy across its entire mission set. As a result, we were able to identify overlapping capability requirements that are germane to multiple missions and those that are unique to a specific mission.

What force structure will the Iraqi Navy need in the future?

Finally, we examined the mission set, CONOPS, and capability requirements and then analyzed the equipment and skill options, to determine which combination of ships, craft, weaponry, and units—or force structure—will satisfy the Iraqi Navy's capability requirements and provide flexibility within the force structure.[8] While we tried to be as specific as possible in our identification, the equipment we reference is intended only to represent the equipment needed to provide a specific capability package.

We looked for synergies among the capability requirements and identified ships and craft that could support a variety of capabilities, in order to minimize the amount of training and maintenance the Iraqi Navy will need in order to support its fleet. We also considered the known rotation rate of platforms, to determine how many of each ship or craft the Iraqi Navy may need. Through this process, we were able to identify a force structure that will fulfill the Iraqi Navy's future capability requirements.[9]

Outline of paper

First, we will discuss the characteristics of the Iraqi Navy's future operating environment. Next, we will describe in detail each mission and the associated CONOPS, capability requirements, and types of equipment/resources necessary to support that mission. Finally, we will present the future force structure recommendations for the Iraqi Navy, based on the capability requirements identified in this study.

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[8] Flexibility, in the form of ships and craft that can be used for multiple missions, will enable the Iraqi Navy to manage training, maintenance, and growth requirements.

[9] Because the Iraqi Navy and MOD's acquisition process allows flexibility in choosing manufacturers of equipment, we have identified required capabilities and equipment instead of specific platforms. Therefore, while we may recommend a specific type of equipment (e.g., Defender-class SAFE Boats), it is meant to be used as a guide for choosing types of equipment from different manufacturers.

Future operating environment

The first step of the analytic process is to describe the future operating environment in order to understand the interests, equities, and threats the Iraqi Navy may need to consider as it develops its mission, capability requirements, and force structure. In this section, we present strategic assumptions, security and economic characteristics, and resource constraints that "set the scene" for the Iraqi Navy's future operating environment.

Strategic assumptions

We posit two strategic assumptions about the security environment in Iraq in 2015:[10]

- Coalition forces will no longer be operating in Iraqi TTW. They may still be operating in the area, but they will have returned control of Iraqi TTW to the Iraqi Navy and the Iraqi Navy will be operating independently within its TTW.
- A relatively stable regime will govern Iraq and will be supportive of the Iraqi Navy's missions. We do not posit the nature of this regime, but we assume that it will support the Iraqi Navy and assist in its development.

Characteristics of future operating environment

We believe that the security and economic characteristics of the Northern Arabian Gulf (NAG) will have changed by 2015.

[10] Our findings are based on these assumptions about 2015. Therefore, if either of these assumptions is not realized, the capability requirements and force structure recommendations will need to be re-examined.

Security characteristics

We posit that Iraq's security environment may change in the following ways:

- The Iraqi Navy will build a defense installation on the Al Faw peninsula. The Al Faw peninsula was home to defense installations under Saddam Hussein's regime, and we posit that it will once again be used for defense facilities.[11]
- Conventional and unconventional adversarial forces will be operating in the region. Given the region's history and the tense relationships between neighbors, it is prudent to assume that another nation or group of individuals may pose a threat to Iraq in the future.
- The Iraqi Navy will acquire its currently planned force structure for the COIN mission. That force structure comprises 15 patrol boats, four patrol ships, and two offshore patrol vessels, and is generally referred to as the 15/4/2 plan. The 15/4/2 force structure is intended to protect the OPLATs, in support of the COIN mission.[12]

In addition, we posit that the Iraqi Navy's area of operations will cover Iraqi TTW and that its specific area of responsibility will extend southward from Buoy 36 in the Khawr Abd Allah (KAA) and the mouth of the Shatt Al Arab (SAA), out to the 12-mile TTW boundary.

Economic characteristics

We posit that Iraq's commercial and economic activity may develop in the following ways:

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[11] Senior Iraqi Navy officials encouraged us to consider such a development.

[12] Equipment for the COIN mission was approved during the most recent acquisition process, and the Iraqi Navy has already signed contracts for obtaining the equipment.

- Oil production will increase from today's production rate of approximately 2.0 million barrels per day to a production rate of approximately 3.3 million barrels per day. We posit this assumption based on the projection of the U.S. Department of Energy's Energy Information Administration regarding future Iraqi oil production capacity.[13]

- Regional trade and economic activity will increase significantly. While insecurity is a key factor undermining economic activity, an increase in security – whether through peaceful resolution to conflict or improved methods of assuring safety – will lead to an increase in economic activity. Iraq has been isolated from international and regional trade for decades, and, given the opportunity, the trade relationships and economic activity can only increase.

- Commercial and civilian maritime traffic will increase as regional trade and economic activity increase. Southern Iraq is home to many important cultural and religious sites that may attract visitors from around the region.

Resource constraints

The Iraqi Navy may face resource constraints that could impact its ability to acquire and operate all of its desired forces, although it is impossible to determine the types and severity of those constraints. Assessments of the Iraqi Navy today provide insight into the aspects of development that could have a long-term impact on the development of the Iraqi Navy.

The first constraint that we identified is funding, in terms of the scarcity of and competition for the Iraqi government's funds, and the politics involved in spending money. While our previous assumption of an increase in production of Iraqi oil implies that Iraq will not be a poor country, it does not mean that Iraq will be wealthy or that money will be available for the Iraqi Navy. Given our strate-

[13] International Energy Outlook 2007, U.S. Department of Energy, Report #: DOE/EIA-0484(2007), Release Date: May 2007.

gic assumptions, in 2015 Iraq will be recovering from decades of economically devastating sanctions, interstate wars, and domestic civil strife, and an increase in oil wealth will not be sufficient for addressing all of the country's needs.

When money is available for the military, the Iraqi Navy will have to compete with other security forces. Ground forces have traditionally received most of the military funding in Middle Eastern countries, and currently the Iraqi Navy receives only a small portion of the defense budget. Therefore, even when money is available for military expenditure, the Iraqi Navy will have to compete politically to gain access.

The second constraint that we identified is jointness. Currently the Iraqi military does not have a joint doctrine and does not practice joint exercises or operations. The capability to conduct joint operations take years to develop; thus, it is plausible that the Iraqi military services will not be operating jointly by 2015. As a result, assets and capabilities located in another part of the military may not be accessible to the Iraqi Navy, thereby constraining its potential resources.

