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# Naval Mine Warfare

Operational and  
Technical Challenges  
for Naval Forces



# Naval Mine Warfare Operational And Technical Challenges For Navel Forces

**U. S. Military, Department of Defense  
(DoD), U. S. Navy, U. S. Government**

## **Naval Mine Warfare Operational And Technical Challenges For Navel Forces:**

*Naval Mine Warfare* National Research Council, Division on Engineering and Physical Sciences, Naval Studies Board, Committee for Mine Warfare Assessment, 2001-09-19 Sea mines have been important in naval warfare throughout history and continue to be so today They have caused major damage to naval forces slowed or stopped naval actions and commercial shipping and forced the alteration of strategic and tactical plans The threat posed by sea mines continues and is increasing in today s world of inexpensive advanced electronics nanotechnology and multiple potential enemies some of which are difficult to identify This report assesses the Department of the Navy s capabilities for conducting naval mining and countermining sea operations Naval Mine Warfare. Operational and Technical Challenges for Naval Forces ,2001 U S naval forces are organized trained and equipped to engage in the full spectrum of military operations in the deep sea the littorals or inland Yet today sea mines in the hands of hostile forces are a growing threat to mobility as evidenced in the Gulf War To meet the threat of the proliferation and ever increasing sophistication of sea mines the Department of the Navy has adopted an integrated approach to countermine warfare that attempts to balance dedicated special purpose forces and organic multimission general purpose forces capabilities intended to leverage emerging technological opportunities As with other warfare areas the mine warfare community also must deal with limited resources and legacy systems These constraints complicate the process of defining the optimal long term strategic balance between dedicated and organic assets the transition path to achieving the objective and the technological capabilities and underlying research and development needed to meet those objectives Naval mine countermeasures MCM programs for countermine warfare employ a mix of undersea surface and airborne systems including special warfare marine mammal and explosive ordnance disposal units The resulting capabilities together with support from other command control communications computing intelligence surveillance and reconnaissance C4ISR systems are intended to provide the naval forces with minefield intelligence surveillance and reconnaissance ISR to facilitate minefield avoidance minefield clearance mine neutralization and mine and obstacle removal and destruction Their operational utility depends also on access to key environmental data and modeling and simulation systems *Combat Divers* Michael G. Welham, 2023-01-19 The full visual history of the special forces combat diver from World War II to the present day Combat divers are an elite within an elite Every special forces combat diver is required to pass selection twice first into the elite military unit and then a combat diving qualification The combat dive units themselves are tiny and the operations highly classified The role of a military diver is inevitably a lonely and a dangerous one whether clearing mines or striking from the sea against enemy held targets Fully illustrated with rare and unusual images *Combat Divers* reveals their little known yet fascinating operations from Dutch Special Forces combat divers covertly operating against Somali pirates to the actions of Soviet Spetsnaz divers in Swedish territorial waters during the Cold War It also examines how the most famous units such as the US Navy SEALs and the Royal Navy s SBS are currently operating and

adapting to threats in a multitude of theatres Combat Divers gives an insight into specialist kit and vehicles presently used and equipment that is being developed and trialed throughout the world Covering a variety of kit from dry deck shelters to mini submarines and swimmer delivery vehicles former Royal Marines Commando Michael G Welham draws on his own extensive diving experience to reveal exactly how this equipment is used by special forces dive teams As their kit and equipment constantly evolve so does the nature of their work and even the team element Combat Divers also details the first female combat divers and includes their own first hand accounts about their groundbreaking roles within their respective units to create a fascinating history of these elite special forces operatives

**The Operational Effects of Mine Warfare**, 1999 This paper demonstrates that naval mines are a threat to the operational commander and that there are actions he can take to reduce the operational effects of mine warfare The first section demonstrates that mine warfare is a pertinent problem for the operational commander by examining three principle relationships It examines the history of mine warfare from an operational perspective warfare in the context of operational art and mine warfare in the context of the U S Navy and U S Marine Corps service visions The second part of the paper explores the Mine Countermeasures MCM concept of operations the difficulties countering the mine problem with recommendations to minimize the operational effects and lastly the future of mine warfare in the context of Joint Vision 2010 and beyond This paper shows that the operational commander can minimize the operational effects of mine warfare by preventing mining maintaining surveillance minimizing maneuver space requirements requesting MCM forces early in crisis using creative schemes of maneuver and exploiting the miner s resource and environmental limitations

