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DEPARTMENTS

Cover: In a historic test firing, the soon-to-be commissioned *Arleigh Burke*-class guided-missile destroyer *Winston Churchill* (DDG-81) fires an Extended-Range Guided Munition test round from her new Mark-45 Mod 4 naval gun built by United Defense. Photo © 2000 Brian R. Wolff/www.iipinet.com. All rights reserved. Photo courtesy of United Defense.

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Take the Small Boat Threat Seriously

By Captain Wayne P. Hughes, Jr., U.S. Navy (Retired)

For my purposes, small boats comprise what Sir Julian Corbett called "the flotilla." In his analysis of naval tactics at the dawn of the 20th century, *Some Principles of Maritime Strategy*,[1] Sir Julian said a navy had three mutually exclusive, mutually reinforcing components: the battle fleet, which destroys the enemy fleet; cruisers, which raid enemy commerce and protect friendly commerce; and a flotilla of small craft in large numbers, which fight for control of narrow seas.

Coastal waters became the province of small combatants at the beginning of the 20th century with the perfection of the mine and torpedo. It was unsafe for a battle fleet to enter an enemy's coastal waters and subject itself to attacks by torpedo boats, submarines, and defensive mines. Writing in 1898, Vice Admiral S. O. Makarov, Imperial Russia's greatest naval thinker, with droll insight said:

> Up to the present [command of the sea] has been understood to mean that the fleet commanding the sea openly plies upon it and the beaten antagonist does not dare to leave his ports. Would this be so today? Instructions bearing on the subject counsel the victor to avoid night attack from the torpedo-boats of his antagonist . . . if the matter were represented to a stranger he would be astonished. He would probably ask whether he properly understood that a victorious fleet must protect itself from the remnant of a vanquished enemy.[2]

Only a few years later Admiral Makarov would go down with his flagship, victim of a Japanese mine off Russia's port of Vladivostok.

A Modern Flotilla

Today, the flotilla suited for coastal operations—littoral warfare—is more complicated in composition than a century ago, comprising not only small fighting craft but also low-flying aircraft and assorted means to detect, track, and target enemy ships of all sizes. Above all, it is complicated by the addition of many kinds of missiles. The breadth of littoral waters also has increased from a few score miles to hundreds of miles. The clutter that complicates coastal operations was, a century ago, the coastal shipping, fishing boats, shoals, islands, cliffs, and inlets of the enemy's waters. Now coastal clutter also includes a high density of electronic signals and commercial aircraft. A modern flotilla will have more elements to it and will face a more intricate tactical environment, but "the small boat threat" remains a featured component.

I propose three ways to assess the nature and extent of this small boat threat:

1. Salvo Equations

The salvo equations described in my own work (and elsewhere) can help us understand contemporary missile warfare.[3] These equations have many strengths and limitations. Their lessons are general and extend beyond the littoral environment, for one does not need to know how big or small a "small boat" is to use them. Nor does it matter whether coastal or open- ocean operations are under investigation.

The equations lead to the fundamental conclusion that when there is a force-on-force exchange of missile fire, numbers are by far the most valuable attribute a force can have. They show that:

- If you pack too much combat potential in a single warship, you face the possibility of losing much unused potential in a missile exchange.
- If you have a fleet of multimission warships with the flexibility to perform many activities, then loss of a ship when performing one mission results in its loss for all other missions.
- Many small enemy fighting craft com-

The Cold War is over, but many nations still operate light forces developed for that conflict, such as these Chinese *Houku*-class missile boats. Small boats always have been unsophisticated, but their inexpensiveness makes them affordable in large numbers for even minor navies. The U.S. Navy cannot afford to dismiss the threat these forces pose to operations in the littorals.

plicate your effort to detect, track, target, and destroy enough of them to prevent a successful enemy attack.

➤ A formation of warships armed with very powerful missiles intended to destroy another formation of large warships is ill-suited to fight a swarm of small craft, because powerful missiles are wasted in overkill while the swarm sucks the large warships dry of their ordnance.

2. A Look Back at Fighting in Littoral Waters

The preceding discussion is an application of combat science in the extreme: abstract, dry, simplified, and mathematical. The opposite extreme is looking at coastal combat as pure art, described in histories and memoirs as ingenious, multifaceted, emotional, willful, and steeped in courage.

U.S. PT boat performance in World War II was only marginally effective for many reasons—one being that the boats used the same faulty torpedoes that plagued our submarines. Another reason was that the PTs were manned by reservists who were viewed by the regular Navy as cowboys—dangerous to friend and foe alike. PT boats had few advocates in the regular Navy, and there was no serious attempt to integrate them with cruisers and destroyers, even when they were employed in the coastal waters of the upper Solomons and the Philippines. The suspicions, mediocre tactics, technical flaws, and lukewarm achievements of our PT boats are covered nicely in Curtis Nelson's recent *Hunters in the Shallow Seas*.[4]