The third constraint relates to military culture. In the current operational environment, Iraqi Navy personnel have been reluctant to spend significant periods of time away from their homes and families. This is understandable in the current security environment; however, it may be a part of military culture that continues after the security situation improves. If the Iraqi Navy cannot sustain operations at sea for several days at a time, it may have completing missions that require multiple-day and/or overnight operations.

In addition, the Iraqi Navy will have to overcome the challenges that it currently faces in several areas: the development of operational capabilities, the acquisition process, logistics support, C2 for a larger mission set, and political support for the navy.

Missions, CONOPS, and capabilities

Next in our study, we identified four critical missions for the Iraqi Navy in 2015.[14] In this section, we define each mission and the respective CONOPS, operational tasks, and capability requirements that we derived for that mission. We also provides options for representative equipment options that would satisfy these capabilities requirements.

Mission: Protect the oil platforms

Today, the Iraqi Navy's primary mission is to protect Iraq's two oil platforms in the Northern Arabian Gulf: the Al Basrah Oil Terminal and Khawr Al Amaya Oil Terminal (ABOT and KAAOT, respectively). These two oil terminals currently pump approximately 2 million barrels of oil each day into tankers for export to the world market and account for approximately 90 percent of the Iraqi government's revenue. The oil platforms are expected to remain the lifeblood of Iraq's economy out to 2015 and beyond; hence, the OPLAT protection mission will remain a paramount responsibility of the Iraqi Navy.

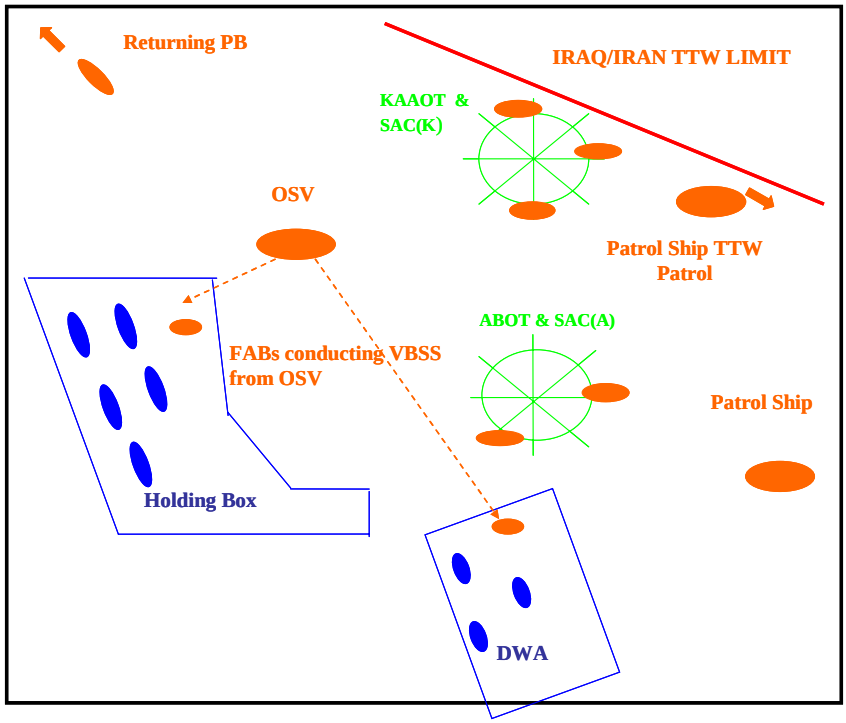
CONOPS

The CONOPS for protecting the OPLATs (figure 1) is based upon the coalition transition plan for the Iraqi Navy. The CONOPS entails persistent (24/7) deployment of a mix of small and medium-sized surface ships in concentric rings of protection around the OPLATs in order to deny unauthorized access to the waterspace surrounding the platforms. This protection is enhanced by security

[14] CNA identified future missions based upon stated Iraqi Navy policy and plans (Ministry of Defense and Iraqi Navy), interviews with Iraqi Navy leadership, discussions with CTF, NaTT, and MNSTC-I.

sweeps of tankers that are authorized to approach the OPLATS by teams with VBSS capabilities to investigate unknown or suspect vessels. A common operational picture and command and control of forces involved in the OPLAT protection mission will be sustained on scene from both fixed and afloat locations.

Figure 1. CONOPS for OPLAT protection mission



Operational tasks associated with CONOPS:

- Conduct intelligence and surveillance operations.
- Identify and monitor exclusion zones.
- Establish common operational picture (COP).
- Communicate with maritime traffic (hail, query, warn of exclusion zone).
- Conduct MIO/VBSS.
- Conduct security sweeps at deep-water anchorage (DWA).
- Attack enemy targets.

- Coordinate local area operations, exclusion zone enforcement, small boat operations, ship position, aircraft control, and fire coordination.
- Sustain communications and information sharing with headquarters ashore.

Associated capabilities

For the OPLAT protection mission, the capability to *observe* entails maintaining wide-area situational awareness and the ability to positively identify commercial, military, and unknown surface contacts. The capability to *react* focuses on denying and controlling access to the OPLATs and protecting them from attack. The capability to *coordinate* covers forces in the immediate area of operations, commercial and other maritime traffic, and fixed locations on the OPLATs and ashore.

Observe

To be capable of protecting the OPLATs, the Iraqi Navy must first have and maintain situational awareness by continuously monitoring all surface traffic in the vicinity of the platforms. According to Iraqi and coalition plans, the Iraqi Navy must be able to identify all surface vessels within 3,000 yards of the OPLATs, and all vessels in the deep-water anchorage, to detect vessels operating at speeds greater than 20 knots, and to maintain awareness of all other military vessels in the vicinity (including outside Iraqi TTW).[15]

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Fixed radars on OPLATS
- Automatic identification system (AIS) receivers (OPLATs, towers, or other fixed sites)

[15] Iraqi Navy and USN Staff Talks, *Iraqi Navy Future CONOPS and C2*, Iraqi Navy Operations Commander, 25 February 2007.

- Radars on patrol ships (PS), patrol boats (PBs), fast aluminum boats (FABs)[16]
- Forward-looking infrared (FLIR) or other day- and night-capable electro-optical, infrared cameras
- Unmanned Airborne Systems (UAS) (for example, Scan Eagle, Wasp, Aerostat)
- Manned observations posts (binoculars, etc.).