**21st Century Complete Guide to Naval Mine Warfare** Department of Defense, U. S. Navy, U. S. Government, 2017-06-02 Seven unique U S Navy documents provide a thorough guide to naval mine warfare with information on modern mine countermeasures MCM marine mammal systems the use of dolphins and sea lions organic MCM Avenger class SQQ 32 Sonar SLQ 37 SLQ 38 SLQ 48 V MH 53E Sea Dragon Helicopters explosive ordnance disposal littoral combat ship LCS methods of actuation USMC Shallow Water Mine Countermeasures and much more The History of the Sea Mine and its Continued Importance in Today s Navy David Bushnell has become known as the father of mine warfare As a student at Yale University he worked on the development of underwater explosives In his research he discovered that gunpowder could be exploded underwater During the American Revolution Bushnell was authorized to design a sea mine usually referred to as a torpedo by Bushnell to be used against the British fleet 21st Century U S Navy Mine Warfare Ensuring Global Access and Commerce In February 1991 the Navy lost command of the sea the North Arabian Gulf to more than a thousand mines that had been sown by Iraqi forces Mines severely damaged two Navy warships and commanders aborted an amphibious assault for fear of even more casualties Spurred on by this experience the Navy has taken consistent aggressive and focused action to ensure that it is prepared for all future mine events Solving the Mine Countermeasures Problem A Matter of Focus and Priority This document reviews mine countermeasure operations and how

they impact on current national security and national military strategies as well as service doctrine

### Shallow Water Mine Countermeasure Capability for USMC Ground Reconnaissance Assets

As the Marine Corps looks to the future with its concept of expeditionary maneuver warfare EMW shallow water mines remain a show stopper to the Corps forcible entry requirement With limited Naval assets available MAGTF commanders are still dependent on Marine ground reconnaissance assets for amphibious reconnaissance of potential beach landing sites to include the detection of shallow water mines

### The Operational Effects of Mine Warfare

This paper demonstrates that naval mines are a threat to the operational commander and that there are actions he can take to reduce the operational effects of mine warfare The first section demonstrates that mine warfare is a pertinent problem for the operational commander by examining three principle relationships

### Sweeping Changes for Mine Warfare

### Controlling the Mine Threat

This report proposes that the U S Navy deter and if necessary combat potential minelayers by pursuing a pro active offensive mine warfare strategy Central to this proposed strategy is the development acquisition and use of Remote Controlled RECO mines It is argued that given the historical problems the United States has had in the area of naval mine warfare a strategy aimed at the aggressive deterrence of enemy mine laying be embraced so as to project forces ashore in future amphibious operations

### Inadequate Mine Countermeasure Systems and Capabilities for Future Amphibious Operations

When a one thousand dollar mine can severely damage a one billion dollar ship it is time to do something about it

### Edney

The significance of mines to naval operations has been recognized in modern warfare For example during the Korean War the Chief of Naval Operations Admiral Forrest P Sherman observed before an amphibious assault on Wonsan When you can t go where you want to when you want to you haven t got command of the sea And command of the sea is a rock bottom foundation for all our war plans We ve been very submarine conscious and air conscious Now we re getting mine conscious

### *Naval Mines in the 21st Century*

U. S. Military, Department of Defense (DoD), U. S. Navy, U. S. Government, 2017-04-14

This unique book examines the current challenge of defending against sea and naval mines With the end of the Cold War NATO countries have embarked on transformation initiatives within their militaries to address the new security realities of the 21st century One of the realities that has not changed is the threat posed by sea mines Global proliferation of sea mines both older variants and advanced new designs has continued to grow and presents a unique challenge to maritime security NATO naval forces must be prepared to counter the danger posed by mines to shipping both civilian and military and to ensure that vital sea lines of communication SLOCs strategic chokepoints throughout the world commercial ports and naval bases remain open and uncontested as they find themselves participating in more security operations at home and abroad There are two main questions that this paper seeks to address The first concerns the threat With major advances in military technology and changes to doctrine is there really a sea mine threat that could pose a significant challenge to today s navies NATO naval forces are the most sophisticated and technologically advanced in the world Yet the first Gulf War in 1991 taught us that even relatively inexpensive and unsophisticated sea mines

can have catastrophic effects on our capital ships The low cost ease of use and tactical effectiveness of sea mines make them a very potent threat even to modern navies Thus to adequately answer the question of threat I will consider the problem of proliferation mine technologies and employment and methods to counter the threat This leads to the second major question Are NATO members adequately developing their MCM capability to meet the threat of sea mines While it is true that NATO MCM forces are among the best there are some notable shortfalls in capability development even as these countries push to develop new systems This paper will analyze the new programs and initiatives that are shaping NATO s mine warfare community and discuss whether and how these programs are addressing the threat This thesis argues that in an era where expeditionary warfare and thus command of the littorals is the central strategic requirement for naval forces mine warfare must remain a primary warfare discipline and must continue to be properly resourced and developed to face the mine challenge of the 21st century

