

THE SUBMARINE REVIEW



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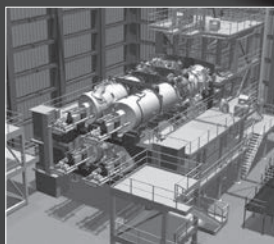
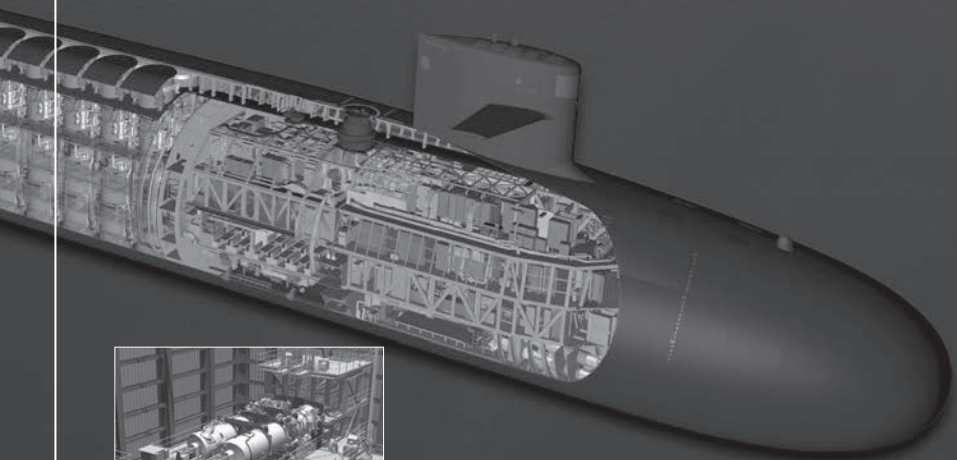
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FROM THE PRESIDENT

I am honored to serve as the new President of your Naval Submarine League (NSL). Just prior to the recent annual symposium, I was elected by the NSL Board of Directors to relieve Rear Admiral John Padgett (Ret.) and Ms. Teri Marconi was elected to replace me as the League's Vice President. John Padgett served as our President for the past seven years. Under his strong leadership the League has prospered and matured significantly. At the opening of the symposium, we publicly thanked John for all he has done for the Submarine League. I, for one, am most grateful for John's leadership and am dedicated to continuing his efforts to make this fine organization even better.

My goal is to continue to grow the League as the professional organization for submariners and their supporters. We will seek additional members from the submarine community to include active duty officers and enlisted, submarine-related industry leaders and their employees, former submariners, Navy Reservists who are/were submariners, government employees in submarine-related organizations and midshipmen who are considering submarine service. The growth in membership will help increase our revenue and enable expanded outreach activities and added support to our chapters.

THE SUBMARINE REVIEW seeks to inform and engage our members and others who participate in decision making regarding our nation's security and the need for a strong Navy. We encourage your feedback as we strive to improve its value to our members. Additionally, as you read our periodic NSL Updates or visit our newly improved web site (<https://www.navalsubleague.org/>), we encourage constructive feedback on how we may better serve you.

On behalf of all the Naval Submarine League staff I wish you a very happy, healthy, prosperous and joyful New Year. Please keep our military personnel who are deployed around the world in your prayers. I look forward to visiting with many of you in the near future.

John Jay Donnelly
President

EDITOR'S NOTES

We believe that you will enjoy this issue as it has a wide variety of material of current interest. The Naval Submarine League recently completed another very successful Annual Symposium. We were fortunate to have been able to schedule the History Seminar the afternoon and evening prior to its kickoff. We have included a transcript of the seminar discussion of *The Hunt for Red October* which should be of interest to all. We also have a summary by CAPT Jim Patton detailing some of the interesting highlights of his experience as a Technical Director for the production. And we have a description of the awardees recognized at the symposium; in the next issue, we will include copies of many of the great presentations

Our nation is in the midst of an effort to recapitalize our military. To provide a well-researched opinion on that issue, we have obtained permission from the American Enterprise Institute (AEI) to publish excerpts regarding our community from a recent article they published, *Repair and Rebuild* by Mackenzie Eaglen. For those of you who would like to take advantage of the research and financial basis, the complete article can be found on the AEI web site.

We have three excellent essays in this issue written by active duty officers. LCDR Ryan Hilger reflects on the underlying strategy and actions leading to the Allied victory in the Battle of the Atlantic. CDR Tim McGeehan has written an important review of the critical importance of our SSBN force to national security and some of the threats and potential actions that must be considered to protect the integrity and credibility of our end of the Nation's strategic deterrent. In our third essay, LT Jim Davis, a student of RADM Jerry Ellis at NPGS, Monterey, presents us with his thoughts and research on the subject of the future of C3 for the submarine community as technology brings unmanned vehicles into play in operational theatres. There is a lot of food for thought in these essays. I welcome similar work by others of you to help keep our creative and innovative juices flowing.

One of our members sent me a copy of a paper that he had kept since he had served with RADM (then CDR) Dave Oliver who was serving as Commanding Officer of the USS *Plunger*. This well-written



paper on service in submarines shows us that there are many things which don't change when they are being done right.

We have an interesting interview with the CO of a Greek submarine conducted by CAPT Ed Lundquist who sits as the Communications Chair for the Surface Navy Association. We also have the second part of the article that we began in our last issue on the use of diesel submarines on Canada's fisheries patrols. There are some lessons here dealing with the need for flexibility as missions change.

We are fortunate to have received an article reflecting on the thoughts of an "outsider" who visited the USS *Dallas*. Lester Paldy is a Professor of Science and he originally published his observations in a publication sponsored by his profession, now he shares them with us in *Where Science and Technology Count*.

Finally, a couple of fine tributes submitted by two of our members. CAPT Sam Ward, who serves as President of our Pacific Southwest Chapter, has written on his reflections on the late ADMIRAL Powell Carter. Sam served as his XO/NAV on *Hammerhead* and was also a shipmate of VADM George Emery in that same wardroom. Likewise, CAPT Dave Miller gives us a personal look at the leadership attributes of VADM Ron Thunman. VADM Thunman was honored, along with VADM Dan Cooper, ADM Carter and Mr. Dan Tyler at our recent symposium and he was displaying the same energy he always has, we salute them all!

No book reviews for this issue. I would like to encourage you readers of history, current events, strategy, etc. to take some notes and write a brief synopsis for the rest of us so we can take advantage of your time and thoughts. You can always look at back issues for some ideas from previous reviewers or contact me, I can provide a few suggestions as to format.

This issue marks my first cycle (year) as Editor of your journal. It has been a learning process and I particularly appreciate the inputs and suggestions that I receive from you. Please keep them coming. Happy Holidays to you and yours!

Good Hunting!!!

Mike Hewitt

Editor@navalsubleague.org

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LETTERS TO THE EDITOR

In his article "Reading Submarine History" in the June 2017 issue of *The Submarine Review*, Captain Wolters not only ignores reviewing the book *Rickover: Controversy and Genius* by Thomas B. Allen and myself, but in passing quotes a review by John Finney citing the book as verging "on the snide" and possessing "a certain petty strain."

Finney wrote one of the three or four critical reviews of the book; the other 40-plus published reviews were most highly favorable. Drew Middleton of *The New York Times* wrote, "The most exhaustive and the fairest biography we are likely to get of the father of the nuclear Navy," while James Fallows wrote in *The New York Review of Books*, "Engrossing.... A skillful biography that explains a complicated subject--the evolution of the modern Navy--through the story of one man." Vice Admiral William P. Mack wrote in *Sea Power* magazine, "*Rickover* will be of great interest to all who have served in the Navy in the last 25 years... Polmar and Allen present these views as objectively as possible, and leave it to the reader to make his or her own judgment." Mack also called the book "fascinating."

Indeed, the book was so appealing to actor-film producer Peter Douglas that he met with Mr. Allen and me to discuss a film about Rickover with his father, Kirk Douglas, playing the role of Rickover. "I admire the Admiral tremendously and I thought the book dealt with him wonderfully," Douglas was quoted in *The New York Times*. But Rickover opposed the film and threatened endless law suits if Douglas proceeded with the project.

And, as Captain Wolters did not see fit to mention my best-selling and unique book *Cold War Submarines* nor any of my other published works on the subject of submarine history, one can only conclude that he allowed his personal prejudices to overtake his opportunity to provide a useful and comprehensive survey of the submarine literature.

Norman Polmar

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LETTERS TO THE EDITOR

I am delighted that a naval analyst as well-known as Norman Polmar has shown interest in the submarine history reading lists suggested by LCDR Joel Holwitt and myself in recent issues of *The Submarine Review*. Regrettably, he appears to have misunderstood the purpose of my piece, which was to engage in the dialogue started by Holwitt, not to produce a "comprehensive survey of the submarine literature," as he writes in his letter.

Both LCDR Holwitt and I make clear that our recommendations are starting points, not definitive lists. Polmar's and Allen's biography of Rickover is a seminal work, which is why I specifically reference it, but Francis Duncan's biography is more recent and also half the length, something not to be overlooked when recommending books for busy submariners. *Cold War Submarines* is indeed a fine book and one that serves as a useful reference work, but it would have been difficult to include it and not Norman Friedman's two excellent illustrated design histories on submarines. As with all articles, word-count limits on submissions mean that tough choices must be made.

