difference-makers in this new war: ♦In the last year, six CVBGs (Carrier Battle Groups) and seven ARGs (Amphibious Ready Groups) have sustained our Seals and Marines over 600 miles inland. ♦The USS Kitty Hawk (CV-63) deployed immediately to serve as a forward operating base for our special forces. ♦Carrier Aircraft have struck over 2,000 targets on missions that have sometimes lasted over 12 hours. ♦Our ships have launched over 100 tomahawk missiles. ♦We have conducted over 200 boardings in support of operations aimed at capturing fleeing terrorists.

We are winning the war on terrorism mainly because of our wonderful people in the military. It comes as no surprise to me that our young people have performed so brilliantly. There has been a lot of talk about this generation or that generation, but let there be no doubt — this current generation is up to the challenge. I have vivid memories of meeting with a young Seal at the Portsmouth Naval Hospital. I can't tell you his name, but his nickname is Turbo. Turbo went to some hellish places to take on al Qaeda. He gave his left leg for his country and some of his buddies gave their lives. You can be proud of your Navy's performance during this war on terrorism. The simple fact is that we could not have executed the campaign in Afghanistan without our nation's aircraft carriers and all the ships — and all the young people that support them. At the same time, however, we all know that the nation is not building enough ships and submarines to accomplish all we are being asked to do today and in the future. We need 8 to 10 [new ships] per year to sustain current force structure; we will build 5 in FY02.

Our efforts in Afghanistan have proven the U.S. Navy is truly the key to success in 21st century warfare where we often will not have forward bases from which to operate. Our dilemma is that given our current resources, we can't maintain a forward fleet, fight the war, maintain our ships at the right level of readiness, and build enough ships to have a future fleet that is adequate. First, we need to be more efficient — then we must argue for an appropriate bottom line. The nation needs to know the consequences for not maintaining and building an adequately sized fleet. So now, the problem that we as a nation face: Which vital missions do we ignore? Which ships do we allow to rust at the pier? Which world crisis do we neglect in order to respond to some other crisis, somewhere else? We need to make the intellectual argument for fully funded depot level maintenance, and building the right number of ships and aircraft. In the end, the Congress and the public need to understand that maintaining the most capable Navy in the world is expensive. But it is still the best security investment for their dollar.

I need your help in keeping the Navy at the forefront of the public's mind. I ask you to read, speak, think and write about our Navy's future. Start a debate. Try and answer some questions like: Do we need more ships, aircraft and submarines? If so, why? For what missions? What should the future Fleet look like? Do we have ship maintenance right or is more needed? Are we on the right course with regard to attrition, retention and leadership? How can we meet the threats of terrorism and weapons of mass destruction? Is Asia going to explode? How can we ensure it doesn't? In the end, it's your Navy and decisions made without a healthy debate are always flawed. ▭

Mine Warfare ...

Edited from a brief given by Vice Adm. Konetzni, Jr., Deputy and Chief of Staff, U.S. Atlantic Fleet at the USNI Warfare Exposition and Symposium. Vice Adm. Konetzni invited the press to a dialogue on mine warfare to fully understand the scope of Naval requirements. Thanks to Rear Adm. Paul Ryan, Commander MINEWARCOM and Lt. j.g. Herlina Rojas, MINEWARCOM Public Affairs Officer, for their expert insight and comments regarding this article.

Sea mines have been an historically important factor in naval warfare. Mines have caused major damage to naval ships, slowed or stopped commercial shipping, and forced the alteration of strategic and tactical plans. Fourteen U.S. Navy ships have been sunk or damaged by mines since World War II (see Figure 1), over three times the number damaged by air and missile attack. Today, advancing technology heightens the threat posed by mines, making them more difficult to detect, classify and neutralize. These experiences, plus the ready availability to potential adversaries of inexpensive sea mines (see Figure 2) have increased interest in mine warfare within the U.S. Navy. In 1995, the Chief of Naval Operations directed that mine warfare receive greater emphasis and become an integral capability of battle forces rather than remain the sole province of a dedicated force.