CHAPTER I INTRODUCTION A PURPOSE B BACKGROUND C METHODOLOGY AND RESEARCH LITERATURE D ORGANIZATION OF THESIS 1 Introduction 2 The Threat 3 NATO MIW Capabilities 4 Case Studies 5 Conclusion

CHAPTER II THE THREAT A INTRODUCTION B MINE TYPES AND EMPLOYMENT C METHODS OF ACTUATION D MINING TACTICS AND COUNTERMEASURES E GEOSTRATEGIC IMPLICATIONS OF PROLIFERATION FOR NATO

CHAPTER III NATO MCM CAPABILITIES A INTRODUCTION B MINE WARFARE ORGANIZATIONS C DEDICATED MCM ASSETS D ORGANIC MCM E CONCLUSION

CHAPTER IV CASE STUDIES A NATO COALITION NEAR AREA MCM OPERATIONS 1 Red Sea Suez Mining Incident of 1984 2 Operation Allied Harvest B NATO COALITION OUT OF AREA MCM OPERATIONS 1 Operation Earnest Will 2 Operation Desert Storm 3 Operation Iraqi Freedom C CONCLUSION

CHAPTER V CONCLUSION BIBLIOGRAPHY

United States Naval Mine Warfare Plan, Third Edition, Fiscal Year 1996-1997 Programs, 1997 The Third Edition of the Mine Warfare Plan 1 Explains how U S Naval Forces will conduct mine warfare operations 2 Assesses our mine warfare strengths 3 Identifies capability shortfalls 4 Outlines our initiatives for providing the mine warfare capabilities our naval forces will require in the 21st century The Mine Warfare Plan also includes summaries of mine warfare technologies and the associated programs designed to meld these new technologies into the operational environments

*Jane's International Defense Review*, 1999 *The Impact of Naval Mining on Operational Maneuver and Planning*, 1996 Despite the fact that U S Armed Forces have repeatedly seen and felt the impact of naval mining during this century naval mine countermeasures capabilities have yet to be fully evaluated and accurately addressed in today s operational planning Naval mine warfare one of the least expensive and easiest to deploy methods of warfare has the ability to prevent or delay opponents from achieving the critical operational functions of maneuver and mobility This being the case it is imperative that the operational commander recognize and adequately plan for a naval mining threat within a theater of operations Operational plans for maneuver within the maritime environment must include all of the complex mine warfare variables in development of realistic timelines for maneuver and operational progression An accurate mine clearance timeline is critical

to the commander's assessment of an operational plan's feasibility. If the primary sea line of communication is unavailable within operational deadlines, alternative plans must be developed. Alternative options available to the operational commander are secondary sea lines of communication or a combination of sea lines of communication and extensive air land lines of communication. These alternatives must be fully addressed and played in exercises which test operational plans and serve to familiarize all concerned with the dramatic impact of naval mining on operational maneuver and the mobility of forces.

*Mine Warfare - The Joint Force Commander's Achilles Heel*, 2004. Mine Warfare MIW has been a traditional weakness of the U.S. Navy. The affordability of mines, their destructive power, and wide proliferation coupled with the requirement for the U.S. Navy to operate in the littorals requires drastic improvements to U.S. Mine Warfare. To support operational timelines, forward-deployed naval forces need Mine Countermeasures systems resident within Strike Groups to counter enemy mine-laying activities. Additionally, the Navy needs to transform its culture and mainstream the full spectrum of MIW to include naval mining and countermine warfare capabilities. Only then will Joint Force Commanders be able to control the battlespace, operate unfettered in littoral areas, and pass freely through critical choke points to execute operational plans. The U.S. Navy needs to transform its culture and mainstream MIW through doctrine, training, education, and leadership. In addition to elevating MIW to a core war-fighting function with an established MIW Commander formalizing MIW doctrine, establishing a base level of knowledge among the officer corps, and incorporating realistic MIW Strike Group work-ups, the Navy must also ensure that MIW assignments are career-enhancing and attract top performers across the spectrum of officer communities. A MIW force capable of overcoming the vulnerabilities exposed by the Gulf War requires the synergy of technological advancements and culture change. The appendixes contain a chart of U.S. ship casualties by weapon type for 1950 to the present, a chart of mine warfare components, and an annotated bibliography of organic mine countermeasure systems. 17 refs.