Many of Polmar's other books on submarines deal with those of foreign navies, but as Holwitt makes clear, his focus was on "an American list for American submariners" (Holwitt, "The Submarine History Reading List for Submariners," *The Submarine Review*, August 2016, p. 99). Given that neither Holwitt nor I discuss the histories of submarines in other navies, I suspect readers of this journal would be delighted to hear Polmar's suggestions in that area, as well as any additions to our already published lists. Rather than cast aspersions, I would encourage Polmar instead to add his own venerable recommendations to the pages of *The Submarine Review*.

Very Respectfully,
Timothy S. Wolters

FEATURES

**REPAIR AND REBUILD
BALANCING NEW MILITARY SPENDING FOR A
THREE-THEATER STRATEGY**

MS. MACKENZIE EAGLEN

Extracts reprinted with permission from the publisher, American Enterprise Institute, and the author, Ms. Mackenzie Eaglen.

Note: This article is available in its full form on the AEI web site. Extracts of particular interest to the submarine community are provided here. –Ed.

EXECUTIVE SUMMARY

The Trump administration and the 115th Congress are pursuing increased readiness and lethality for America's military and, therefore, higher defense spending. Although the White House and the Hill are seeking different levels of investment, this is a long-overdue initiative that enjoys bipartisan support. The United States now fields a military that could not meet even the requirements of a benign Clinton-era world. The services have watched their relative over-match and capacity decline in almost every domain of warfare, and against select adversaries, for nearly two decades. As rival nation-states have accelerated their force development, the Department of Defense has stalled out, creating a dangerous window of relative military advantage for potential foes. The recommendations in *Repair and Rebuild* seek to narrow that period of opportunity for American adversaries before closing it permanently. While the United States continues to field the best military personnel in the world, policy makers have asked them to do too much with too little for too long. As a nation, we have moved toward adequately compensating our service members, but have fallen utterly short in our second sacred compact with the troops: providing them with the tools and training they need so that they never enter a fair fight.

To reduce the chance of war and restore the credibility of America's



nonmilitary tools of power, the United States must quickly repair and rebuild its military. Yet lawmakers and Pentagon leaders must also ensure that the necessary haste of repairing and rebuilding the force does not lead to strategically shortsighted choices. The investment strategy in this report does not exist in a vacuum, but rather flows from the strategic rationale articulated in *To Rebuild America's Military*, a report from the AEI Marilyn Ware Center for Security Studies, to which this report should be understood as a supplement. While *To Rebuild America's Military* provided an alternate set of military strategic ends and the necessary force structure and capabilities to achieve them, this report delves further into the specifics of building a balanced plan that meets the US military's immediate needs and postures the force for the challenges of the 2020s and early 2030s.

As policymakers begin to rebuild the military, they should keep two overarching strategic truths in mind. First, global powers do not pivot. The US military cannot flit from crisis to crisis given its enduring security interests in three theaters: Europe, East Asia, and the Middle East. The US military must return forward in force over the long haul and tailor its presence to the threats and requirements in each theater. Second, the military cannot always choose its fights. It must prepare for a full range of contingencies to support deterrence at all levels and avoid strategic surprise. The Pentagon cannot choose between preparing for the future or the present, as historical attempts to do so have left the nation unprepared for both. The military must immediately expand, increase its full-spectrum readiness, and arm itself with what is available—even as it invests heavily in the next-generation technologies that will manifest themselves in 2030 or 2035.

Under those guidelines, *Repair and Rebuild* fields an Army large enough and lethal enough to sustainably conduct stability operations and decisively win in high-end conventional warfare. Most notably, the Army should expand from 476,000 to 519,000 active-duty soldiers and create new, forward-based armored cavalry regiments in Eastern Europe. Modernization efforts must focus on doubling the upgrade and procurement rate of current weapons systems while expanding and improving the Army's missile defense capabilities at all levels.

The Navy must refocus on sea control. To do so, this plan expands

the fleet from 310 to 339 ships by the mid-2020s by hastening carrier and amphibious ship construction and expanding procurement of small surface combatants, expeditionary sea bases, attack submarines, and logistics ships. Instead of purchasing additional destroyers, it more rapidly upgrades current destroyers with advanced missile defense software and accelerates development of a new major surface combatant capable of hosting the weapons of the future.

Repair and Rebuild focuses the Marine Corps on dispersed power projection by accelerating aviation-focused amphibious assault ships, purchasing additional F-35B jump-jet stealth fighters, increasing KC-130J aerial tanker production, and fielding new weapons and refueling packages for KC-130Js and V-22s. By 2023, the Corps should complete its expansion from 185,000 to 202,000 Marines and improve its ground warfare capabilities through additional artillery and rapid acquisition of new small-unit expeditionary capabilities.

The Air Force must refocus on air superiority by doubling F-22 upgrades and F-35A production while accelerating its efforts to recapitalize support and satellite launches to inform future acquisition decisions and decrease program risk. Lastly, to more sustainably conduct its missions, the Air Force should grow from 321,000 airmen to more than 350,000 and purchase two wings of low-cost close air support aircraft.

In joint matters, *Repair and Rebuild* doubles down on current ballistic missile defense plans by continuing Ground-Based Interceptor and THAAD procurement and accelerating kill vehicle and radar upgrades. The plan also provides funding to establish a new space-based missile defense sensor layer, as well as new defense-wide funding for joint networking, electronic warfare, and directed-energy weapons system development. Throughout the report, *Repair and Rebuild* endorses and funds rapid acquisition and experimental efforts that show promise in quickly delivering better capabilities to the warfighter. Lastly, the plan recommends significant increases in facilities sustainment funding—particularly for nuclear infrastructure—and invests heavily in building new, dispersed, and resilient forward basing.

Congress and the president cannot wait until 2019 to begin this endeavor. Rather, 2018 defense spending should be increased to \$679 billion to provide a credible down payment on rebuilding the armed force-



es. In total, the plan articulated in *Repair and Rebuild* costs about \$134 billion per year above the Budget Control Act caps extrapolated through 2022, for a total of \$672 billion in additional defense funding above the BCA levels. That sum is roughly equal to funding lost from the past five years relative to Secretary Robert Gates' 2012 budget proposal.

This plan is not only necessary, but affordable. Out of the \$9.5 trillion in new debt the Congressional Budget Office expects the United States to accrue by 2027, additional defense spending outlined in *Repair and Rebuild* would represent only 6 percent of that increase. Furthermore, research shows that periods of sustained increases in defense spending correlate with the lowest cost growth and schedule delays for major weapons programs, thereby saving money.¹ While the per-unit cost savings of efficient production rates are well-known, the cost-effectiveness of combining spending increases with stability is incalculably valuable across all defense accounts.

While the tangible outputs resulting from increased defense spending may take some time to manifest, the political signaling of budgetary increases will be immediate. The day after the president and Congress announce a detailed, large-scale military repair and rebuild plan, all other efforts—including diplomatic, economic, and cyber—will instantly become much more effective. By shoring up the military foundation of national power along the lines of *Repair and Rebuild*, the United States will be better able to achieve its national interests—not just today and in 2035, but during each day in between and far into the foreseeable future.

Notes:

1. David L. McNicol, "Are Changes in Acquisition Policy and Process and in Funding Climate Associated with Cost Growth?," Institute for Defense Analyses, March 2015, https://www.ida.org/idamedia/Corporate/Files/Publications/IDA_Documents/CARD/D-5448.pdf.

A SENSIBLE COURSE TO 350 SHIPS IN SUPPORT OF A THREE-HUB NAVY

When you ask me which do I want to buy—capability, or capacity, or readiness? The only answer is yes.

—Admiral Phil Davidson, January 2017

What objectives should the 350-ship fleet accomplish? That is the question now that the Trump administration, Congress, and US Navy leadership have endorsed the larger fleet size. Over the past decade, a bipartisan consensus has emerged that naval forces must expand to meet the increasing demands placed on them.¹ Today's Navy is too small to keep up with its myriad day-to-day missions and ill-equipped to fight for sea control in combat environments. Yet the Navy's needs extend far beyond simple fleet size calculations. How the Navy grows and what that expansion includes will determine the Navy's future ability to restore conventional deterrence through the right mix of presence and posture—and win a battle for sea control if called upon.

While President Trump campaigned on the bipartisan goal of constructing a 350-ship fleet, Navy leaders are currently more interested in maximizing the extant fleet's utility. According to Vice Chief of Naval Operations Admiral Bill Moran, that translates into spending new funds on ship and aircraft maintenance,² along with more fighters and munitions.³ This approach is confirmed by the March 2017 request for additional appropriations and the FY2018 naval budget request.

There is eminent wisdom in this approach; the overall capacity and capability of the Navy is a product of many factors beyond the number and type of ships. *Repair and Rebuild* provides more than \$38 billion over the FYDP to address deferred maintenance shortfalls created by the overextension of an under-funded force during the past decade.⁴ Properly funding the existing fleet and aviation enterprises to ensure they are performing up to standard represents an immediate, low-risk, and cost-effective path to shoring up near-term risk and repairing the foundation of the sea services.

