

2000

## Meeting the Submarine Challenge: A Short History of the Naval Underwater Systems Center

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### Recommended Citation

Helms, Chester E.; Merrill, John; and Wyld, Lionel D. (2000) "Meeting the Submarine Challenge: A Short History of the Naval Underwater Systems Center," *Naval War College Review*: Vol. 53 : No. 4 , Article 24.  
Available at: <https://digital-commons.usnwc.edu/nwc-review/vol53/iss4/24>

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Postwar transition reduced the naval fighter-bomber inventories to minimum levels. However, the Navy retained its interest in night combat capability and formed two fleet all-weather training units to conduct the specialized training required for carrier night combat operations. By the late 1940s, the Soviet bomber and submarine threats had become evident. Brown describes in detail the evolution of aircraft, missions, systems, and training in response to the increasing threat.

At the beginning of the Korean War, the Navy was again ready to conduct night operations. The Navy night flyers helped the Marines retire from the Chosin reservoir, and they performed interdiction missions at night north of the thirty-eighth parallel. Brown discusses the innovative tactics developed by the aviators, as well as the introduction of jet-powered aircraft into the Navy's order of battle.

Mature operations and a new era began in 1953, when the Navy introduced the angled-deck carrier to the fleet. New electronic systems rounded out significant improvements in the effectiveness of carrier aircraft. That same year, the first radar-guided air-to-air missile, the Sparrow, was tested; it would prove to be the turning point in U.S. night fighter capabilities. After the Korean War, the Navy's primary mission was focused on its nuclear strike capability. The introduction of aerial refueling with the newest fighters further improved their potential. By 1954 each of the fifteen carriers had a night-fighter squadron. An optical landing aid, the mirror, was introduced in 1955 aboard USS *Forrestal* (CV 59) and greatly reduced the number of carrier landing accidents. By 1960 a new era was evident in carrier aviation. Every carrier had completed the major modifications, installing angled decks and steam catapults,

and the frequency of night sorties had increased sixfold. The new era of the 1960s saw the introduction of the F-8, F-4, A-5, A-6, and A-7.

Brown skillfully describes carrier operations during the Vietnam War, including the tempo, Alpha strikes, barrier combat and patrol (BARCAP), and the strike missions performed by the Navy. He then proceeds with the resumption of the Cold War missions and the introduction of the F-14 in 1973 and the F/A-18 in 1980.

The final chapter highlights the Navy's performance in the Persian Gulf War, with its sustained twenty-four-hour operations; over half the missions were flown at night. As a final note, the author declares, "Clearly, carrier night air combat operations had proven their value to the U.S. Navy."

*Dark Sky, Black Sea* should appeal to many interests. Aviation buffs will enjoy it for its vignettes: those in weapon system procurement will not be surprised to see rapid periods of development with emerging threats, and vice versa; and old, bold carrier pilots will particularly enjoy the personal accounts, which may revive memories of similar experiences. All naval aviators should have this book in their professional collections. It will be the best read on "Steel Beach," and it will surely impress the air group commander.

ED CAHRYN  
Captain, U.S. Navy



Merrill, John, and Lionel D. Wyld. *Meeting the Submarine Challenge: A Short History of the Naval Underwater Systems Center*. U.S. Gov't. Print. Office, 1997. 329pp. (no price given)

The Naval Underwater Systems Center (NUSC) was formed in 1970 by merging the Navy Underwater Sound Laboratory

at New London, Connecticut, with the Navy Underwater Weapons Research and Engineering Station at Newport, Rhode Island. In 1992, NUSC ceased to exist as an entity, absorbed by the newly created Naval Undersea Warfare Center. The twenty-two years of its life included the most intense period of competition between the Soviet Union and the United States in the undersea cold war. *Meeting the Submarine Challenge* documents the role of NUSC in that competition.

NUSC was the Navy organization primarily responsible for the research and development of submarine sonar, combat (fire) control, weapons, and electromagnetic systems, as well as for surface-ship sonar and torpedo systems. To support these efforts NUSC also developed computerized warfare and systems analysis, test and experimentation ranges, and an organization to keep the laboratory's technology base current. The book devotes a chapter to each major area; it provides some pre-NUSC history for context.