More instructive is the British and German experience in World War II in the North Sea, the Norwegian coast, the eastern coasts of Scotland and England, and the French, Belgian, and Dutch shallow coastal waters. *The Battle of the Narrow Seas* by Peter Scott is a good description, but it appeared too soon after the war.[5] Better is the autobiographical narrative of Peter Dickens, describing in great detail the motor torpedo boat (MTB) attacks on German coastal shipping in 1942. Dickens carefully researched the Kriegsmarine's archives, admitting some sobering disappointments about his own flotilla's supposed successes. He describes the tactical challenges, experimentations, and moves and countermoves exhibited on both sides. His MTBs' night attacks (operations always were at night in fair weather or foul) were seen as so threatening to German shipping that convoys were formed, and when the sinkings continued, the convoys sailed in daytime—only to suffer even more severe losses to Royal Air Force bomber attacks. Unlike fleet actions (which tended to be few and far between), the battle of the flotillas was, like the air war over England and Germany, in constant ferment.[6]

3. Combining Science and Art with Experimentation

A third way to take the small boat threat seriously is to blend science and art with a set of experiments that could begin immediately, using a model-test-model approach. The model uses any of a variety of analytical methods. It would have four salient properties:

➤ Take place in a real coastal setting that can then be transferred into an at-sea experiment. A great deal of attention should be given to enemy players who are accustomed to littoral operations. Coast Guard officers are familiar with the difficulties of inshore operations, and officers of friendly foreign navies are candidates.

➤ Assign one of two missions to the U.S. forces. One is to deny the enemy the movement of shipping in his own coastal waters; the other is to protect our own shipping as it moves into the port of a friendly state being supported by our ground forces. I do not think the employments most often seen in U.S. studies, namely, the delivery of air and missile strikes or the execution of an opposed amphibious assault, are the place to start. The strike scenario already is overworked and the amphibious assault is too challenging if the enemy has a respectable coastal defense.

➤ Include the exact capabilities of existing U.S. forces and the imagined capabilities of enemy missile boats and coastal submarines supported by a coherent detection-and-targeting system. An air- and land-based missile threat could be added later. The tactics employed are dependent on the capabilities of both sides. Since the history of actual coastal operations is replete with tactical move and countermove, there is no reason to believe the best tactics can be discovered on the first try. The idea behind model-test-model is to improve by experimentation.

➤ The most difficult (but also most important) aspect of the model or simulation is to introduce a high density of sea-bottom, surface, aerial, and electronic clutter. This will be hard to do with a map exercise or simulation. That is why the model effort, the purpose of which is to go as far as possible in developing campaign plans and tactics, must be followed by an exercise at sea, where the geography, oceanography, coastal traffic, electronic signals, and commercial aircraft will create the confusing environment that enhances the small boat threat.

Our experience to date with fleet battle experiments offers hope of valuable lessons to be learned. The difference here is the creation of a serious opponent in a force-on-force campaign that is competitive. To be blunt, the opposing forces should be sized realistically so that U.S. victory is not a foregone conclusion.

When we practiced approaching the Soviet mainland we knew we faced a formidable system of seaward defenses in depth. After many years of study, analysis, tactical development, and experimentation at sea we had a pretty good idea of what we could and could not do. We analysts believed we could make informed judgments about what constituted U.S.-Soviet maritime parity: how many carrier battle groups it would take to defend against how many Backfire regiments, and how many nuclear attack submarines we would need to reduce the Soviet submarines arrayed against our carrier battle force. In a similar vein, the object of the model-test-model process would be to estimate the size of U.S. forces required to overcome different quantities of enemy coastal defenses and make a realistic assessment of losses, when a high level of tactical skill is exhibited on both sides.

The Experiments' Payoff

After the at-sea test, then another round of tactical development and simulation would follow in which both sides would make improvements. By the time a second sea test has been conducted a great deal should be known in three areas:

➤ The composition and numbers of existing U.S. Navy sensors, aircraft, and warships it will take to gain and maintain dominance in the home waters of several levels of enemy coastal capabilities, with major attention to the small boat threat.

➤ Lessons learned that will help develop Streetfighter characteristics, manning, tasks, tactics, and mutually supporting operations with the existing blue-water Navy.

➤ Indications of how to develop and employ unmanned vehicles of various descriptions as companions, or eventual replacements, of Streetfighters.

I offer a paragraph from chapter 11 of *Fleet Tactics and Coastal Combat* as a suitable summary of the small boat threat and the need to take it seriously:

> A special concern for inshore warfare is a greater risk of catching a single ship napping because of the cluttered environment and the reduced battle space. I have yet to find a rationale for sending large, expensive, and highly capable warships into contested coastal waters unless they can take several [missile] hits and continue fighting

without missing a beat after suffering a first attack by the enemy. It is better to fight fire with fire using expendable, missile-carrying aircraft or small surface craft. In fact, ever since the introduction of numerous torpedo boats, coastal submarines, and minefields early in this [the 20th] century, contested coastal waters have been taboo for capital ships and the nearly exclusive province of flotillas of small, swift, lethal fast-attack craft.