Beyond readiness, *Repair and Rebuild* allocates an additional \$85 billion in naval investment over the FYDP. Given the long lead time



associated with shipbuilding, this five-year period will be particularly problematic for maritime force development. Policymakers cannot simply pay the bills to resolve the readiness problems of today while setting their sights on building a fleet for 2035. Such an approach ignores critical medium-term requirements. To compensate, *Repair and Rebuild* proposes a rapid initiative to field a more lethal fleet of 339 ships within eight years, cementing a three-hub Navy that can maintain permanent presence in the Mediterranean, the Persian Gulf, and the Western Pacific.⁵ How the Navy expands on this base of 339 ships remains an open question well-addressed by the fleet architecture studies recently released by the Center for Strategic and Budgetary Assessments (CSBA),⁶ the Navy N81 staff,⁷ the Congressional Research Service (CRS),⁸ and the Congressional Budget Office (CBO).⁹ As the CRS and CBO studies note, the necessity of timely ship retirements has problematic implications for any attempt to increase naval force structure over a prolonged period. Overall, *Repair and Rebuild* prioritizes immediate results and minimizing acquisition risk by expanding and accelerating the purchase of existing ship designs and upgrades instead of steering new funding toward newly designed ships or operationally speculative technologies, such as directed-energy weapons and railguns.

The CSBA and N81 studies in particular provide a thoughtful starting point for considering the needs of the Navy in 2030 and beyond. Both papers recommend serious departures from current Navy shipbuilding plans and operating concepts and a movement toward (semi)autonomous systems. While *Repair and Rebuild* adopts some of those recommendations, nothing below should preclude further naval experimentation. In several places, *Repair and Rebuild* takes a long-term view of naval modernization. For example, this plan avoids overinvestment in Flight III Arleigh Burke-class destroyers in favor of accelerating a cruiser replacement capable of hosting future weapons systems once they mature. At the same time, this plan continues investment in promising long-term technology projects, such as electro-magnetic railguns, high-powered lasers, and large autonomous underwater vehicles.

But in many ways, the future is now. Wholesale changes to existing plans would saddle the Navy with risks—especially in acquisition—that may once again allow the perfect to become the enemy of the good-

enough. For instance, canceling the littoral combat ship (LCS) program to pursue a true open-ocean frigate as soon as possible would assuredly result in the sailors of 2022 grumbling about schedule delays, cost overruns, and capability shortfalls of that new frigate. Chief of Naval Operations Admiral John Richardson recently articulated this concern by stating his preference for using existing designs to grow the fleet,¹⁰ a desire echoed by Vice Admiral Moran.¹¹

The force development plan in this report will take time to manifest, and Admiral Richardson cannot ask the Chinese Navy to press pause for five years. Since most shipbuilding choices take many years to bear fruit, the recommendations in *Repair and Rebuild* for improving the fleet extend far beyond shipbuilding. As the N81 study rightly notes, “Today’s fleet possesses most of the platform capacity and payload volume to support the distributed fleet architecture.”¹² There are many existing modernization programs that can be fielded at an accelerated pace, from conducting existing ship upgrades faster (AEGIS Baseline 9) and expanding small scale capability improvements meant to cover the entire fleet (SeaRAM) to supporting rapid procurement such as for unmanned underwater vehicles (UUVs)—and buying more munitions.

The Navy’s 2016 force structure assessment sets a requirement of 355 ships, up from the Obama-era target of 308 and the current fleet of 280.¹³ Relative to the existing plan for 310 ships by FY2021, *Repair and Rebuild* would complete or contract for another 29 vessels in the FYDP to achieve 339 ships by the mid-2020s. Sustained acceleration of construction programs for attack submarines, carriers, and amphibious ships beyond the next five years would allow the Navy to reach 350–355 vessels faster than current estimates. *Repair and Rebuild* seeks to grow the fleet using immediately available options by rectifying the massive shortfall in small surface combatants, meeting enduring carrier and amphibious requirements, and filling the existing and expanded attack submarine shortfall through 2040. The new large surface combatant shortfall created by the 2016 force structure assessment, which requests 104 of these ships instead of 88, is partially mitigated by increased ground-based ballistic missile defense capacity, an expansion of the small surface combatant fleet, and a combined acceleration of both the cruiser upgrade and cruiser replacement programs. *Repair and Rebuild* also funds



the addition of 10,000 active Navy personnel in FY2018 and FY2019 to prepare the Navy for the early stage of this shipbuilding expansion.

According to both Chief of Naval Operations Admiral John Richardson¹⁴ and Matthew Paxton, president of the Shipbuilders Council of America, the extant shipbuilding manufacturing workforce and facilities can meet the challenges of growing the fleet to up to 355 ships if pursued responsibly.¹⁵ The recommendations herein thus rely on plausibly conservative estimates of defense industrial base capacity.

ATTACK SUBMARINES

[Taken from A Sensible Course to 350 Ships in Support of a Three-Hub Navy –Ed.]

Undersea warfare remains America's preeminent area of comparative advantage in its long-term conventional military competitions with Russia and China. While the new force structure assessment leaves the Columbia-class Ohio Replacement Program untouched, it calls for an 18-boat increase from the current target of 48 attack submarines, for a total of 66.¹⁶ The current fleet of attack submarines meets only 62 percent of combatant commander requirements against a Russian Navy that operates first-class attack subs¹⁷ and a Chinese Navy fielding quiet diesel subs in numbers and rapidly moving toward serial production of nuclear attack subs.¹⁸ Yet such an expansion of the silent service would necessitate a significant investment in the current submarine industrial base right as those contractors prepare for the Columbia-class SSBN.¹⁹ So far there has been no indication that the Navy can or would accelerate boomer production before FY2021, the planned first year of Columbia procurement, but such opportunities should be explored. The Navy has stated there is currently no margin for error or delay built into the schedule for Columbia; owing to the importance of the nuclear deterrence mission, a production acceleration should be considered to build in schedule margins for the Columbia-class.²⁰ This plan also strongly recommends against moving Columbia-class procurement out of the shipbuilding budget.²¹

To start rebuilding the submarine force, Congress should lock in a

second Virginia-class in FY2021, the first year of Columbia-class production. This follows a course charted by Rep. Joe Courtney (D-CT) in the FY2017 NDAA22 and endorsed in the Navy's FY2018 budget request.²³ Thereafter, the Navy should procure a second Virginia-class attack sub in each year of Columbia-class procurement, as well as a third attack sub in certain years. The fleet would continue procuring two attack subs a year even after transitioning from Virginia-class production to follow-on production of the SSN(X) in FY2034.²⁴

Based on a current 60-month delivery time for each attack sub, such a procurement schedule would result in the attack submarine fleet bottoming out at 43 or 44 subs (instead of 41) in FY2028 or FY2029 and a subsequent climb back to the current force structure of nearly 50 attack submarines by FY2033 and 60 by FY2040. In response to a House of Representatives reporting provision in its draft FY2017 NDAA,²⁵ the Navy affirmatively determined that the submarine industrial base could achieve such a build rate for attack subs.²⁶ Given the remaining 23-boat shortfall in the late 2020s even under this plan, Congress should seek more information about further increasing the build rate to three Virginia-class subs per year during Columbia-class construction, a possibility hinted at by the Navy's updated FY2017 unfunded priority list²⁷ and endorsed by Sen. McCain's plan,²⁸ but cautioned against by recent news from the program and the need to maintain a balanced Navy.²⁹ The Stackley memo calling for an increased fleet size confirms that increased SSN production prior to FY2021 is infeasible.³⁰

Further, all extra Virginia-class attack subs should include the Virginia Payload Module, which adds 28 vertical launch cells to each vessel. This would improve naval power projection by creating an attack submarine force capable of tormenting adversaries' defensive schemes.³¹ Hundreds of payload-independent tubes dispersed in the world's oceans on American's future submarine force will ably replace the retiring SSGNs, which have fired the opening shots in many of America's modern conflicts.

Notes:

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NUCLEAR WEAPONS ENTERPRISE

President Trump has tasked Secretary of Defense James Mattis with conducting a new Nuclear Posture Review that will likely validate the necessity of the existing nuclear modernization program with some changes.¹ If the 2010 Nuclear Posture Review is any indication, translating the findings into changes to the nuclear program of record will take time. Current modernization priorities for the nuclear enterprise generally enjoy deep and widespread bipartisan consensus, although adjustments at the margins may eventually be needed in response to an evolving nuclear environment. No other defense modernization effort can boast of simultaneous endorsement by eight former combatant commanders.² Except for the third offset evangelism proselytized by former Secretary of Defense Ash Carter and his deputy Bob Work, no other spending area has benefited from the sustained support of senior leadership and such a sacrosanct budgetary commitment. As Vice Chairman of the Joint Chiefs General Paul Selva recently testified:

There is no higher priority for the Joint Force than fielding all components of an effective nuclear deterrent, including weapons, infrastructure, and personnel. Perhaps the clearest indicator of this prioritization is how we have chosen to spend our resources and the tradeoffs we have been willing to accept. Although our current nuclear strategy and program of record were developed before the Budget Control Act imposed strict caps on defense spending, we are emphasizing the nuclear mission over other modernization programs when faced with that choice.³

Given the military's outstanding maintenance work to maintain the readiness of existing nuclear capabilities, it is not yet necessary to accelerate any of the core nuclear modernization programs. These programs, which will undergird the nuclear force of the future, include the Columbia-class nuclear ballistic missile submarines, the Ground-Based Strategic Defense ICBM replacement program, the B-21 nuclear-capable bomber variant, the Long-Range Standoff cruise missile, dual-capable F-35As, and the consolidation of existing nuclear warhead variants for the modernized B61-12 nuclear gravity bomb. So far, these programs have exhibited many positive development markers, including much-im-

proved life-cycle planning compared with the weapons they will replace. What cost overruns that exist are mostly a function of cost estimation difficulties rather than acquisition malpractice.