Mine warfare (MIW) is comprised of both mining operations and mine countermeasures, and may be either offensive or defensive in nature. Mine countermeasures (MCM) incorporate much more than actual mine detection and neutralization. Key elements of MCM include: intelligence; reconnaissance and warning; development and exploitation of environmental databases; reduction of ships' magnetic and acoustic signatures; and specialized training in mine warfare tactics.

Successful integration of MIW capability into battle group units requires its promotion as a major warfare area, similar to the traditional air, surface and submarine specialties. Each of these warfare specialties has a "sponsor," specific to the platform type, within the OPNAV requirements division (N7). In contrast, MIW, in which effective execution requires use of platforms from various warfare specialties, has a capabilities-based sponsor, Expeditionary Warfare (N75). Public law [10 USC 505] mandates this sponsorship. Careful consideration should be given to the appropriate sponsorship for Mine Warfare so that the benefits of capabilities-based sponsorship can be maintained while advancing the emphasis on Mine Warfare as a vital warfare competency.

The development of MIW capability within the battle force is known as "mainstreaming." Mainstreaming of MIW can and should be happening today, independent of the introduction of organic mine warfare capabilities into the battle force. Fielding a MCM capability organic to battle force units provides increased impetus to development of MIW expertise. At the same time, mainstreaming provides the professional foundation on which effective utilization of future organic assets will be built. However, mainstreaming, with its emphasis on development of capabilities within the battle force, may lead to the misconception that new organic mine countermeasures systems (OMCM) are replacements for existing dedicated platforms. This is not the case.

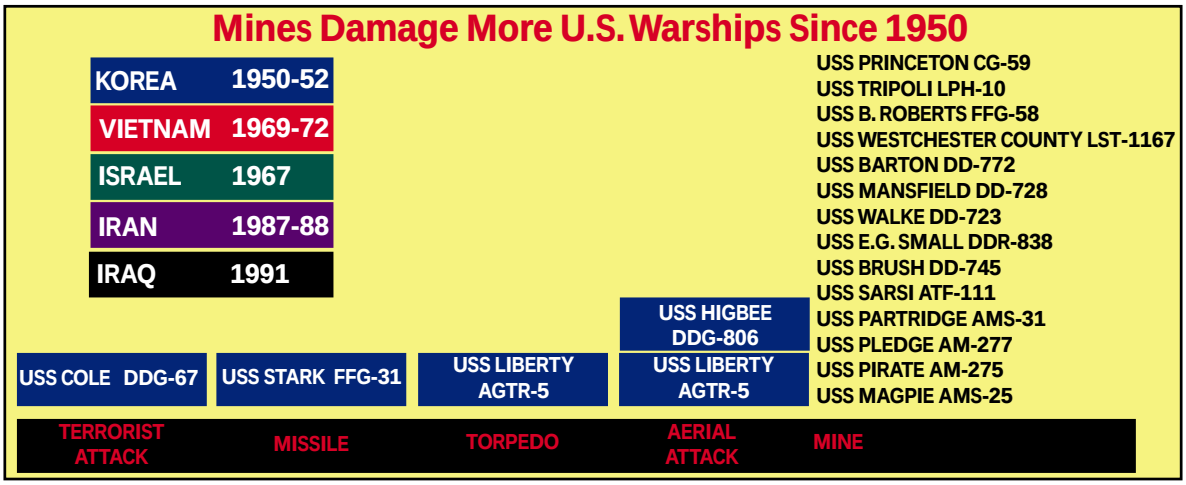

Figure 1.

Figure 2.

A good way to view the distinction between organic and dedicated MIW resources is to classify them either as tactical or strategic assets. Organic MCM systems are tactical in nature. They are resident within the battle group, and are intended to provide the ability to detect mines and a limited minesweeping capability that permits "punching through" a minefield if necessary. Dedicated MCM systems are theater or strategic assets. They are intended to provide large area or long-term MCM capability.