**Mine Warfare at Sea** Howard S. Levie, 1992. This book includes a study of the history of mine warfare at sea from the earliest days to the present time. It will be of interest to military lawyers and to all those concerned with the conduct and control of warfare. At the technical level, it is intended for laymen. While there is a chapter dealing with many technical matters relating to both mine warfare at sea and mine countermeasures, the sole purpose of that chapter is to give the non-technician, whether naval officer or civilian, a basic understanding of various categories of sea mines and their accessories and of mine countermeasure gear. It assumes that like the author, the reader will have a minimum of electrical and mechanical knowledge. However, it is believed that after finishing this volume, the reader will have a much better understanding of the part that mines have played in warfare at sea in past conflicts as well as the part they may be expected to play in any future conflict. Howard S. Levie is Professor Emeritus of Law at Saint Louis University School of Law and Adjunct Professor of International Law at the U.S. Naval War College. **Mine Warfare** Paul A. Lluy, 1995. This thesis analyzes the possible implications to global maritime interests posed by the growing international proliferation of advanced

sea mines and examines the role of NATO's mine countermeasures (MCM) forces in countering this threat in the post Cold War security environment. It is argued that given the Iraqi mining success during the Gulf War, the current global proliferation of sophisticated sea mines and deficiencies in the international laws which govern their use, mine warfare will present a growing threat to vulnerable Western nations into the next century. Consequently, NATO's mine countermeasure forces will have a prominent role in future Alliance or UN mandated out of area naval contingencies ranging from counter terrorism operations to major regional conflicts and will be called upon to provide a credible MCM capability to protect Alliance and coalition naval forces, secure vital sea lines of communication (SLOCs) and ensure unimpeded maritime freedom of the seas prescribed under international law. NATO's capability to meet these challenges will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first rate MCM rapid deployment force. As a leader within NATO, the United States Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency.

*Weapons that Wait* Gregory Kemenyi Hartmann, Scott C. Truver, 1991      *Navy Mine Warfare* United States. General Accounting Office, 1998      **U.S. Naval Mine Warfare Strategy** Gregory J. Cornish, Army War College (U.S.), 2003

The history of naval mine warfare in wars and conflicts has taught the United States Navy many valuable lessons. Unfortunately, many of these lessons learned have for the most part been painfully relearned in successive wars and conflicts. Compared to more glamorous naval mission areas such as strike warfare, mine warfare has usually been underfunded and had difficulty maintaining momentum toward improving fleet capabilities in this vital mission area. Sea mines today remain a serious threat to U.S. strategic interests in key regions of the world. The United States Navy today is embarked on an ambitious plan to improve and transform its mine countermeasures capabilities. This paper discusses common themes and lessons learned in past wars and conflicts, depicts the current mine threat, discusses current force structure, analyzes the Chief of Naval Operations Sea Power 21 vision for improving long term mine warfare capabilities, and provides recommendations for improving near term readiness.

Surface Warfare. Mainstreaming, Mine Warfare. May/June 1998, Vol. 23, No. 3, 1998. Contents include: Think or Sink 21st Century Mine Warfare, The Naval Mine Threat to U.S. Surface Forces, Shaping the Battlespace, Organic Mine Countermeasures, Offensive Mining, A True Force Multiplier, The History of Mining, Mine Warfare, Enabling Power Projection in the Littorals, Maneuver Warfare and Mine Countermeasures, Surf Zone Technology, Enabling Operational Maneuver from the Sea, and Conquering the VSW Environment.