Yet *Repair and Rebuild* does establish a new fund to address one neglected component of the nuclear forces: the backlog in nuclear facilities FSRM. This funding will support deferred projects in support of nuclear weapons facilities to ensure the nuclear enterprise remains healthy in the immediate future.⁴ Similarly, this plan would create a new joint fund to bolster the integration and cyberresiliency of nuclear command, control, and communications systems. The 2018 Senate draft of the defense policy bill identified several shortcomings in the acquisition strategy of this bedrock of the nuclear weapons enterprise.⁵

Taken in concert, these measured steps will ensure the existing nuclear modernization plans successfully renew America's strategic deterrent. However, the Department of Defense must also grapple with the reality that the enemy gets a vote. International actors could prompt a change in US nuclear posture on a timeline that renders the forthcoming Nuclear Posture Review, which is largely expected to continue the current modernization plans, insufficient or obsolete. Such a fate befell the 2010 review, which was written amid continuously evolving Russian nuclear doctrine and weapons modernization programs, worsening tri-lateral nuclear dynamics in South Asia, and souring multilateral relations between the regional nonnuclear neighbors of North Korea and Iran.

Numerous credible studies from disparate authors have raised red flags about the increasingly complex and dangerous nuclear weapons environment, which is characterized by the potential dynamics of multiple interlocking arms races. Notably, a December 2016 report by the Defense Science Board concluded that changes in the nuclear environment in forthcoming decades would require an expansion in the number of low-yield nuclear weapons and nuclear delivery methods. Yet the board went beyond analyzing low-yield weapons to present interesting and underappreciated analysis on ways to improve nuclear command and control and diagnostics to assess weapon readiness.⁶ Their recommendations may be worth pursuing, and the Pentagon should undertake continuous study of the evolving nuclear weapons landscape, even after the Nuclear



Posture Review delivers its policy verdicts. No need for additional funding or programmatic choices exists at this early stage.

But that will not be true in perpetuity. In a land-mark 2015 report, the Center for Strategic and International Studies organized three ideologically disparate teams to consider the future of the US nuclear deterrent. While the teams presented three different recommendations for changes at the margins of future US nuclear posture, they all accepted a broad set of framing assumptions that suggest the future nuclear weapons environment will become ever more complicated and more dangerous.⁷ The Marilyn Ware Center's 2015 report *To Rebuild America's Military*⁸ endorsed those assumptions and encouraged the Pentagon to begin laying a foundation for change in order to respond to an evolving threat environment.

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CONCLUSION AND FULL FUNDING INDEX

The intellectual, cultural, and programmatic underpinnings of the second offset began under the leadership of Secretary of Defense Harold

Brown and Under Secretary of Defense for Research and Engineering William Perry in the late 1970s. This work prepared the Pentagon for the Reagan buildup in the early to mid-1980s. Similarly, Secretary of Defense Ash Carter and Deputy Secretary of Defense Robert Work set the conditions for a third offset by fostering discussion on restoring American military technological superiority—a long-overdue recognition that the period of assumed American supremacy has come to an end.

The core tenet of *Repair and Rebuild* lies in my belief that while regaining technological superiority will be necessary to ensuring conventional deterrence in the future, this alone is far from sufficient. As articulated by the strategic vision underpinning *To Rebuild America's Military*, the Pentagon requires a three-theater force-sizing construct to inform a balanced and sustainable force development strategy. The global threat environment is changing too quickly to accept multi-year periods of risk generated by pivoting from theater to theater or by investing only in the readiness of today's military or the technological capabilities of the future force.

To Rebuild America's Military concluded that haste is of the essence in rebuilding our armed forces. Clearly, the Pentagon's inability to deliver a five-year spending plan in FY2018 and a strategy for rebuilding does not align with that urgency.

Thus, my intention is that *Repair and Rebuild* spark the necessary discussions on thorny force development questions at the programmatic level, with the aim of resolving them ahead of the point of no return. As such, please do not hesitate to reach out to discuss the calculations or the choices made in this study. For those with further interest in the budgetary specifics, a full index of the additional expenditures recommended by this report follows.

The table referred to by the author is available in the original version of this report at the website of the American Enterprise Institute, www.aei.org. —Ed.



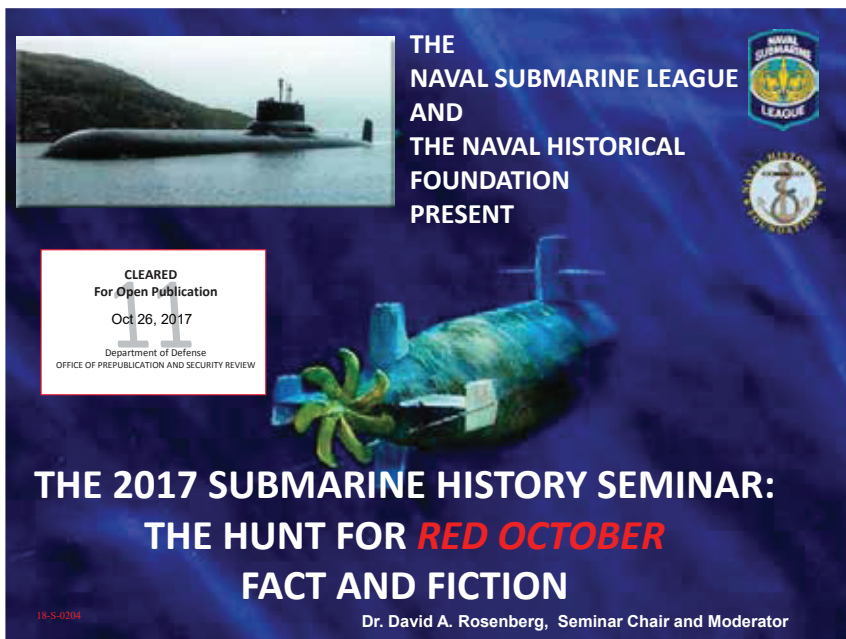
TRANSCRIPT OF 2017 NSL HISTORY SEMINAR

THE HUNT FOR RED OCTOBER - FACT AND FICTION

OCTOBER 31, 2017

DR. DAVID ROSENBERG: Good afternoon and welcome to the Sixteenth Naval Submarine League-Naval Historical Foundation Submarine History Seminar. I am a longtime member of both the Submarine League and the Foundation. I do recommend membership to both.

May I have the first slide, please? We are here to talk about atomic submarines. We are here to talk about U.S. submarines trailing Russian submarines. But the key issue is we're here to talk about atomic sub-



The poster features a blue background with a submarine on the left and a model of a submarine on the right. Text on the right side reads: "THE NAVAL SUBMARINE LEAGUE AND THE NAVAL HISTORICAL FOUNDATION PRESENT". Logos for the Naval Submarine League and the Naval Historical Foundation are in the top right. A white box on the left contains the text: "CLEARED For Open Publication Oct. 26, 2017 Department of Defense OFFICE OF PREPUBLICATION AND SECURITY REVIEW". At the bottom, the title "THE 2017 SUBMARINE HISTORY SEMINAR: THE HUNT FOR RED OCTOBER FACT AND FICTION" is displayed in white and red. The name "Dr. David A. Rosenberg, Seminar Chair and Moderator" is at the bottom right. A small number "18-S-0204" is in the bottom left corner.

marines because the fact is that only atomic submarines can trail other atomic submarines.

The interesting point about all of this, however, is, just like the movie and the book are based on some aspects of historical fact, much of that fact still remains classified. So, for the submariners in the audience and any others, including NCIS agents, I want to assure you that everything that is on the screen, at least, and what we are going to be saying, has, in fact, been cleared through the submarine force and through the Office of the Secretary of Defense. With that, let's get started.

Next slide, please. I think any of you who have any familiarity with the history of nuclear submarines know about Hyman G. Rickover, the engineering duty only admiral who, starting as a captain, literally creat-

Chief of Naval Operations Admiral Arleigh Burke's Direction to the First Four Nuclear Submarine Captains, 2 January 1959

"Nuclear powered submarines are going to have two big jobs, three big jobs.

One is to develop the areas around Russia.

Another is to follow the Russian submarines so that we know what we have got—if they know that we are following them, it doesn't matter.

The third one is this antisubmarine training.

These are the three we have to do...."

Source: Arleigh Burke CNO Transcripts, NHHC, Declassified 1998-99



ed the atomic submarine. But what is often forgotten is the operational aspect of it, in part because it's so classified.

The plan for atomic submarine was built on the experience -- the World War II experience of submarines. But some of the lessons, some



of the leadership, were provided by folks who weren't. This is a quote from Admiral Arleigh Burke, Chief of Naval Operations for three terms, six years, from 1955 to 1961. It was Burke who made the decision in late 1955 to make all future submarines nuclear powered and to begin the Polaris program that created the ballistic missile submarines.