React

Protecting the OPLATs also requires the capability to control access to the platforms 24 hours per day, every day. Specifically, this means establishing a 3,000-yard exclusion zone around the OPLATs and preventing unknown, unauthorized, or hostile forces from approaching them.[17]

To enforce the exclusion zone and control access to the OPLATs, the Iraqi Navy needs to be able to quickly react and warn vessels that are 3,000 yards away from the OPLATs, exclude vessels 2,000 yards away, engage with direct fire at a vessel 1,000 yards away, and provide a very robust point-defense capability within 1,000 yards of the OPLATs. For friendly vessels that have a legitimate need to approach the OPLATs (e.g., oil tankers), the Iraqi Navy needs the ability to board and search the vessel and escort it to the OPLAT.[18]

In order to react to unknown contacts or to determine the nature and cargo of observed contacts, the Iraqi Navy will need the capability to carry out VBSS operations.

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[16] FABs are also called fast attack craft and fast attack boats. The Iraqi Navy currently used the term "fast aluminum boat" to describe its small, rigid-hull craft.

[17] The forces cycle between UQNB and the OPLATS, returning periodically to UQNB for maintenance, rest, and training. Forces engaged in OPLAT protection will not be removed from that mission to support another mission unless they are in the maintenance, rest, and training part of the deployment cycle.

[18] Iraqi Navy and USN Staff Talks, *Iraqi Navy Future CONOPS and C2*, Iraqi Navy Operations Commander, 25 February 2007,

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Floating barriers
- Armed personnel afloat on the OPLATs to provide point defense
- Patrol boats (five on-station at all times)
- Patrol ships (two on-station at all times)
- Off-shore support vessels (one on-station at all times)
- Fast aluminum boats (several on-station at all times)
- Armed aircraft (for overwatch of VBSS teams).

Coordinate

Protection of the oil platforms also requires a constant C3 capability. The Iraqi Navy needs to be able to communicate with its forces in a secure manner and with other relevant parties in its TTW at all times.

The CONOPS for OPLAT protection requires forces protecting the OPLATs to be under the tactical control (TACON) of the deployed asset responsible for C2, not Iraqi Navy headquarters at UQNB. However, forces involved in the OPLAT protection mission will need to contribute to and maintain the operational picture at the Iraqi Navy headquarters at UQNB.

Constant C3 requires the on-scene commander to coordinate and direct activities of the Iraqi Navy forces in a secure manner and to communicate with other vessels in the area via open (i.e., commercial) channels. Individual Iraqi Navy units, including those conducting other missions, also need to be able to communicate with each other and with the command center at the Iraqi Navy headquarters in Umm Qasr. Finally, the Iraqi Navy will need to be able to develop, monitor, and share precision locating and tracking data and accurately relay this information.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Secure voice communications (ship-to-ship, ship-to-aircraft, ship-to-shore)
- Sustained real-time data connectivity between OSVs, tactical operations centers (TOCs), and UQNB (for shared operational and tactical picture)
- Commercial-band radio (for contact with mariners)
- Public address, long-range acoustics device (LRAD), or other direct means to hail non-responsive vessels
- C3 suite for TACON of multiple surface vessels (TOC, OSV, etc.).

Mission: Conduct maritime security operations

The second mission of the Iraqi Navy is to conduct maritime security operations (MSO). The focus of MSO is to preserve the free and secure use of the water space by legitimate mariners, and to prevent terrorists and smugglers from using the maritime environment as a venue for attacking/launching an attack onshore or transporting illicit materials.[19]

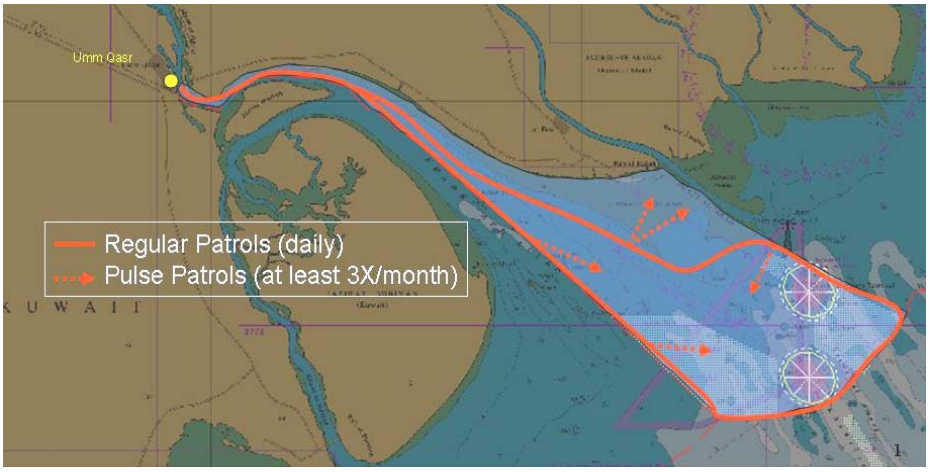
CONOPS

The CONOPS for maritime security operations (figure 2) entails monitoring maritime traffic in Iraqi territorial water (including ports and the KAA), identifying prospective threats to maritime security, and interdicting illicit, dangerous, or illegitimate users of Iraqi waters. It involves the integration of diverse sensor data and information sharing and coordination between dispersed units and with shore facilities. Maritime security operations also require presence patrols, frequent queries, inspections, and other interactions

[19] Derived from NAVCENT's definition of MSO. www.navcent.navy.mil

with maritime traffic, and, when necessary, interdiction and the use of force against threats to maritime security.

Figure 2. CONOPS for MSO mission



Operational tasks associated with CONOPS:

- Conduct intelligence and surveillance operations.
- Monitor surface traffic in Iraqi TTW.
- Identify prospective threats to maritime security.
- Establish COP.
- Conduct presence operations and patrols.
- Conduct small boat operations.
- Conduct maritime law enforcement operations.
- Communicate with maritime traffic (hail, query).
- Conduct MIO/VBSS.
- Attack enemy targets.
- Assist mariners in distress.
- Conduct search and rescue operations.
- Coordinate surface and air operations.

- Sustain communications and information sharing between afloat forces and with headquarters ashore.

Associated capabilities

For the MSO mission, the capability to *observe* entails maintaining wide-area situational awareness, the ability to target collections and information gathering to a particular area, and the ability to positively identify commercial, military, and unknown surface contacts. The capability to *react* focuses on having periodic presence in important areas of Iraqi TTW, being able to shift and/or surge forces to respond to threats, and having sufficient force to dominate the area of operations in order to counter or overcome sources of insecurity. The capability to *coordinate* covers forces in the territorial waters and other maritime traffic, and fixed locations at UQNB and other locations ashore.