Navy mine warfare United States. General Accounting Office, 1996      Clearing the Vital Choke Points in the Sea Lines of Communication-Its Not Just a Navy Problem and Solution, 1993

This paper is primarily a thought process. Many scholarly works and group efforts have pointed clearly to the abysmal condition of the United States Naval Mine Countermeasures (MCM) both in capability and size. The problems which the U.S. Navy has in this capability stem from two reasons: first, an historic lack of effort in funding a robust MCM capability, and second, there are limitations in the laws of physics which make detection of mines a difficult



process The purpose of this paper is not to split the arrow which has already landed in the center of the Navy's MCM forces but to stimulate the reader to not view MCM as the Navy problem There are no quick solutions to the problems However the operational commander who reviews the entire process of mine warfare and its countermeasures has a better chance of employing and assisting a Naval force in dealing with this threat There are two purposes to this paper first is to show that MCM operations are not just minesweeping minehunting second is to suggest that Army Air Force and Marine forces may be very useful in keeping the vital choke points in the Sea Lines Of Communication SLOC open against Naval mines

**Mine Warfare: An Old Threat Presents New Challenges for NATO's Post-Cold War Navies**, 1995 This thesis analyzes the possible implications to global maritime interests posed by the growing international proliferation of advanced sea mines and examines the role of NATO's mine countermeasures MCM forces in countering this threat in the post Cold War security environment It is argued that given the Iraqi mining success during the Gulf War the current global proliferation of sophisticated sea mines and deficiencies in the international laws which govern their use mine warfare will present a growing threat to vulnerable Western nations into the next century Consequently NATO's mine countermeasure forces will have a prominent role in future Alliance or UN mandated out of area naval contingencies ranging from counter terrorism operations to major regional conflicts and will be called upon to provide a credible MCM capability to protect Alliance and coalition naval forces secure vital sea lines of communication SLOCs and ensure unimpeded maritime freedom of the seas prescribed under international law NATO's capability to meet these challenges will depend largely on its ability to reorient its focus toward the requirements necessary to train and maintain a first rate MCM rapid deployment force As a leader within NATO the United States Navy must assume the lead in forging multinational transatlantic MCM forces capable of dealing with any global mining contingency

The Development of Mine Warfare Norman E. Youngblood, 2006-06-30 In 1997 the International Campaign to Ban Landmines ICBL coordinated the Convention on the Prohibition of the Use Stockpiling Production and Transfer of Anti Personnel Mines and on their Destruction As of mid 2005 145 states had signed the agreement The ICBL's efforts were in large part a response to the careless use of landmines in the previous fifty years The history of mine use in warfare however goes back much further than the World Wars of the 20th century and includes both land and sea use This first comprehensive study traces the technical tactical and ethical developments of mine warfare from ancient times to the present Beginning with mine warfare's roots in ancient Assyria and China Youngblood takes the reader through the centuries of debate about how these hidden weapons should be used A look at 19th century developments explores the intertwined development of land and sea mines and the inventors behind them including Robert Fulton Samuel Colt and Immanuel Nobel father of Alfred Nobel Subsequent chapters examine the use of mines in the American Civil War the Russo Japanese War both World Wars and the battlefields of the Cold War and chart key battles and technical innovations such as the development of air delivered munitions Finally the author addresses the ethical concerns raised by the careless

mining namely the impact on civilians and the difficulties of de mining and the treaties that regulate landmine use

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## **Table of Contents Naval Mine Warfare Operational And Technical Challenges For Navel Forces**

1. Understanding the eBook Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - The Rise of Digital Reading Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Advantages of eBooks Over Traditional Books
2. Identifying Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - User-Friendly Interface
4. Exploring eBook Recommendations from Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Personalized Recommendations
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces User Reviews and Ratings
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces and Bestseller Lists
5. Accessing Naval Mine Warfare Operational And Technical Challenges For Navel Forces Free and Paid eBooks
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces Public Domain eBooks
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces eBook Subscription Services
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces Budget-Friendly Options

6. Navigating Naval Mine Warfare Operational And Technical Challenges For Navel Forces eBook Formats
  - ePub, PDF, MOBI, and More
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces Compatibility with Devices
  - Naval Mine Warfare Operational And Technical Challenges For Navel Forces Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Highlighting and Note-Taking Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Interactive Elements Naval Mine Warfare Operational And Technical Challenges For Navel Forces
8. Staying Engaged with Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Naval Mine Warfare Operational And Technical Challenges For Navel Forces
9. Balancing eBooks and Physical Books Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Naval Mine Warfare Operational And Technical Challenges For Navel Forces
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Setting Reading Goals Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Fact-Checking eBook Content of Naval Mine Warfare Operational And Technical Challenges For Navel Forces
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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