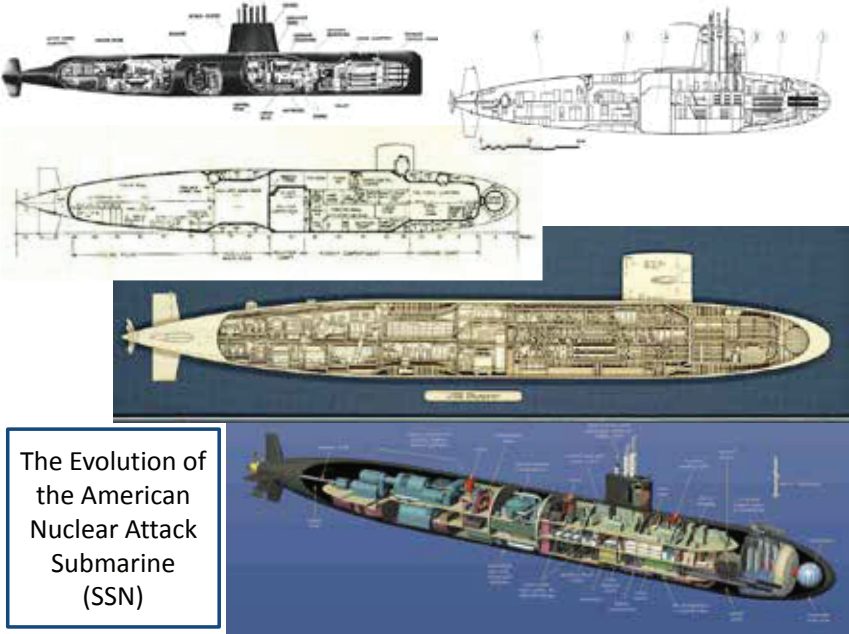
Burke, in January of 1959, decided to have a one on four talk with the first skippers of U.S. nuclear submarines, namely in particular at top: Captain Dennis Wilkinson, (this [picture] was taken in 1955), the first skipper of *Nautilus*; Commander William Anderson, who was the current skipper of *Nautilus*; Captain Dick Laning, who was the skipper of *Seawolf*, the second [nuclear] submarine; and Commander Jim Calvert, skipper of USS *Skate*. *Nautilus* and *Skate*, [during] the previous summer, had [sailed under the ice to] the North Pole. They received great news coverage. *Nautilus* got a ticker-tape parade when she came back to New York.

But what you had here was a meeting between Burke and these four skippers talking about the future. They talked about a lot of issues, engineering questions, how many [different] classes [of submarines needed to be built], whether the Navy were moving too fast, and some interesting points about [Rear Admiral] Rickover. At the end, Commander Calvert raised the question. He said, sir, do you have any charge for us? What should we be doing?

This is what [Burke] said, develop our knowledge of the areas around Russia, [and] follow the Russian submarines so that "we know what we have got." He noted "if they know that we are following them, it doesn't matter" -- but that wasn't quite true -- and then develop anti-submarine training for our own forces to know how to deal with these submarines. Next slide.

What we saw was, during the period between the 1950s and the 1980s when the book and the movie "The Hunt for Red October" take place, the American submarine force evolved. This is not a lecture on the evolution of American submarines, [but this slide is designed] to emphasize two points. The first point -- at the top is *Nautilus*, the Skate-class was somewhat smaller and different -- but the key point on *Nautilus* is the nuclear power reactor.

This is the *Skipjack*. The Skipjack-class, you can tell, this is a totally different, revolutionary, hull form based on the hull form of the USS *Al-*



The Evolution of the American Nuclear Attack Submarine (SSN)

bacore, an experimental [conventionally-powered] submarine. And then what you have is the next three classes of American nuclear submarines.

This is the Permit or Thresher-class, followed by the Sturgeon-class, and then finally the Los Angeles-class. The Los Angeles-class, in the form of the USS *Dallas* in the movie and in the book, is the boat that trailed Red October. The key thing I want to point out to you is this, the sonar dome in the bow. It is that capability, the ability to use sound to track passively the acoustic emissions of submarines that makes trailing possible. That is what is absolutely critical to understanding the broad technical aspects of all this. Next slide.

The problem is that, looking around the audience I don't think this is an issue -- I don't see that many millennials here -- but for those who may have forgotten, we had a formidable enemy in the Cold War. The Soviet Union built a great many atomic submarines. They surprised us with the speed in which they built them. They surprised us in many ways with the quality in which they built them.

Along the top row of this slide are the first nuclear attack submarine,



The Soviet Submarine Threat



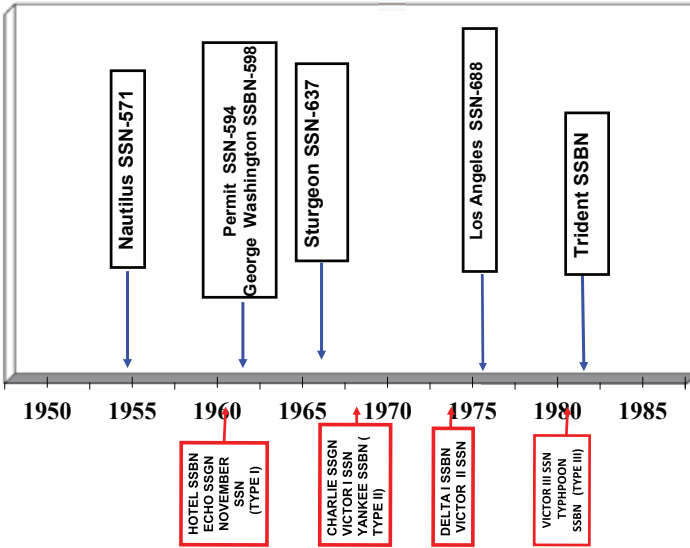
the first guided missile submarine, an Echo, which we will hear about shortly, and the first ballistic missile submarine, which this is essentially the same model, if you will, the same class as the *K-19* for those who saw that movie about *K-19, the widow-maker* with Harrison Ford. Then we have advanced nuclear submarines, Victor I and Victor III, and a new guided missile class submarine, the Charlie. And then finally, ballistic missile submarines that were utterly critical to the Soviet Union in terms of developing its nuclear strategy; initially Yankee-class submarines and the Deltas, a Delta III here, and the Typhoon.

The thing to remember, is this. The Russians built a lot of them. In 1982, according to the declassified National Intelligence Estimate on the Soviet Navy, the Soviet Union had a grand total of 363 submarines, of which they had 85 ballistic missile submarines. Over 60 of them were nuclear powered. They had 64 guided missile submarines, over 50 of them were nuclear powered. And then they had 214 attack submarines, more than two-thirds of those were nuclear powered.

This is a formidable navy. It's something to really worry about. So, the question is, how did we balance against them? Next slide.

SUBMARINE CLASSES: THE ACOUSTIC ADVANTAGE IS KEY

Source: VADM Roger Bacon Brief, NSL History Seminar, 2007

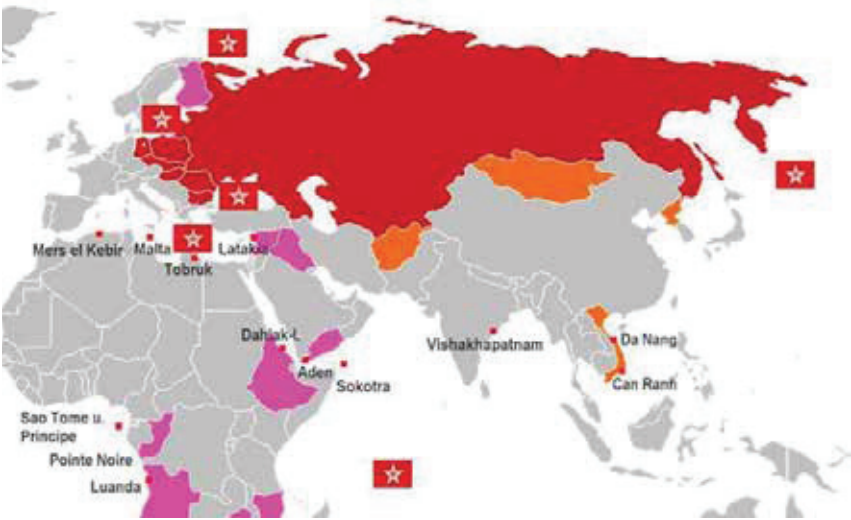


This comes from a slide from [Vice] Admiral Roger Bacon at an earlier submarine history seminar. It shows the evolution of the building and deployment of submarines [in the U.S. and USSR]: the first classes, the Type I, the Type II and the Type III nuclear submarines, when they came in. While we can't really show you acoustic advantage -- although the Navy did declassify some stuff on this in the 1990s -- it is acoustic advantage [that mattered]. It is the fact that we could hear them, and they could not hear us that made it possible to do the kind of trail that is written about and then shown in the book and the movie. Next slide.

Just to remind you again of the formidable nature of that threat, this is a wonderful [map] showing the [dimensions of the Soviet naval threat in the 1980s]. There are the four Soviet Fleets: the Northern Fleet, the Baltic Fleet, the Black Sea Fleet, and the Pacific Fleet. [In addition], the Russians had the Fifth Escadre in the Mediterranean and the Ninth Escadre in the vicinity of Socotra Island in the Indian Ocean.

This was a global navy. It was a navy that worried us. The question is, how do we keep tabs on that navy? We had the 7th Fleet in the Pacific, the 6th Fleet in the Mediterranean, and the 2nd Fleet in the North





Soviet Navy Fleets, Squadrons, Bases and Anchorages 1984
 Red countries are Warsaw Pact members, Orange and pink countries are states with special treaty of mutual assistance and friendship with the USSR. Stars are Fleets and Squadrons of the Soviet Navy



U. S. Navy Submarines in the Cold War: Where Were They?

MEMORANDUM FOR ADMIRAL RADFORD 7 November 1956

Subj: Submarine Patrols

1. The normal submarine patrols in the Pacific are off Petropavlovsk, in the Sea of Japan off Vladivostok, in the Yellow Sea off Darien, Kwantung and Tsingtao and off the China coast south of Formosa. Periodically we have a patrol in the Sea of Okhotsk.
2. It is expected that the first two patrol stations to be filled by submarine patrols will be off Petropavlovsk and Vladivostok.
3. In the Atlantic the normal patrol stations are in the Barents Sea and Norwegian Sea. We have had for the last month or so three submarines operating in the Iceland area to obtain technical data.
4. CINCLANTFLT has established an initial patrol in the Denmark Strait-Iceland-Faroes-British Isles area, using seven submarines.