Observe

To conduct MSO, the Iraqi Navy must be able to maintain situational awareness within its water space. Specifically, it must be able to identify all vessels the size of a dhow or larger in its TTW during both day and night operations, regardless of the weather or sea state conditions. Additionally, it must be able to visually identify surface contacts and interact with personnel aboard maritime traffic in Iraqi TTW. Because direct interaction with local and transiting mariners can provide a rich source of information and intelligence, the ability to both query and board ships helps the navy observe and analyze conditions in the maritime environment.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- UAS (e.g., Scan Eagle, Wasp, Aerostat)
- Surveillance aircraft (i.e., helicopter or fixed-wing)
- VHF radar or similar wide-area surface search radar
- Patrol ships, PBs, or other platforms capable of sustained presence in important areas of Iraqi TTW

- Shallow-draft, highly maneuverable craft (FABs, 25′ Defender-class SAFE Boats) for shallow and restricted water operations
- Fixed radars on OPLATS
- Radar-equipped patrol ships, PBs, FABs
- AIS receivers (OPLATs, towers, or other fixed sites)
- FLIR or other day- and night-capable electro-optical, infrared cameras
- Commercial-band radio (for contact with mariners)
- Public address, LRAD, or other direct means of hailing non-responsive vessels.

React

MSO requires sustained presence, and the abilities to respond quickly to events in the TTW, to deter illicit activities, and to provide appropriate security for mariners within the TTW. It also requires the capability to dominate the area of operations by shifting and/or surging forces as needed. Important capabilities include regular patrols of primary channels and sea lanes, maritime borders, and other areas of potential vulnerability, supplemented by occasional pulses or surges of additional forces (as a planning assumption, we defined the pulse rate as three times per week). Key capabilities include the abilities to conduct VBSS operations at all times, to locate and assist mariners in distress, to identify and disrupt illicit maritime traffic, and to destroy direct threats to maritime security.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Large patrol craft (e.g., WPB or medium endurance cutter (WMEC)) (one deployed at all times)
- Fast, shallow draft patrol craft (e.g., Defender-class SAFE Boats/Boston Whalers) (two deployed at all times)
- Armed helicopters (e.g., Seahawk, HIND, Super Cobra, Hip) (one deployed/ready to deploy at all times)

- Surveillance aircraft (i.e., helicopter or fixed-wing) (one deployed daily).

The Iraqi Navy also needs the capability to continuously monitor all actions within the ports/harbors and respond quickly to an emergency there.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Small, armed harbor patrol boats (e.g., Defender-class boats) (one deployed at all times in each port/harbor)
- Marine barriers around port facilities (e.g., nets, floating barriers)
- Land barriers around port facilities (e.g., fence)
- Surveillance equipment (e.g., video camera, night vision equipment, binoculars)
- Full radar coverage of port area.

Coordinate

Given that MSO will occur throughout Iraqi TTW, the Iraqi Navy will need to be able to execute both TACON and OPCON of forces from UQNB, with the option of passing TACON to a local commander afloat (e.g., on an OSV). Additionally, since forces executing MSO tasks may operate near OPLAT protection forces, or near harbor patrol forces, the ability to communicate and coordinate across the force will be important.

Since information gathered from fixed sensors and afloat forces must be fused to create maritime domain awareness, and supplemented by intelligence (including human intelligence (HUMINT), and airborne surveillance information) the Iraqi Navy will need to be able to develop and share a common operational picture.

While the Iraqi Navy units and UQNB will need to be able to pass information via secure means, afloat forces will also need to be able to communicate with a range of mariners in and around Iraqi TTW. Prospective communications capabilities include HF, VHF, and loudspeaker hails.

Finally, the Iraqi Navy will need an accurate means of identifying and sharing location data. This may require such capabilities as global positioning system (GPS) navigation, detailed grid-maps, radar ranging, and/or radio frequency (RF) direction finding.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Secure voice communications (ship-to-ship, ship-to-aircraft, ship-to-shore)
- Sustained real-time data connectivity between OSVs, TOCs, and UQNB (for shared operational and tactical picture)
- Commercial-band radio (for contact with mariners)
- Public address, LRAD, or other direct means of hailing non-responsive vessels
- C3 suite for TACON of multiple surface vessels (TOC, OSV, etc.)
- GPS and other navigation and location aids.

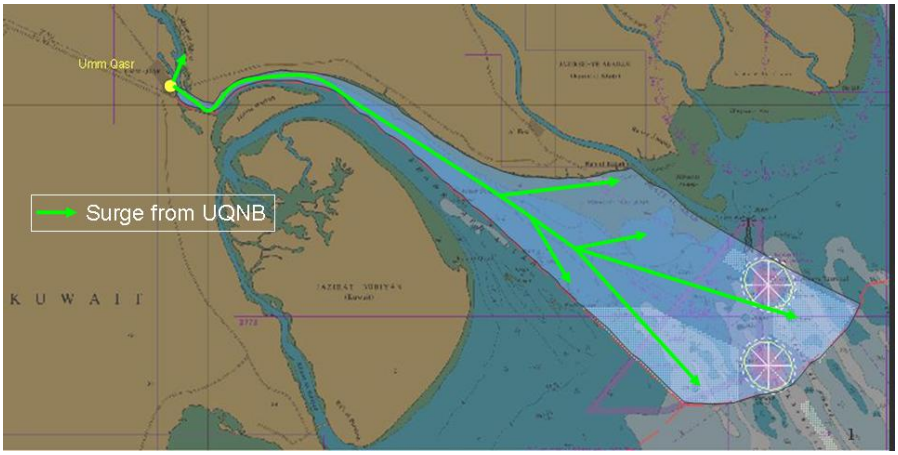
Mission: Respond to man-made or natural disasters

The Iraqi Navy also has a mission to respond to man-made or natural disasters and conduct appropriate consequence management. Man-made and natural disasters threaten safety and security at sea and ashore. Given the offshore oil infrastructure and heavy tanker traffic, the potential for disasters involving oil spills is substantial. Disasters may also affect Iraq's limited commercial maritime infrastructure and critical navigable waterways.

The CONOPS for this mission (figure 3) calls for the Iraqi Navy to respond quickly to disasters and take immediate control of the proximate maritime environment in order to minimize additional damage or loss of life. The Iraqi Navy will need to identify the nature and scale of the disaster; evacuate affected personnel/mariners, when necessary; cordon off or otherwise exclude non-essential maritime traffic; and coordinate the swift introduction

of national, international, and/or private sector response, mitigation, and recovery capabilities.