Mine Warfare Command (MINEWARCOM) demonstrated its capability during a ten day at sea training period in the Gulf of Mexico in October 2002 with Norfolk-based USS Kearsarge (LHD 3). USS Kearsarge, acting as a stand-in Mine Warfare Command ship, embarked airborne, surface and undersea MCM personnel and equipment from Naval Station (NS) Ingleside and Naval Air Station (NAS) Corpus Christi during this simulated wartime scenario. According to Rear Adm. Paul Ryan, Commander, Mine Warfare Command, mine warfare forces are expeditionary by design. Packing up and going where needed and when needed is how mine warfare was conducted prior to Desert Storm and prior to having a dedicated mine warfare command and support ship. "This exercise familiarized a new generation of mine warfare personnel with the details of embarking on a ship of opportunity," said Ryan.

During the exercise, MINEWARCOM used USS Kearsarge as a host ship and exercised all three legs of the MCM triad: airborne, surface and underwater MCM. A squadron of MH-53 minehunting helicopters from NAS Corpus Christi provided airborne MCM. Explosive ordnance disposal (EOD) units embarked on USS Kearsarge provided underwater MCM. Three NS Ingleside minehunter and minesweeper ships, USS Sentry (MCM 3), USS Scout (MCM 8) and USS Devastator (MCM 6), provided surface MCM. "We utilized USS Kearsarge the same way we utilized USS Inchon. We hunted for exercise mines, swept the mines once they were located, and used EOD personnel to neutralize designated mines," added Ryan. When the exercise was completed, USS Kearsarge returned to Norfolk.

Since the decommissioning of USS Inchon in June 2002, the Navy has been evaluating options for a permanent replacement. In October, the Navy's Military Sealift Command awarded a $21 million one-year charter contract with renewable one-year options to Bollinger/Incat USA, L.L.C. for the leasing of a High Speed Vessel (HSV). The ship will support U.S. Navy Mine Warfare Command and serve as a test platform for experiments with advanced hull and propulsion technology integrated with advanced communications technology. Currently, the HSV is slated to participate in three exercises from September to December 2003. These exercises include Atlantic Fleet Joint Task Force Exercise, Gulf of Mexico (GOMEX 04-1) Exercise and Pacific Fleet Joint Task Force Exercise.

Top: EOD units embarked aboard USS Kearsarge (LHD 3) launch their RHIBs (Rigid Hull Inflatable Boats) from the ship's well deck while three minesweepers from Naval Station Ingleside look on. Bottom: The Navy's HSV-1X. (U.S. Navy photos.)

Mine Countermeasures Ship (MCM/MHC) Reliability

The need for U.S. Naval forces to maneuver and project power in the world's littorals is increasing. Littorals are highly susceptible to extensive enemy mining. Current MCM force consists of 14 MCMs with minesweeping (mechanical, magnetic and acoustic) and minehunting (detect, classify, identify, neutralize) capabilities, and 12 MHCs with mine hunting capabilities only. Dedicated MCM capability is required for deliberate, large-area mine clearance. Planned organic capabilities provide "See & Avoid" hunting and

Near-Term Recommendations

- With the decommissioning of Inchon, make MCS functions portable.
- Plan to use "Large Deck of Opportunity."
- Exercise portable functions regularly.
- Plan for a replacement MCS.
- Re-engine MCM/MHCs with priority on MCMs (~ $100 million).
  - Consider intermediate maintenance contract for diesels.
- Support long-range class modernization program.
- Require frequent deployments to improve fleet engagement.

Mid-Term Recommendations

- Retain MH-53E until an adequate replacement is developed.
- Upgrade MH-53E with "Organic" technologies.
- Support "Organic" introduction plan.
- Fund current dedicated MCM forces.
- Upgrade dedicated MCM force with proven organic technology.
- Fund phased acquisition of a standoff mining capability.
- Fund development and phased acquisition of modern mine inventory.