[1]Julian S. Corbett, *Some Principles of Maritime Strategy* (Annapolis, MD: Naval Institute Press, 1988).
[2]S. O. Makarov, *Discussion of Questions in Naval Tactics* (Annapolis, MD: Naval Institute Press, 1990).
[3]Wayne P. Hughes, Jr., *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000).
[4]Curtis L. Nelson, *Hunters in the Shallow Seas: A History of the PT Boat* (Dulles, VA: Brassey's, 1998).
[5]Peter Scott, *The Battle of the Narrow Seas* (London: Country Life Ltd., 1945).
[6]Peter Dickens, *Night Action: MTB Flotilla at War* (Annapolis, MD: Naval Institute Press, 1974).
[7]Hughes, *Fleet Tactics and Coastal Combat*, p. 290.

Captain Hughes teaches tactical analysis at the Naval Postgraduate School in Monterey, California. This article originally was given as a lecture in May 2000 at the Office of Naval Intelligence's small boat threat workshop in Suitland, Maryland.

Reduced Manning and High-Tech Bridges Demand New Training Standards

By Captain Brian Boyce, U.S. Navy (Retired)

On the open sea, only one or two individuals usually man merchant ship bridges. The entire crew may be fewer than 20 crewmembers, including seamen, cooks, and engineers. Other than the master, there usually are only three officers (chief mate, second mate, and a third mate) who stand officer of the watch (OOW). Normally, the OOW will be assisted by one or two other watchstanders, one of whom is the lookout, drawn from the ranks of a handful of able-bodied and ordinary seamen.

On Navy ships, the management of combat systems and other functions increasingly have moved below decks, while core seamanship tasks have remained on the bridge. If the DD-21 program is any indication, the Navy will have integrated bridge systems designed to be operated safely and effectively by a single individual. Rules of the road require that a lookout also be on watch, and it is arguable whether the Navy ever will choose to man a bridge with a single officer. Nevertheless, even with a lookout and other team members, including a surface radar watch below decks, the officer of the deck on an integrated bridge system is going to have to be very well qualified. It is not an "entry-level" position.

Talent and experience are scarce resources, and although a lot of both must be focused on the high-tech systems below decks, the Navy needs to ensure that this does not come at the expense of competence on the bridge. These single-person bridges will not be just on new-construction DD-21s. Advanced integrated bridge systems—the outgrowth of the Smart Ship Program—are being fitted and backfitted on many ships. As the Navy reviews its training programs to support innovations leading to reduced manning on advanced bridges, it might consider just how much like merchant marine bridges they will become.

Whether a ship is gray hulled or black hulled, it operates in the same environment of wind, sea, and current and obeys the same laws of physics. Regardless of how many people are on watch, the basic seamanship tasks of conning, lookout, log keeping, navigating, and communicating must be performed. It is the prudence and skill of the mariner in performing those tasks that makes for a safe passage or dictates survival or disaster in a crisis. Mariners, as they progress toward qualifications, will study the same natural laws and the same cues that will show which law is uppermost and what the ship will do in response. It is skill at mastering the situation that is being tested. The only difference is the path the mariner will use to achieve qualification.

Many of the improvements in merchant ship professionalism have been stimulated by lessons learned in the wake of the *Exxon Valdez* and other disasters. Although there have been some Band-Aid fixes, there also has been a long-term disciplined approach to progress. Shipping is the most international of all of the world's industries, as well as one of the most risky. Part of the risk is because of the great variety of ships from many nations plying the same waters. These ships must understand each other's intentions clearly and be governed by the same laws and regulations. The body that drafts these international laws and regulations is the International Maritime Organization (IMO), an agency of the United Nations consisting of 158 member nations. The IMO's first task was the Convention for the Safety of Life at Sea in 1960. From that beginning, it expanded to address issues such as pollution, the carriage of dangerous goods, disability, compensation, and liability.

In recent years, special attention has been given to the standards of crew performance through a subcommittee of the Maritime Safety Committee. The original convention of this subcommittee was the Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) in 1978. These standards entered into force in 1984 and were amended in 1991, 1994, and 1995. The 1995 amendments to the STCW (which went into effect in February 1997) are the most extensive, in that they added the "STCW Code"—which turned the previous articles into specific standards and requirements. In the United States, the STCW resolutions are codified under various titles of the Code of Federal Regulations (CFR) that apply to U.S.-flag merchant shipping. Foreign-flag vessels sailing in U.S. waters are covered by the same STCW codes, although administered under the laws of their countries of origin. U.S. Navy ships are operated in accordance with regulations issued by the Secretary of the Navy under authority of Title 10 of the U.S. Code.

While some portions of the CFR apply to both merchant shipping and the Navy (e.g., Chapter 33—The Rules of the Road), the STCW resolutions apply only to merchant shipping. Nonetheless, these accepted worldwide standards and professional requirements levied on the merchant mariner may have benefit to Navy training policy.

Among the notable features of STCW '95 that represent a new approach affecting crew training and operation of merchant ships is the establishment of minimum standards of competence. With the advent of STCW '95, not only is knowledge tested, but understanding, proficiency, and competence must be demonstrated as well. STCW '95 cites the competence function to be assessed, the elements of competence to be examined, the criteria to be used for evaluating competence, and the methods of demonstration that are acceptable. Administration of STCW is the responsibility of the flag nation, and the training and evaluation of the various competence standards are ac-