Figure 3. CONOPS for disaster response mission



Operational tasks:

- Conduct intelligence and surveillance operations.
- Monitor surface traffic in Iraqi TTW.
- Assist mariners in distress.
- Conduct search and rescue operations.
- Coordinate surface and air operations.
- Identify and monitor exclusion zones.
- Communicate with maritime traffic (hail, query, warn of exclusion zone).
- Coordinate local-area operations, exclusion zone enforcement, small boat operations, ship position, aircraft control, and fire coordination.
- Communicate with friendly maritime forces and commercial shipping vessels.

Associated capabilities

For the disaster response mission, the capability to *observe* entails maintaining wide-area situational awareness, and being able to positively identify commercial, military, and unknown surface contacts. It also entails the ability to visually identify/survey disaster scenes. The capability to *react* focuses on surging capabilities to the location of a disaster, establishing immediate control over the scene, and enabling the response of appropriate capabilities to mitigate, manage, and recover from the event. The capability to *coordinate* covers forces in the territorial waters, other maritime traffic, and fixed locations at the OPLATs, the UQNB, and other locations ashore. In addition, this capability includes the ability to coordinate with foreign governments or their militaries and private sector businesses to conduct salvage/disaster response activities.

Observe

To respond to a disaster, the Iraqi Navy must be able to detect and identify an emerging or developing disaster in its TTW, day or night. It must also be able to receive and analyze information about disasters or potential disasters from other sources, including mariners, regional partners, open-source media reporting, and intelligence sources.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- UAS (e.g., Scan Eagle, Wasp, Aerostat)
- Surveillance aircraft (i.e., helicopter or fixed-wing)
- Wide-area surface search radar (e.g., J/I-band radar)
- Patrol ships, PBs, or other platforms capable of sustained presence in important areas of Iraqi TTW
- Shallow-draft, highly maneuverable craft (FABs, 25′ Defender-class SAFE Boats) for shallow and restricted water operations
- AIS receivers (OPLATs, towers, or other fixed sites)

- FLIR or other day- and night-capable electro-optical, infrared cameras
- Commercial-band radio (for contact with mariners)
- Public address, LRAD, or other direct means of hailing non-responsive vessels

React

Once the Iraqi Navy identifies a disaster, it needs the capability to respond quickly – either with forces already on patrol or with additional forces from headquarters. It must have a surge capacity for search and rescue (SAR) and the ability to control access/protect other mariners from entering into a dangerous/disaster area, to mark and monitor disaster areas, and to direct follow-on capability providers.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Patrol craft (e.g., PC, WPB, WMEC) (one ready to deploy at all times)
- UAS (e.g., Scan Eagle, Wasp, Aerostat)
- Surveillance aircraft (i.e., helicopter or fixed-wing)
- Helicopter for search and rescue (one ready to deploy at all times)
- Marine barriers (e.g., floating barriers, warning signs)
- Helicopter (e.g., Sea Hawk) (one ready to deploy at all times)
- Commercial-band radio (for contact with mariners)
- Public address, LRAD, or other direct means of hailing non-responsive vessels.

In addition, the Iraqi Navy also needs the capability to quickly control access to the area and prevent maritime traffic from entering the disaster area.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Marine barriers (e.g., floating barriers, warning signs)
- Helicopter (e.g., Sea Hawk) (one ready to deploy at all times).

Coordinate

For the disaster response mission, forces will be under the OPCON and TACON of Iraqi Navy headquarters at UQNB, unless a disaster occurs within the OPLAT exclusion zone, in which case the TACON will switch to the OPLAT protection forces. C3 for response forces will need to be exercised across Iraqi TTW. As the Iraqi Navy identifies and responds to a disaster, it will need the capability to communicate with its own forces and potentially with the maritime forces of neighboring countries and with commercial and private maritime traffic. This includes the abilities to receive reports of disaster incidents/calls of distress from all vessels in its TTW, and to warn other mariners of a dangerous situation. In addition, it will need the capability to coordinate with commercial entities—and, if necessary, to direct them—in certain recovery efforts after the disaster.

For this capability area, the Iraqi Navy could employ the following types of equipment:

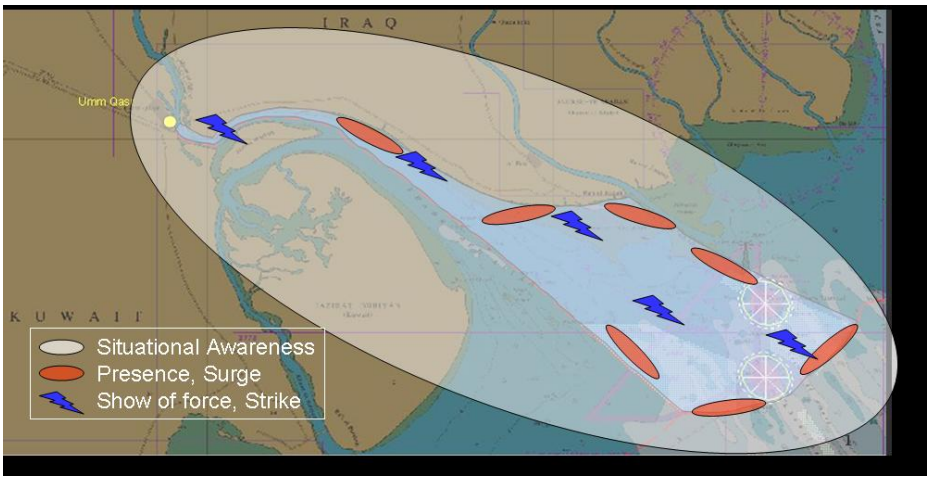
- Commercial-band radio (for contact with mariners)
- Public address, LRAD, or other direct means of hailing non-responsive vessels.

Mission: Defend territorial waters

According to guidance from the Iraqi MOD, the primary long-term mission of all of Iraq's military forces is to protect Iraqi sovereignty. For the Iraqi Navy, this mission focuses on the defense of Iraqi TWW from all prospective threats. As part of the national security forces of Iraq, the Iraqi Navy must be able to defend its TTW from conventional and unconventional threats in the maritime environment, 24 hours per day, every day.

The CONOPS for the defense of Iraqi territorial waters (figure 4) includes **deterring and disrupting** aggression by a state with a sizable naval force, **defeating** any attack by a limited-size conventional or mixed conventional/unconventional force, and **identifying and neutralizing** irregular forces that might conduct conventional or unconventional attacks. The CONOPS focuses on defense of Iraqi TTW, but it also entails monitoring activities and forces that originate beyond the TTW. This CONOPS relies on accomplishing the mission without reallocating forces from the OPLAT protection mission.[20]

Figure 4. CONOPS for TTW defense mission



Operational tasks:

- Conduct intelligence and surveillance operations.
- Establish common operational picture.
- Attack enemy targets.
- Conduct show-of-force operations.
- Conduct presence operations.