The documentation of the evolution of submarine combat and sensor systems starts with the earliest units, around the beginning of the twentieth century, through the advances of both world wars, into the Cold War. Particular attention is given to the development of the AN/BQQ-2, AN/BQS-6/13, AN/BQQ-5/6, towed array, and wide-aperture-array sonar systems. A similar treatment is presented for fire control systems, with primary emphasis on the Mark 113 series and the Mark 117/118 systems. With the advent of the Combat Control System Mark 1 (CCS Mk 1), sonar, fire control, and weapons control all began to merge into integrated systems, culminating with the development of the AN/BSY-1 and 2 systems. The history of surface ship antisubmarine system development includes the SQS-26 sonar,

variable-depth sonar, the Light Airborne Multipurpose System (LAMPS), towed arrays, and the SQQ-89 sonar and fire control integrated combat system.

The chapter on submarine electromagnetic systems covers the entire field: communications antennae (buoyant cable, towed buoy, and mast mounted); periscopes and their capabilities; and electronic support measures. The chapter on weapons systems details the evolution of torpedoes and launchers, including submarine-launched weapons through the Mark 48 Advanced Capability torpedo, and surface-launched and air-launched torpedoes through the Mark 50 Advanced Lightweight Torpedo. Antisubmarine missiles (Asroc and Subroc), submarine-launched antisurface missiles (Harpoon and Tomahawk), and Tomahawk land-attack missiles also are chronicled.

Of course, the development of technologically advanced undersea warfighting systems requires a parallel and substantial support infrastructure, and this book provides full coverage of NUSC's capabilities. The test ranges and facilities at the Tongue of the Ocean in the Bahamas, Newport, Fishers Island (Long Island), Dodge Pond (near Niantic, Connecticut), Seneca Lake (New York), Bermuda, and others are discussed, along with their specific capabilities and functions. Additional chapters detail NUSC's efforts to acquire capabilities in computer analysis and simulation.

Just as important as the technology were the individuals responsible for it. This book names those people, some of whom are little known outside their respective fields, while others are immediately recognized as giants in the submarine technology world. It is entirely appropriate that they are all given credit for their accomplishments. The world in general will

never know of their contributions to the national security of the United States during one of its most trying periods, but those of us who went to sea at least will know who it was that kept us ahead of the competition.

*Meeting the Submarine Challenge* is not a primer; it will not be easily accessible to the novice. While each chapter could easily be expanded into a book of its own, the authors have done an admirable job of including only that information necessary for the task at hand—a chronicle of NUSC's achievements. Every page is packed with important details; very little fundamental theory or explanation is offered.

John Merrill is a former head of the NUSC Submarine Electromagnetics Systems Department, and Lionel D. Wyld is a former head of the NUSC Technical Writing Division. Their credentials are impeccable, and their technical bent is reflected in a no-nonsense, "just the facts, ma'am," writing style. *Meeting the Submarine Challenge* is highly recommended for those who have sufficient background in the subject matter.

CHESTER E. HUMS  
Captain, U.S. Navy



Michno, Gregory F. *USS Pampanito: Killer-Angel*. Norman: Univ. of Oklahoma Press, 1999. 445pp. \$37.95

*USS Pampanito* (SS 383) made six war patrols in 1944 and 1945, sinking five ships and rescuing a record number of Allied prisoners of war. Decommissioned in 1945, *Pampanito* survived the postwar years to earn designation as a national historic landmark in 1986. Today the carefully restored submarine is open to the public at the San Francisco Maritime National Historic Park.

*USS Pampanito: Killer-Angel* represents a remarkable accomplishment of interviewing and research. Michno, the son of a *Pampanito* crew member, Motor Machinist's Mate Frank B. Michno, conducted more than twenty-five interviews of his father's shipmates to draw together *Pampanito*'s story from the perspective of its crew. Michno used additional oral-history interviews by Clay Blair. The book's bibliography of published sources is one of the most extensive of recent books about the submarine service in World War II. The result of all Michno's work is a comprehensive account that succeeds nicely in giving the reader a view of life on a World War II submarine as experienced by the men whose often unnoticed contributions were essential to success: torpedomen, machinist's mates, sonar and radar operators, electricians, yeomen, and sailors of a dozen other ratings.

It has been said that no man is a hero to his butler, and this quip applies to the relationship between *Pampanito*'s crew and many of its officers. *Pampanito*'s enlisted men (and a few officers) here speak plainly and directly about the war. Their recollections range from the torpedoman who judged his captain to be too conservative to the disgruntled steward who spat routinely in the commanding officer's coffee.

The book begins with the crew and the submarine at the building ways at Portsmouth Naval Shipyard and continues through its training, fitting out, and transit to Pearl Harbor to enter the war. The book covers all six war patrols, some of which were evaluated as unsuccessful. Readers will find the crew's first-person accounts of liberty in ports in Hawaii, Australia, and on Midway Island rollicking and amusing. Michno also notes the hard work and personnel changes that accompanied every refit period.