ARLEIGH BURKE
 Source: Burke Memo, Originators File, NHHG, Declassified by ONI 1993

August 13, 1974: Joint Chiefs of Staff Briefing to President Gerald R. Ford, White House Cabinet Room, 3:11 to 4:20 p.m.

Adm. Holloway (CNO): The Navy is flexible, mobile and multipurpose. Chart number 11 shows Naval postures and contingencies for limited war and general war (either with general-purpose forces or nuclear). All our major ships can operate either conventionally or nuclear. Chart number 12: To protect NATO's southern flank or any US contingencies. We have 21 ballistic-missile submarines on patrol. **One tactical nuclear sub is usually in the Barents Sea for reconnaissance.** Chart number 13: To support our Asian allies and national tasking. Since World War II, the 7th Fleet has been combat ten years. **One nuclear sub is on reconnaissance off Vladivostok or Petropavlovsk.**
 Source: Foreign Relations of the US, 1969-76, Vol XXXV, National Security Policy, 2014, pp. 200-205

Atlantic. But the question was, how do you keep tabs on submarines? Next slide.

U.S. submarines, we can say this officially, at least through 1974 -- but one can in fact think a little bit further ahead given a line in the movie I will note -- we had submarines in the Barents Sea. We had submarines in the Norwegian Sea. We had submarines off Petropavlovsk and the Kola Peninsula. And we had submarines in the Sea of Japan off Vladivostok.

For those who might worry whether I'm giving anything secret away, that's why there are these little comments down here. These are fully declassified statements of where American submarines were starting in '56 and continuing in the briefing to President Ford after President

On Board USS DALLAS, November 1984, in "The Hunt for Red October"



Captain Bart Mancuso: Have you got a make on him?
 Sonar Technician Submarine Second Class Jones:
 Computer's chewing on it, sir. Twin screws. The plant noise sounds like a TYPHOON. I'd say we got a new boat, sir.
 Captain Mancuso: Tommy, I miss something on the boards?
 XO (LCDR Thompson): SUBLANT hasn't said anything about it....
 [Computer printout indicates the contact is a Soviet TYPHOON Class ballistic missile submarine not previously recorded]
 Captain Mancuso: Hmm. All right. How many TYPHOONS we got in the computer?
 STS2C Jones: Six, sir.
 Captain Mancuso: OK. Call this guy TYPHOON Seven. Start a tape on him. See if we can work in a little closer.
 STS2C Jones: Yes, sir.
 Seaman Beaumont: Won't he hear us?
 STS2C Jones: Not if we stay in his baffles, Seaman Beaumont. Not if we stay in his baffles. Come in behind his propeller, and he's deaf as a post.

Nixon resigned. U. S. submarines were there to keep tabs on the enemy, and this was a point of concern. Next slide.

This is my favorite quote from the movie. Scott Glenn, playing Bart Mancuso, is talking to sonar technician second-class Jones, and asking



about this new contact and how to follow it. He replies it sounds like a Typhoon, [but the *Dallas* had received no previous] word on it.

You may recall in the movie that it is noted that USS *Dallas* is 100 miles off the Polyarny Inlet. The previous slide explains why *Dallas* was there. But the question is, what are we doing? And [what Captain Mancuso says we are going] to do is we're going to start a tape on this new submarine and we're going to try to work in a little closer. This is the way we kept tabs on enemy submarines. Mancuso has this subma-

Why Trail "Red October"?

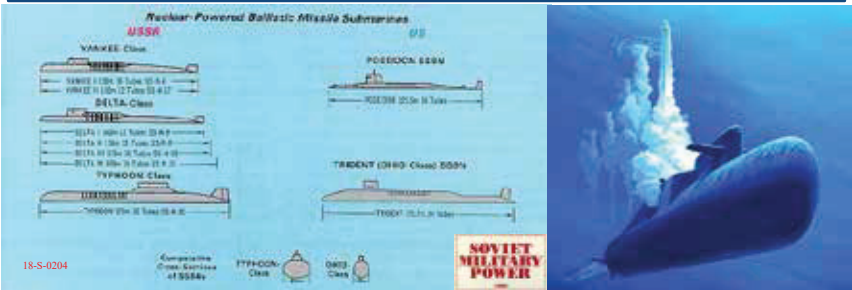
From" National Intelligence Estimate NIE 11-15-82D,
Soviet Naval Strategy and Programs through the 1990s, 15 November 1982
Key Judgments

Secret Version, March 1983, Copy 393, Declassified by CIA Accession number NN3-263-95-001 31 Jan 1995

"Within the Soviets' overall wartime strategy... the primary initial tasks of the navy remain:

- To deploy and provide protection for ballistic missile submarines in preparation for and conduct of strategic and theater nuclear strikes.
- To defend the USSR and its allies from strikes by enemy ballistic missile submarines and aircraft carriers.

Accomplishment of these tasks would entail attempts to control all or portions of the Kara, Barents, and northern Norwegian and Greenland seas, the seas of Japan and Okhotsk, and the Northwest Pacific Basin, and to conduct sea-denial operations beyond those areas to about 2,000 kilometers from Soviet territory. We believe that virtually all of the Northern and Pacific Fleets' available major surface combatants and combat aircraft and some three-quarters of their available attack submarines would be committed initially to operations in these waters."



rine designated Typhoon 7 (in reality there were only six Typhoons). Typhoon 7, the Red October is a ballistic missile submarine. Next slide.

Why are ballistic missile submarines important? The declassified National Intelligence Estimate on the Soviet navy from 1982 emphasizes one key point. In Soviet wartime strategy the primary initial task for the navy remains to deploy and provide protection for ballistic missile submarines in preparation for and conduct of strategic and theater nuclear strikes.

[As this slide indicates,] the Russians had a good many [different

WASHINGTON (SSN 787)

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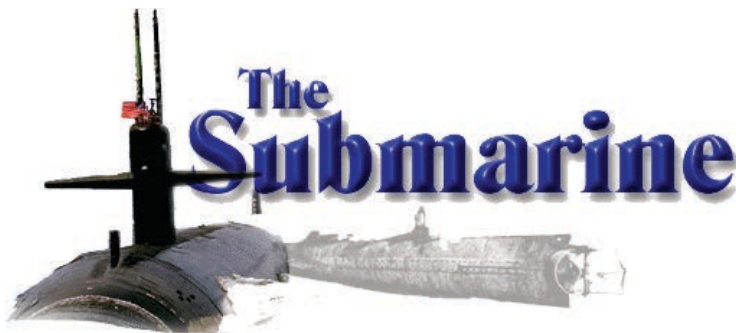
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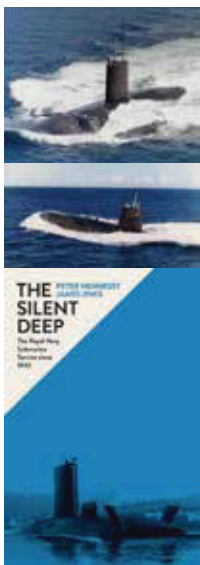
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classes of nuclear powered ballistic missile] submarines. We only had two classes of nuclear [powered ballistic missile] submarines at the time. [The number of classes and the number of submarines in each class shows the importance of their SSBNs and] the role [that their] defense played in the defense of the Soviet Union and Soviet naval strategy.

That's why you wanted to trail *Red October*. One key point, though, with respect to the Delta and the Typhoon SSBNs: there are lines in the movie that the threat from the *Red October* was that it could come over here [across the Atlantic] to shower us with nuclear missiles. That's what the U.S. feared Captain Ramius was going to do. No, folks, that's the one thing that was a bit of a Hollywood embellishment to make the movie more dramatic. The fact is that the Deltas and the Typhoons could

Trailing Soviet Nuclear Submarines: A Royal Navy Perspective



Detecting and remaining in contact with Soviet submarines was... nowhere near as simple as is often portrayed in Cold War fiction or Hollywood films. Establishing viable estimates of a target's course, speed and range when only provided with passive sonar bearings was, as [Captain Richard] Sharpe [RN, former commanding officer of HMS COURAGEOUS] explained, the "most important and obscure of the submariner's black arts."

"It is difficult enough when the noise source is constant, as in a cavitating surface ship propeller, but achieves a whole new plane of obfuscation when the contact is irregular. A simple analogy is that it is like being in the field with a herd of cows in pitch darkness. You can hear munching, the swish of tails, footfalls and the occasional seismic contribution to global warming, but only a fool would claim that he knows the exact PIM [Position and Intended Movement] of any individual animal. Part genius or part 'con job?' The answer is, a bit of both, and to an extent the dynamics of each encounter are variable and uncertain. You really do need first-hand experience of submarine vs. submarine operations to understand what happens and ...what doesn't happen. This takes years for Commanding Officers to learn."

Peter Hennessey and James Jinks, *The Silent Deep*, (2015) pp. 353-4

18-S-0204

fire from home waters; [they could shoot] 4,000-mile missiles at the United States. That's a key point. Next slide, please.