[20] The preservation of the OPLAT protection mission is critical to the survival of the state. Potential adversaries may attack elsewhere in the TTW in order to lure Iraqi Navy forces away from the OPLATs, rendering them vulnerable to an attack.

- Conduct local air defense.
- Protect sea lines of communication (SLOCs).
- Perform combat search and rescue operations.
- Conduct mine countermeasures operations.
- Conduct explosive ordnance disposal operations.
- Conduct information operations.
- Interdict shipping vessels.
- Coordinate local-area operations, exclusion-zone enforcement, small-boat operations, ship position, aircraft control, and fire coordination.
- Sustain communications and information sharing with headquarters ashore.

Associated capabilities

For the TTW defense mission, the capability to *observe* entails maintaining wide-area situational awareness, the ability to target situational awareness to a particular area, and the ability to positively identify commercial, military, and unknown surface contacts. The capability to *react* focuses on dominating the area of operations, demonstrating the ability to strike, and responding quickly to an attack. The capability to *coordinate* covers forces in the territorial waters and other maritime traffic and fixed locations at the OPLATs, UQNB, and other locations ashore.

Observe

As with its other missions, in order to defend its TTW, the Iraqi Navy needs the capability to see and identify ships and craft operating within and beyond its TTW. Specifically, it needs the ability to monitor its operating environment day and night, and to identify all vessels the size of a dhow or larger that are in, or are approaching, its TTW. The Iraqi Navy also needs the capability to rapidly assemble/focus capabilities for targeted situational awareness, in order to respond quickly to quickly investigate unusual activity or closely observe all activities within a limited area.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Fixed wide-area search radars (on OPLATS, on shore)
- AIS receivers (OPLATs, towers, or other fixed sites)
- Radars on patrol ships, PBs, FABs
- FLIR or other day- and night-capable electro-optical, infrared cameras
- UAS (e.g., Scan Eagle, Wasp, Aerostat)
- Manned observations posts (with binoculars, night-vision equipment, etc.)
- Surveillance aircraft (i.e., helicopter or fixed-wing)
- Armed helicopter.

React

To deal with an identified threat, the Iraqi Navy needs the capability to conduct a variety of strike operations to disrupt, neutralize, or defeat an enemy attack by delivering a blow to enemy forces.

The Iraqi Navy may need the capability to respond quickly to a threat and defeat the enemy by employing fires from a variety of positions (long distance, close distance, air). Because the Iraqi Navy's potential adversaries in 2015 could range from a conventional naval force, to a smaller force with limited conventional capabilities, to an unconventional non-state actor, the capabilities requirements for this mission area represent a broad spectrum.

The Iraqi Navy also needs the capability to conduct VBSS or infiltrate a hostile vessel anywhere in its TTW at any time of the day or night.

The Iraqi Navy may need the capability to respond to, defeat, neutralize, or deter a highly specialized attack through the employment of specialized forces in a limited area. Because Iraq and other NAG countries have a history of employing mine warfare and other explosive ordnance, the Iraqi Navy may need additional equipment and expertise to deal with a specialized attack/counter attack.

Finally, the Iraqi Navy also needs the capability to conduct SAR operations, in order to quickly locate and recover overboard personnel or to locate enemy combatants anywhere in the TTW at any time of the day or night.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Coastal artillery on the Al Faw peninsula
- Coastal defense cruise missiles
- Armed helicopters (e.g., Sea Hawk or Super Cobra with Hellfire missiles) (one or two minimum)
- Patrol ships with naval guns (e.g., PCs, WPB) (one or two)
- Missile boat (one)
- Point air defense capabilities (e.g., MANPADS)
- Mine countermeasures capability (e.g., divers and minesweeping boats)
- Explosive ordnance disposal team
- Patrol craft (e.g., PC, WPB, 25′ Defender-class SAFE Boats) (one or two minimum)

Coordinate

The Iraqi Navy also needs the capability to conduct robust C3 across its TTW. It may need to coordinate multiple task groups (for example, a surface action group and the OPLAT protection forces). It will need the ability to direct and coordinate a quickly maneuvering and dispersed force. It will require rapid and robust information and intelligence-sharing capabilities.

Communications will have to be reliable and secure. The Iraqi Navy will need some capacity to transition its C2 headquarters from the UQNB to another location ashore or afloat.

The Iraqi Navy will also have to be able to coordinate across a broad sea-air battle space in order to synchronize and deconflict surveil-

lance, attack, and search and rescue aircraft; air defenses; and fires that originate from the shore.

For this capability area, the Iraqi Navy could employ the following types of equipment:

- Shared COP between UQNB, the OPLATs, and other fixed locations (e.g., computers, radar links)
- Secure voice communications (ship-to-ship, ship-to-aircraft, ship-to-shore)
- Sustained real-time data connectivity between OSVs, TOCs, and UQNB (for shared operational and tactical picture)
- Afloat C3 suite for TACON of multiple surface vessels (e.g., TOC, OSV)

Force structure recommendations

In the final analytic step of our study, we examined the different ships, craft, systems, weaponry, and units that would satisfy the requirement for the capabilities we had derived. We identified areas in which platforms, weaponry, and skill sets could create a synergy and derived a force structure that fulfills the Iraqi Navy's capability requirements, provides operational flexibility, and seeks to minimize the number of different classes within the force structure.

Summary of platforms types needed to fulfill capability requirements

Missions

For OPLAT protection we leveraged existing force structure plans and periodicity rates to identify the number of forces necessary. For this mission, we adopted the current Iraqi Navy plan for satisfying this requirement: 15 PBs, four PSs, and two OSVs.

We determined that the following forces will be appropriate for maritime security operations: one armed helicopter; two fast, armed, shallow-draft boats for patrolling TTW; one patrol boat with an endurance of several days at sea; and one small harbor patrol craft per each port/harbor.

We determined that the Iraqi Navy will need the following for disaster response: one helicopter (available at all times) and one fast, shallow-draft response boat.

The Iraqi Navy could use many assets to defend territorial waters. We determined that, for a defensive and deterrent posture, it will need the following: one armed helicopter; one small, fixed-wing aircraft; several armed, shallow-draft patrol craft; coastal artillery on the Al Faw peninsula; and one additional patrol boat with arma-

ment appropriate for anti-surface warfare against other similar-sized naval vessels. In addition, the Iraqi Navy will need to use units with specialized skills in explosive ordnance disposal and mine countermeasures.