Long-Term Recommendations

- Make unmanned sweeping systems a fleet requirement.
- Demonstrate concept with current systems.
  - Ex: Unmanned Surface Vessel (USV) tows MK-106 Sled/SQS-20.
- Consider MCS(X) options with emphasis on unmanned systems.

Figure 3. Mine Warfare Study Outline

"Punch Through Clearance" but are insufficient for sustained, large-scale mine clearance. MCM ships require upgrades to improve equipment reliability through their planned service life (~2022). C4I upgrades are required to maintain MCM/MHC effectiveness.

Mine Warfare

MIW is composed of both Mining and MCM. The proliferation of inexpensive, lethal sea mines makes MIW a critical war fighting capability. Combating mine threat requires an amalgam of surface, air and undersea capabilities. The variety of platforms and equipment involved makes assignment of the optimum OPNAV program sponsorship difficult. OPNAV program sponsorship must be properly aligned to ensure that maximum benefit is obtained from scarce resources. Capabilities-based rather than platform-based sponsorship may provide MIW with better representation.

The future of MIW lies with emerging technologies, and will most likely include the use of unmanned, undersea vehicles (UUVs), remotely controlled sensor arrays and various other undersea platforms/weapons. The future vision of distributed sensor fields with embedded autonomous mines plus remotely controlled minefields will require extensive water space management.

Organic Mine Countermeasures (OMCM) Capabilities

A key requirement of Naval Studies Planning Group objectives is to develop mine detection and clearance capabilities organic to CV [carrier] battle groups (shown in Figure 4) permitting these forces to identify, avoid, or neutralize mines within operationally acceptable timelines and with acceptable levels of operational risk. On-scene MCM capabilities, through introduction of organic capabilities into all CVBGs, will be completed by 2012. Introduction of these capabilities to the first CVBG is planned for 2005. CVBGs are currently deployed with limited active MCM capabilities. MIW capabilities include intelligence collection and surveillance; notification of imminent mining; interdiction; post-interdiction intelligence evaluation and dissemination; and passive MCM (threat awareness and signature control). Embedded MIW capabilities are not being fully realized. Current C2F/C3F mainstreaming initiatives are focused on leveraging these embedded capabilities today. CVBGs today have no capability to detect or avoid mines (except for drifters or detecting minelayers and localizing the potential hazard area to avoid). The Kingfisher system (a funded software upgrade to the SQS-53 Sonar) may provide a mine avoidance capability, but will require a dedicated operator training program that does not exist today.

The proliferation of inexpensive, lethal sea mines makes MIW a critical war fighting capability. Combating mine threat requires an amalgam of surface, air and undersea capabilities.

Seven OMCM systems are currently under development and planned for battle group introduction. These systems are intended to instill an MCM capability "organic" to battle group forces. This capability will not be adequate to replace the dedicated MCM forces that currently exist. ♦The Long-term Mine Reconnaissance System (LMRS) is an autonomous UUV, launched and recovered from 688- and 744-class submarines, which provides clandestine mine reconnaissance (detection and limited classification) for advanced battle space preparation. A LMRS system on a host submarine would yield a total system area coverage of up to 400-650 square nautical miles. Engineering challenges include meeting mission reliability goals; achieving reliable launch and recovery; meeting ambitious reduced radiated noise goals; certifying an advanced high-density primary battery for submarine use; and developing effective computer-aided detection/classification algorithms. Nets, cables, nonmilitary shipping and other obstacles, or piracy of the unit can potentially cause premature mission abort. LMRS navigation accuracy remains a potential issue for contact reacquisition, identification and mine neutralization. ♦The Remote Mine-hunting System (RMS) includes a semiautonomous, semi-submersible vehicle that

Figure 4.

Incorporates a mixture of low, medium and high risk options with a good anticipated rate of return

tows mine reconnaissance sonar and is launched and recovered by surface ships. Engineering challenges include achieving desired high duty cycles and demonstrating reliable launch and recovery techniques even in high sea states. Nets, cables, nonmilitary shipping and other obstacles, or piracy of the unit can potentially cause premature mission abort.