So, what was it like to trail [a nuclear submarine]? One of the things we [found as we worked on an introduction to this seminar is that the

U.S. Navy has] not declassified any American comments on what it was like to trail a Russian submarine. [Fortunately,] the British have published a book called *The Silent Deep*, [by Peter Hennessey and James Jinks]. I recommend it to you, although it's 800 pages. It could be used as a door stop. Do not read it in bed as it could crush your chest if you fall asleep and it falls over [on you]. It is a marvelous book, however. It tells you wonderful things about British submarines, and along the way it tells you a lot of good things about American submarines. I refer you to this comment from Captain Richard Sharpe, later the editor of *Jane's Fighting Ships*, who in fact talks about how difficult [trailing] is.

I love this line in particular, a simple analogy [for] trailing was that "it is like being in the field with a herd of cows in pitch darkness. You can hear munching, the swish of tails, footfalls and the occasional seismic contribution to global warming, but only a fool would claim to know the exact position and intended movement of any individual animal. Part genius or part 'con job?' The answer [is, a bit of both, and] to an extent the dynamics of each encounter are variable and uncertain. You really do need first-hand experience of submarine vs. submarine operations to

The 2017 Submarine History Seminar:
The Hunt for Red October – Fact and Fiction

- **Panelist – CAPT David C. Minton, III, USN, Ret.**
CDR Minton was the commanding officer of USS *Guardfish* during the 1972 mission trailing a Soviet *Echo II* missile submarine.
- **Panelist – RADM David R. Oliver, Jr., USN, Ret.**
LCDR Oliver was on the staff of ADM Zumwalt in the Pentagon in 1972. He assisted CAPT Al Baciocco in the Naval Operations Command Center when the *Guardfish* alerted the President that three Russian submarines armed with nuclear cruise missiles were underway, possibly to target U.S. carriers off the coast of Vietnam.
- **Panelist – ADM Thomas D. Fargo, USN, Ret.**
CDR Fargo was the commanding officer of USS *Salt Lake City*, which took Scott Glenn (who played the commanding officer of the U.S. submarine in the movie) to sea to watch a real submarine crew at work before filming began.
- **Panelist – Mr. Mace Neufeld**
Mr. Neufeld was a producer of *The Hunt for Red October*, *Patriot Games*, *Clear and Present Danger*, and *The Sum of All Fears*, based on bestselling books of Tom Clancy. He has many other credits in film, television and entertainment.
- **Moderator – David A. Rosenberg, Ph.D.**
Military historian and NSL History Seminar Chairperson



18-S-0204

understand what happens and ...what doesn't happen. This takes years for Commanding Officers to learn. Next slide, last one.

We are fortunate today that we do have three former commanding officers who, in fact, did know how to do things like this. In particular, Captain Dave Minton, who will be talking next about the trail he undertook on USS *Guardfish* of a Soviet Echo II Class submarine in the Pacific in 1972. He will be followed by Rear Admiral Dave Oliver talking about what he saw in Washington of that trail. Dave commanded USS *Plunger*. And then finally [Admiral] Tom Fargo will be talking about his experience [as captain of USS *Salt Lake City*] taking aboard the cast of *The Hunt for Red October*.

Finally, we're delighted to have Mace Neufeld, who produced the movie and a number of the other Tom Clancy and Jack Ryan movies. He will provide his perspective on the story. So, with that, I'd like to turn to Dave Minton. Go ahead, sir.

CAPT. DAVID MINTON: I want to talk to you about a trail that started in Vladivostok, way up north. The trail extended for 6,100-plus miles, 28 days in trail. It was an exciting event, there was no question about it.

It all started on 8 May when Nixon announced the mining of Haiphong and other North Vietnamese ports. As a result of that, there was a message that I received onboard *Guardfish*, and I was up along and close to Vladivostok along the Tubin River, Cape Codelang, which separated the Soviet Inland Sea and the open ocean. I was right along the channel where normally all Russian commerce came, military and civilian, in and out of that channel.

The message said, be aware they might respond to this. I was sitting there just waiting to see what was happening. There wasn't anything going on. I was actually having dinner in the wardroom and I got a call from the officer of the deck. He said, there's a noise level we picked up coming out of the northeast headed out from Vladivostok. My answer to that was, when you have him visually give me a call.

So, I got a call, and I went up and looked out of the periscope. I could see both port and starboard running lights of this vessel. Although it was designated as being some type of patrol craft, I knew right away it was a submarine because in fact I had spent a lot of time around Russian submarines and the starboard side light on Russian submarines was an off color



of green, a dead giveaway. So, I called the tracking party away, and this submarine in the growing darkness passed me. I could see each one of his launch cavities and could identify him as an Echo II-class submarine.

This was the beginning of an extensive period of time at sea and in trail, and I'd like to jump forward in time. In 1999 the Naval Submarine League and Sonalysts developed a videotape, *Century of Silent Service* -- many of you have seen it -- and a coffee table book *United States Submarines*. To have that book work, they had all sorts of information from earlier days, from the beginning of the submarine force up through World War II, all declassified. When it came to the Cold War there was nothing available.

So, in their infinite wisdom, they declassified two patrol reports, mine and the *Batfish*, one in the Atlantic and one in the Pacific. I drew the lucky straw. And so suddenly this story that I could not divulge, classified as secret, is now declassified. So that's how I got to be here.

(Laughter).

That book found its way to Russia. An admiral, retired, submarine commanding officer by the name of Alfred Berzin saw the book. He spoke no English, read no English, but there were a lot of good pictures and he flipped through the book and he saw the track chart that was in the book. It had dates on it, at that level, and he realized, oh my God, he was trailing me.

He wrote a blog describing his reaction and quoting sections of the book that he had translated into English. This blog was then translated into English and put on the net. I received in 2008 an email identifying this blog and suggesting maybe I'd like to look at it. I did, and it took me a year to finally make contact with Admiral Berzin.

That began a long period of time, up until today, where I corresponded with Admiral Berzin. We talked about all aspects of the trail. We talked about our lives, our careers, life in the United States, life in Russia, our families, our kids, all sorts of things. I found him to be a real gentleman, a professional sailor, a nice guy.

And, in fact, in 2012 my wife and I went to St. Petersburg and visited with him and had an absolutely wonderful time. He's a spectacular guy. He had the same types of bitches about what went on in his navy that I had with my Navy.

(Laughter).

He complained about bad intelligence and poor management of the staff and all sorts of things. It seemed very similar. Our wives were very



similar. So, having made that contact, I'd like to introduce the players in this trip. Next slide.

That's me, believe it or not, in 1972. I've aged. Next one. That's





Admiral Berzin in 1972. He was only a captain, first rank, at that point. As I said, a real gentleman. Next slide.

That's *Guardfish*, another big player in this, my submarine, off Pearl Harbor. Next slide. That is an Echo II. It is not Admiral Berzin's Echo II. This is a generic Echo II picture.

You can see the cavities along the hull that have those launchers. There are eight launch cavities and containers. They hold a Shaddock missile, which had about a 200-mile range.

Through correspondence with Admiral Berzin, I asked a question. Did you have nuclear weapons onboard? But don't tell me if that's going to be a problem for you.

He came back, no problem at all. I had four nuclear weapons and four conventional weapons, and I had two nuclear torpedoes. He was well armed, as were the other submarines.

As we went south in the Sea of Japan, he popped periodically and went to periscope depth. My conclusion was that he was getting a message to give his patrol orders to him, that they had sent him out right



away and would, in fact, now update him with what he was supposed to be doing. That wasn't the case.

He, in fact, had a missile casualty. He had a leak in one of the cable runs to his launcher number six, which had a nuclear weapon in it. That cable run could be drained into the ship, and he had surfaced when I thought he was at periscope depth, and he was trying to stop the leak, unsuccessfully.

As a result, he made a decision not to dive deeper than 85 meters, which made a big difference in the rest of the trail. At that time, our best guess is that frequently the Soviets ran at a nice round number, 100 meters, 50 meters, 150 meters. As a result, you can take a look at the profile of our submarine and his submarine and see that there's a space between them. If he's at 50 meters or 100 meters, it's good for you to be in between those so you don't run into each other.

But there is no system, unlike in *The Hunt for Red October*, where



they could tell exactly where that submarine was. We didn't know what the depth of the other submarine was at all, no information for that other than the supposition of 100 meters. It turned out he and I were running at the same depth most of the time. As I pointed out to Admiral Berzin, it pays to be lucky. We never came in contact with each other.

He cleared baffles hourly for the whole trail. If he didn't clear a regular baffle he'd change course far enough to see back into his stern area. I've always described that as sort of like looking in your rear vision mirror. You're driving along and you look in the rear vision mirror and you see what's behind you. That's what a submarine does routinely, and that was a major portion of his protecting himself from being trailed.

Of course, he had a terrible sonar and he couldn't hear us. We were very quiet, and struggled to be very quiet. The whole process of baffle clearing created a certain amount of tension on board because when he turned you never knew exactly how far he was going to turn. Sometimes he would turn 180 degrees and run right back down his track.