Supporting activities across all missions

The following surveillance equipment will allow the Iraqi Navy to maintain maritime domain awareness: fixed radar towers onshore and offshore (in such locations as Umm Qasr, Al Faw, and on an OPLAT or tower in Iraq's TTW); AIS receivers; equipment that will enable it to collect HUMINT from deployed systems on patrolling craft; and electro-optical and infrared (EO/IR) capability, such as FLIR, on surveillance aircraft (either small fixed-wing or helicopter).

The Iraqi Navy needs the following equipment for communication: secure communications (radio, IP), unsecured communications (commercial radio, LRAD, cell phone, etc.) marine barriers (nets, floating barriers), and warning signs.

Force structure recommendations

This section describes our recommended force structure, which satisfies the capability requirements derived in this analysis. Table 1s displays the ships and craft, weaponry, and equipment that satisfy the capability requirements for the Iraqi Navy's force structure.

Table 1. Iraqi Navy force structure requirements[21]

	Rotation ratio	OPLAT protection*	Maritime security operations	Disaster response	Defend TTW	Number deployed regularly	Number to surge	Total
Boats/Craft								
Fast, armed, shallow-draft boat	3:1		x			2	1	**6**
Large, overnight patrol boat	2:1		x					
with small boat launch capability				x				
with weapons			x	x	x	1		**2**
Harbor patrol craft	3:1		x			1		**3****
Aircraft								
Helicopter	3:1		x	x	x			
with weapons			x		x	1	1	**3**
Surveillance equipment								
Radar	1:1	x	x	x	x	1		**1**
AIS	1:1	x	x	x	x	1		**1**
FLIR (on helicopter)	1:1	x	x	x	x	1		**1**
Weaponry								
Coastal artillery	1:1				x	1		**1**
Naval guns	1:1				x	2		**2**
Supporting equipment								
Secure comms (radio and phone)	1:1	x	x	x	x			
Marine barriers	1:1	x	x	x				
Warning signs	1:1	x	x	x				

* We assumed the 15/4/2 force structure is complete, and included only additional capabilities in this chart
** Per port/harbor

We also examined the employment concept for the planned 15/4/2 force structure for the OPLAT protection mission and sought ways to maximize the utility of those ships, craft, and forces that the Iraqi Navy will already possess. We identified two assets from the 15/4/2 force structure that the Iraqi Navy may leverage for additional use in other mission areas without interfering with the OPLAT protection CONOPS. When transiting to and from the OPLATs, the Iraqi Navy's 15 patrol boats and four patrol ships (large patrol boats) may be able to extend their deployments by hours or days in order to conduct patrols in support of maritime security operations, thereby lessening the burden on the rest of the fleet.

[21] We derived the total number of assets for each ship, craft, weapon, or piece of equipment by multiplying the rotation ratio by the number of assets deployed regularly, taking into consideration the need to have the capability to surge. For example, fast, armed patrol boats have a rotation rate of 3:1, and two need to be deployed regularly; thus, the navy needs a total of six fast, armed patrol boats.

Ships and craft

Fast, armed, shallow-draft patrol boats are important to the Iraqi Navy force structure because much of Iraq's TTW is very shallow (in many areas averaging less than five feet), and the navy needs some craft with which it can patrol the entire TTW. These craft also need to be fast, in order to conduct MIO and to respond quickly to disasters or mariners in distress. Finally, the craft need to be armed (e.g., with machine guns and perhaps grenade launchers) to support VBSS teams for MSO and TTW defense. Two boats with these characteristics are the U.S. Special Operations Craft – Riverine (SOC-R) and the Small Unit Riverine Craft (SURC). Another example is the Patrol Boat – Riverine (PBR), found in the force structures of Romania and Sri Lanka.[22]

Patrol boats capable of multi-day deployments are important to the Iraqi Navy's force structure because they enable the navy to have constant presence and deterrent capability in the TTW. If such patrol boats have a small-boat (RHIB or similar) launch capability and can accommodate a VBSS team, they can respond to disasters, assist distressed mariners, or conduct a boarding. If the patrol boat is armed with MANPADS, mounted machine guns, and anti-surface weapons (such as 40-76mm guns), it will have additional MSO capability for VBSS, and the firepower capabilities required for the TTW defense mission.

Harbor patrol craft become important as the amount of commercial and other traffic increases in and around Iraqi ports. These small patrol craft can provide a constant presence in the port/harbor, visit incoming ships, conduct compliant boardings, and provide a limited defense against a rogue small-boat intrusion or attack.

Helicopters are key to conducting and supporting many of the Iraqi Navy's missions. They can provide surveillance (wide-area search, platform for EO/IR sensors), and search and rescue capabilities. Helicopters armed with machine guns and/or snipers can provide overwatch for VBSS teams in potentially hostile situations and can serve as a deterrent to criminal activity. Helicopters armed with mis-

[22] *Jane's Fighting Ships*, 2007.

siles (such as the Penguin or Sea-Skua) helicopters can provide potent anti-surface capabilities for MSO and TTW defense missions. Other aircraft (such as small, fixed-wing planes) may provide some of these required capabilities, but helicopters fulfill a broader range of capabilities and, therefore, add greater utility to the overall force structure. In addition, a force structure with a single type of aircraft requires less training and less logistical and maintenance support than a force structure with both rotary- and fixed-wing aircraft.

Systems

Radar is important to the Iraqi Navy force structure because it provides constant surveillance capabilities for the Iraqi Navy's entire operating area and beyond. Radar with an I- or J-band surface-search capability will allow the Iraqi Navy to securely detect and track surface objects in its TTW throughout the day and night and in most weather conditions.

AIS is important to the Iraqi Navy's surveillance and situational awareness capability. It allows participating vessels to transmit information about the position, course, speed, and other characteristics of the ship, making identity and pinpointing of ships easier. AIS is required by the IMO on ships of 300 or more gross tons, but is optional for smaller ships, and can be turned off at any point in time. Because AIS is elective and does not provide information on all vessels in the TTW, it is best suited for use in conjunction with radar.

FLIR is important for the Iraqi Navy's force structure because it fulfills the capability requirement to visually observe, track, and target vessels in the TTW in the dark and through atmospheric obscurants, such as smoke, fog, or haze. FLIR can be used to maintain situational awareness for any mission, to acquire and track targets for TTW defense, and to locate mariners in distress in search and rescue or disaster response operations. FLIR may present maintenance and technology challenges for the Iraqi Navy, but it can fulfill unique surveillance capability requirements when used in conjunction with aircraft.