Five remaining MCM systems are airborne (AMCM) being developed primarily for the MH-60s with various launch dates between 2003 and 2007. ♦The AN/AQS-20X, an evolution of current technology, is a towed mine hunting system that includes identification capability. A key engineering challenge includes enhanced CAD/CAC algorithms to achieve reduced false contact rates. ♦The Airborne Mine Neutralization System (AMNS) is an expendable, remotely operated, mine neutralization device compatible with both MH-60s and MH-53E. Deployment from MH-60s including associated munitions certification tests must be demonstrated. ♦The Organic Airborne and Surface Influence Sweep (OASIS) is a combination magnetic/acoustic influence sweep towed system. It provides only OMCM influence sweep capability. Engineering challenges include ensuring the ability to survive shallow water detonations from various mines and achieving appropriate tow depths and speed to effectively sweep certain difficult shallow water bottom influence mines. Its 800 amp system provides roughly half the capability of the MK-105 sled. Significant depth and sweep limitations may prove inadequate for many areas. ♦The Airborne Laser Mine Detection System (ALMDS) is an electro-optical-based mine reconnaissance system capable of rapid detection, localization, and classification of mines on or very near the sea surface (about 40-feet water depth, dependent on turbidity). Engineering challenges include achieving desired or acceptable false contact rates and achieving adequate depth coverage under likely conditions. ♦The Rapid Airborne Mine Clearance System (RAMICS) is a gun system designed to rapidly acquire, target and neutralize floating and near-surface moored mines. It is the least mature of the airborne MCM systems. Engineering challenges include establishing safe helicopter standoff distances from floating or very-near-surface mines, and establishing a gun and turret installation concept that minimizes the impact on the aircraft in terms of loads, recoil and flight dynamics.

The Navy's implementation plan for OMCM includes a mixture of low, medium and high-risk options with good anticipated rates of return.

Mining Issues and Recommendations

For a variety of reasons, the U.S. Navy risks a severely limited ability to conduct mining operations. Without high-level attention and funding now, this critical warfare requirement will be seriously degraded within the next five years. Current mine inventories are adequate to meet requirements for most scenarios, however the small size and advanced age of the stockpile limit operational flexibility. A standoff/high altitude mine delivery capability is necessary for mining to be a viable offensive capability. A conversion kit is needed for the existing MK-62, MK-63 and MK-65 Quickstrike series mines. This is an unfunded requirement. A Tactical Decision Aid is necessary to restore a Fleet Level Minefield Planning capability. Currently all minefields must be planned by reachback. A replacement for the MK-56 intermediate depth moored mine is necessary to retain a mining response in the 150 to 600 feet regime. The Submarine Launched Mobile Mine (SLMM) provides the only clandestine mining capability. This weapon is rapidly reaching end of service life and is not compatible with Virginia Class submarines. I-SLMM development was stopped when Australia backed out of a bilateral development agreement due to funding. I-SLMM would double the payload over SLMM (2 mines vice 1), use the much more capable MK-48 torpedo, and provide a digital fire control capability/compatibility. The Navy's core mining infrastructure has been reduced to 21 engineers and scientists, and we continue to lose this talent to other programs as funding continues to be reduced. Further reductions in infrastructure funding will soon eliminate our ability to develop replacement mines without a significant reinvestment in time and funding.

Vision/Requirements

The U.S. Naval Mine Warfare Plan (developed by Adm. Johnson/Gen. Jones, 2000) states that sea mines remain a classic, low-cost force multiplier of increased importance during fleet downsizing and increased littoral operations. It states that the Navy is to "develop, procure, maintain, and deploy a modern family of sea mines," with features that permit remote control of sea mines, standoff mining and full-water-depth mining.

Current U.S. Naval mining capability is adequate to execute requirements of some scenarios. However, the inventory is composed of old mines, and mining capabilities are funded at near the minimum levels required to safely maintain the stockpile. Research and development for new mining capabilities is severely restricted. The Navy has no funded plans to acquire any new mines in the next 7 years. A low priority has been placed on mining attributed in part to lack of specific sponsorship within OPNAV. "Mines are weapons that contribute to control of the surface and undersea environment, but their delivery (with the exception of small numbers of SLMMs) is accomplished entirely by air — with U.S. Air Force bombers being the primary platforms for high-volume delivery. Although mines have many of the characteristics of strike warfare weapons, the nominal Navy sponsor for mining is Expeditionary Warfare [N75], which is quite properly more concerned with MCM shortfalls." (NSB report, 2001)

Long-term solutions include use of innovative, emerging technologies for remote control of mines, distributed sensor fields, standoff deliveries, adaptation of new sensors for target influence (magnetic, acoustic, electric, pressure), miniaturization (easing delivery burdens), and the development of nonlethal mines to include devices for fouling propulsion, damaging electronic systems, etc. Recommendations include: The current war on terrorism suggests maintaining weapons stockpiles at levels greater than the minimum requirements; Modernize existing mine stocks with standoff/high altitude delivery capability; Retain the mining core infrastructure and begin development of a replacement for the MK-56 mine to preclude a gap in capability expected to develop by 2010; Add funding to develop a standoff mining capability. This might include production of I-SLMM or research and development on JDAM-ER type bomb conversion packages—or both; and Align functions within MIW community (OPNAV through COMINEWARCOM) to benefit the specific subset of mining operations in accordance with separate point paper on MIW Alignment. Realignment allows focus on operational

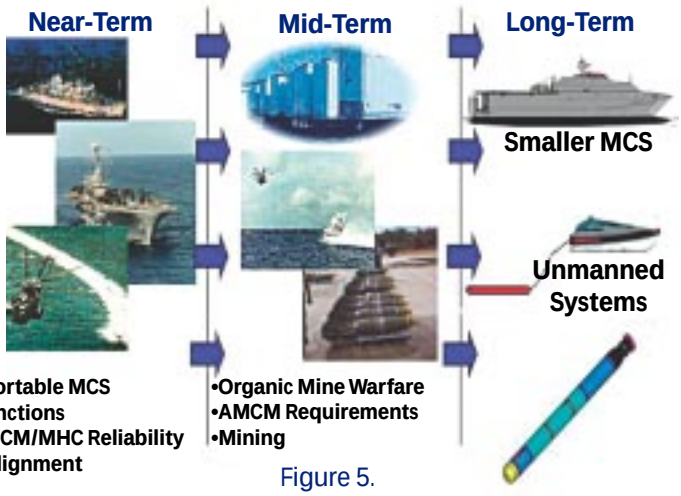

Figure 5.

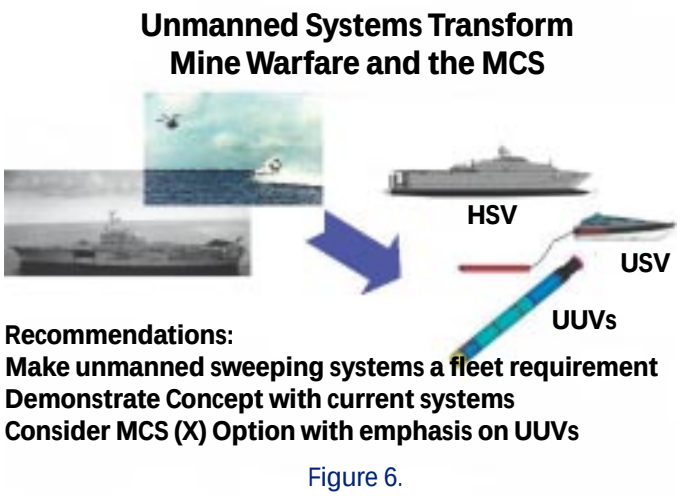

Figure 6.

mining requirements, which are currently barely met. Realignment also allows a forward-thinking vision of where we want to go —and encourages long-range planning for a phased program that addresses future needs.