Weapons

When we examined the capability requirements, we also determined that the Iraqi Navy may need several new types of weapons in the future. Some of these weapons would reside on the platforms we identified, while others would call for a modification to or an increase in the Iraqi Navy's firepower capabilities.

The Iraqi Navy's capability requirements indicate the need for a variety of weapons across ships, craft, and missions. To achieve its missions—particularly TTW defense and maritime security operations—the Iraqi Navy needs the capabilities that are provided by the following weapons: coastal artillery, naval guns or other anti-surface weapons; MANPADS for unit self-protection; and localized air defense for maritime installations.

Coastal artillery is well suited to the Iraqi Navy's needs. It provides the capability to target a sizable attacking force (through saturation fire of specific areas), it enables area denial, and it is an affordable and visible way to conduct show-of-force operations. Given the commercial traffic—to include tankers—in the NAG, and the presence of significant offshore infrastructure, coastal artillery avoids some of the disadvantages of cruise missiles, which may lock on inappropriate or unintended targets.[23] In addition, given the Iraqi military's long experience with the employment of artillery—including operations in and around the Al Faw peninsula—it may be a relatively easy capability to develop and deploy. This also may be a capability that the Iraqi Navy can leverage from within the Iraqi land forces.

Units

While we did not assess the total manpower requirement to operate and sustain the force structure, we identified areas where highly trained individuals may provide specialized skills, thereby increasing the Iraqi Navy's overall capability and capacity. Based on our as-

[23] Coastal artillery is not without targeting risks (such as misidentification, wind direction and mis-aiming), but the potential kill range of an errant missile poses what we consider to be a greater risk.

sessment of the Iraqi Navy's prospective requirements to execute its TTW defense mission, the navy needs a mine countermeasure capability (MCM) (including divers and mine-sweeping equipment), and the capabilities of an explosive ordnance disposal (EOD) team, VBSS teams, and point defense.

By their nature, highly specialized skill sets require a significant amount of time and financial investment to develop. The Iraqi Navy may be able to procure these skill sets through a variety of ways. It could grow them within its own ranks (as it has begun to do for VBSS teams and point defense)—although this approach requires a significant investment of resources. For skill sets that are needed less often (such as MCM capabilities or EOD teams) the Iraqi Navy may be able to coordinate with other services (Iraqi Army, Iraqi Air Force) to develop joint capabilities or leverage extant capabilities within them. Joint operations might require less Iraqi Navy investment while still providing the requisite skills. Another option may be for the Iraqi Navy to contract private security companies to provide these capabilities, although the Iraqi Navy may face security and bureaucratic hurdles with this approach.

In addition to these specialized skills, there is an additional capability requirement for the Iraqi Navy's force structure. In order to conduct several of its missions (OPLAT protection, MSO, TTW defense) as described above in the CONOPS, it must be able to operate at sea overnight, and in some cases, for several days or weeks at a time. This capability is critical to the successful completion of the Iraqi Navy's missions.

Other equipment options and capability requirements

Some equipment options and supporting capability requirements are not listed in the above force structures. These were omitted for several reasons.

Equipment options

We made recommendations for the Iraqi Navy's future force structure based on three factors: the ability of each ship or craft to be flexible in performing multiple types of missions; considerations of

sustainability within the force; and the associated costs of purchase, training, and maintenance/replacement. If a capability could be provided by an asset already resident in the force (or necessary for other missions), we did not include additional assets to duplicate that capability. For example, the Iraqi Navy could employ UAS for surveillance of its TTW, but the combination of radar, AIS, and aircraft with FLIR (all of which are necessary for other missions) satisfies the capability requirements for surveillance. Therefore, UAS are not included in the Iraqi Navy force structure recommendations, because while they would augment existing capabilities, they would not have the flexibility to fulfill other capability requirements (as would helicopters, for example).

Additionally, some equipment options (such as SCAN EAGLE) may be needed by the Iraqi Navy in the near term (1-8 years), given the navy's current capabilities and technical expertise. However, these short-term assets may become less important to the force structure as the Iraqi Navy develops the new areas of expertise for its more-flexible equipment options (e.g., helicopters). Given that this force structure recommendation is for 2015 and beyond, we assumed that the Iraqi Navy will seek to develop the capabilities and expertise required to support ships and craft for its future force structure.

Supporting capability requirements

While such supporting capabilities as maintenance, logistics, and training are important, we did not address their requirements in this study because they depend largely on the specific ships and craft in the Iraqi Navy force structure.[24] However, there are requirements for equipment, technology, and information tools specific to the Iraqi Navy's mission set, which will enable the Iraqi Navy to function efficiently and effectively.

The capability required for supporting and enabling the Iraqi Navy's force structure is found in: barriers, warning signs, secure communication equipment, a shared COP between UQNB and deployed forces, a method for the Iraqi Navy to communicate with the

[24] See earlier discussion of force structure options.

public, and a means of communication within the Iraqi security services and the Government of Iraq.

Barriers provide a low-technology exclusion capability that is easy to obtain and maintain, and they require very little support from the Iraqi Navy. Barriers to support the Iraqi Navy in OPLAT protection, maritime security operations, and disaster response are fences for port or harbor facilities, floating barriers, and marine nets to stop traffic or swimmers. Warning signs also provide a low-technology, cost-effective way of communicating in an exclusion zone. Signs reduce confusion and the chances of unintentional intrusion into an exclusion zone, which is important for OPLAT protection, maritime security operations, and disaster response.

Secure communications equipment will provide the Iraqi Navy with a reliable and protected way for its forces to communicate with each other and to coordinate their actions, regardless of their location in the TTW or at UQNB. This equipment is instrumental to developing an operational C3 capability to support all missions.

A shared COP between UQNB and secondary locations (including OPLATs and other deployed assets) will enable the Iraqi Navy to shift its headquarters to a secondary location (such as the OSV stationed at the OPLATs) in order to provide redundancy in C2 in case of an attack.

A method for the Iraqi Navy to communicate easily with the public (including mariners) will support the navy's disaster response and maritime security missions. This method could be used to issue public safety warnings and to receive reports of incidents or disasters in the TTW.

Finally, the Iraqi Navy also needs equipment and procedures to communicate within the Iraqi security services and the MOD in order to support the TTW defense and disaster response missions. If Iraq is attacked, or if the need arises for a specialized capability found only in the other services, the Iraqi Navy will need a system in place to communicate quickly and securely with other parts of the Iraqi government.