Maturing Technologies and Future Mine Clearance Systems

The requirement for a large deck to support MH-53 helicopters for minesweeping is the largest cost driver in acquiring a dedicated MCS. Maturing technologies have the potential to dramatically alter our MIW capabilities in the next decade and transform the nature of future MCS. Programmed organic systems may greatly improve our mine hunting and neutralization capability. Employing AQS-20 sonar on an MH-60 helicopter, for instance, will be three times more effective than the current AQS-14 employed by the MH-53, even considering the substantial difference in range and endurance of the two helicopters. The AQS-20, coupled with the incorporation of the unmanned Remote Minehunting (RMS) and Long-term Mine Reconnaissance (LMRS) systems, offer a significant increase in mine hunting capabilities. These improvements mean that fewer airborne assets will be needed to accomplish the mine hunting mission both in the dedicated (theater) and organic (tactical) MIW forces.

Unfortunately, mine hunting is not effective in sixty-percent of the littoral regions near potential adversaries. Sea access to these areas requires minesweeping. Currently, the MH-53 helicopter wedded to the MK-106 sled, or the MH-60s with the developmental OASIS system, are needed to meet OPLAN minesweeping requirements. AMCM sweeping capabilities require a large-deck design for MCS. Many of the same technologies that are driving the improvements in mine hunting could be leveraged in an effort to develop an unmanned minesweeping system. A desire to keep the man out of the minefield makes unmanned minesweeping systems an attractive option.

Unmanned systems are the minesweepers and hunters of the future. Future MCS must incorporate emerging technologies. A focused technology effort is needed to incorporate unmanned systems into the MCS(X). Adequate study by appropriate technical authorities concluded that USVs have been shown to possess potential as effective low-observable MCM platforms, allowing mine hunting and minesweeping missions to be performed without a man onboard — eliminating the risk to personnel. It is time to press ahead with establishing fleet requirements for unmanned MCM systems that lead to programming decisions. Long-term recommendations include: Establish unmanned minesweeping systems as an emerging fleet requirement; Demonstrate the ability to launch MCM UUV/USV from HSV at the earliest opportunity; Leverage off the Spartan ACTD (Advanced Concept Technology Demonstration) if possible; Request that the MCS(X) working group explore options of using a combination of unmanned systems and a smaller helicopter detachment; and Establish a focused technology effort to incorporate unmanned minesweeping systems into future acquisition plans for a new MCS(X). A summary of near- to long-term strategies is shown in Figures 5 and 6.

Conclusion

The 2001 Quadrennial Defense Review (QDR) reaffirmed that "advanced mines could threaten the ability of U.S. Naval and Amphibious forces to operate in littoral waters" and are a likely method through which "future adversaries may have the means to render ineffective much of our current ability to project U.S. power overseas." The U.S. Navy's long history of difficulty in combating the mine threat culminated in the response to Iraqi mining efforts during the Gulf War. Despite a rudimentary and aged mining capability, Iraq severely damaged two ships and effectively deterred the United States from conducting planned amphibious operations into Kuwait.

Our ability to combat modern sea mines depends upon an amalgam of capabilities including MCS, AMCM squadrons, EOD units and Marine Mammal Systems. A central lesson of the Gulf War is that a dedicated MCS, capable of directing all aspects of the multifaceted MIW campaign plan, is needed to bring the various MCM capabilities together, providing unity of effort in defeating the mine threat. At the same time, it is clear that a heavy lift helicopter is essential to accomplish the airborne minesweeping mission. This will remain the case until maturing unmanned vehicle technologies replace the need for airborne minesweeping.

The future of MIW is clearly with unmanned systems; the Navy needs a focused effort to bring these technologies to maturity as they have the potential to transform the nature of MIW. Given the current state of technology, it is easy to envision a smaller, faster MCS that acts as a mother ship for a variety of unmanned systems that can rapidly move into theater and combat the mine threat without the presence of men in the minefield. ▭