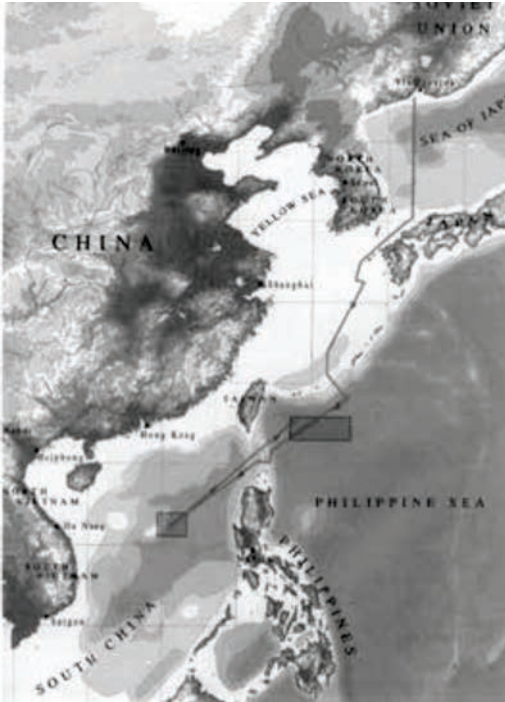
Well, I was somewhere back on his track, and I would come to a stop. That didn't stop the submarine, all this metal was going to coast along at pretty near the same speed. So, the two of us were approaching at each other pretty dramatically.

You wondered just how this was all going to work out. The worst possible thing is that there'd be a collision. The most likely thing is I would be detected. Neither one of those happened.

He was running too fast. He came back along his track at the speed he had been going. As a submarine increases speed its capability of detection of another ship, its sonar capability, is degraded. He didn't slow down, so he was still blind. I concluded that actually the whole process was designed to contact another trailing submarine by use of trail. We're going to hit them.

Fortunately, neither of that happened. He didn't detect me. But we did this a lot of times. Next slide.

During the trail where we passed through between Japan and South Korea, he slowed and came to periscope depth and spent a lot of time there. I made a mistake. I stayed down below the layer.



There is generally a temperature gradient in the Western Pacific between 140 and 160 feet. If you're above the layer and he's below the layer, you can't hear him, and vice versa. If you were above the layer and he's below it, you can't hear him.

So, he went to periscope depth and I stayed down, and waited and waited and waited. Finally, I couldn't take it any longer and I came up through the layer, and he was gone. I was really upset because by this time I had alerted the whole Navy that I was in trail of this guy and I had detected other Soviet submarines in the group.

In fact, in my report I said I had at least three and possibly four Hen-type submarines in this group. I only knew one for sure, the one I was trailing. So suddenly I've lost the gas. There I am without a trail. Next slide.

This guy is the Eckland Ranger, not the Lone Ranger. Eckland

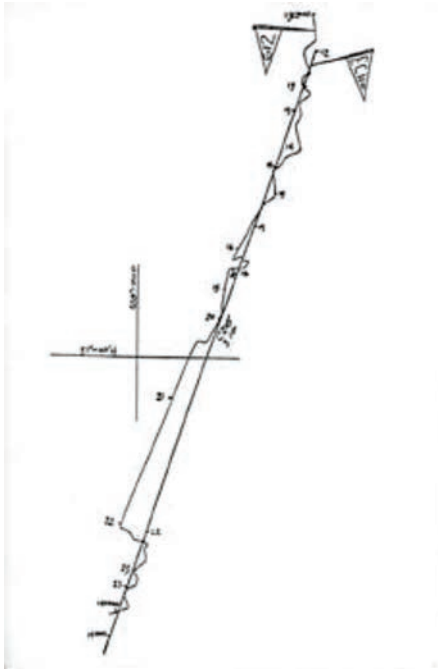




ranging is a process by which submarines determine range to another contact. To do that, one has to develop a bearing rate on the contact on one course, and then you change course and you develop a bearing rate. Through a mathematical process, using a little device on the guys cap there, you determine the range.

It's very important. Range is the most important thing. You have a bearing on him, but you need the range. In actuality, to do that, you have to do a lot of plotting.

We took bearings on the Echo every 30 seconds for almost the whole 28 days. You've got to think about how intense that was. Not only that, but when he did a baffle clear, we did it every 15 seconds because we needed the information more rapidly. We plotted a curve and determined the slope of the curve, and the slope of the curve was in fact the bearing rate. All this worked well in developing his range, and with the bearings, ultimately his course.



So, we had a pretty good handle on what he was doing when we had contact. Next slide. This is a little out of order.

When I lost contact, I was right there in the center hatch, and I realized that he had proceeded on. In some way we had missed him coming down through the layer, and I was way behind him. So, I ran what we typically referred to as sprint and drift. You sprint after a contact, and you're blind because you're going too fast. You slow down, you listen, you sprint and you slow down, until you regain the contact.

I sprinted for an hour and a half. At that point, I couldn't take it any longer. I slowed and we came down in speed, and right away we picked up a contact on our port beam, which showed by the 22 hours there, and we closed and got back into trail. I was relieved.

In *The Hunt for Red October*, Jonsey was the sonar man. On my submarine, a guy by the name of Harold Wilson was the sonar man. He was an expert, not the leading sonar man, but the best guy that we had aboard managing and operating the sonar system. Jonsey had picked this



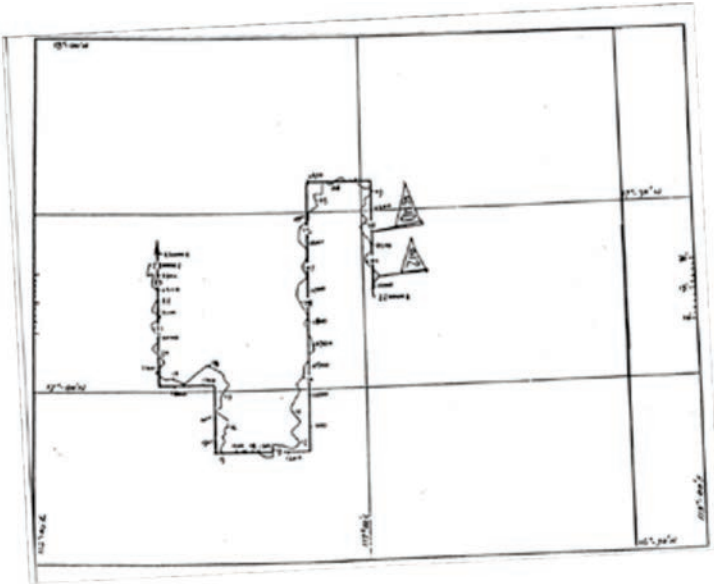
contact up, and I wanted some way to acknowledge his position and his feat, in some way to reward him for that.

Prior to deploying to the Western Pacific, my wife would give me a bag of smiley face pins, little smiley face pins. So, I thought I'd give this a try. I got on the 1MC and I called Willie to the control room, and on the 1MC awarded him a smiley face pin for duty above and beyond.

(Laughter).

Interestingly, I thought this might be a problem, but you have to understand, most of my crew were in the early 20s. The average age was way down there, a lot of them a lot younger than that. They took this as a great idea. They brought into it.

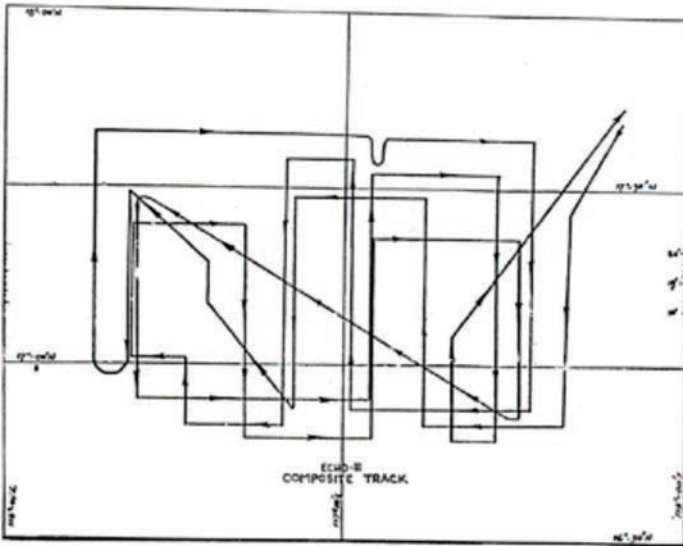
So, for the rest of the trail, I used that multiple times for different things that happened, including one time when I came off watch and went down by the galley. The night cook was a baker, and he had the best sticky buns I had ever had. I awarded him a pin, because dammit,



that's what submarining is about. Next slide.

(Laughter).

After this, we proceeded on down into the South China Sea. This is a depiction of one short period of time where we were in trail of the



Echo. The squiggly lines are for developing range, getting bearing rate. The straight lines were the Echo operating. Next slide.

We ended up in one area pretty much in a block there, and I was able to provide that information to SUBPAC and to Washington. He was outside of his range. The Yankee station was about 700 miles away and his missile range was 200 miles.

So, he was there stationed to be available to take action if they decided that's what they were going to do. My job was to keep track of him and make sure that if he started closing on our fleet, which was off South Vietnam -- our carriers in particular who were in fact pursuing a massive war and were not really geared to defend themselves against a submarine attack -- that was important to be able to tell the intelligence people what was happening.

At the same time, and as Dave Oliver will comment on it, we deployed every submarine we had to the South China Sea, all the attack



boats, so it was like Grand Central Station down there. Submarines were all over the place. The hardest part of the problem was making sure we kept a distance from the other submarines. Because U.S. submarines were quiet, we couldn't hear each other very well. So, it was easier for me to find the Echo than it was for me to find another U.S. submarine, particularly if he was running really silent, which we normally do.

So, we were in this block and we were there from May 20th to May 26th. On May 24th Nixon went to Moscow, the great summit in Moscow, with Brezhnev. That summit almost didn't happen because of all these events because the Russians had really reacted pretty aggressively to our mining of the ports down there and denying them, the North Koreans and the Chinese, being able to bring supplies into North Vietnam.

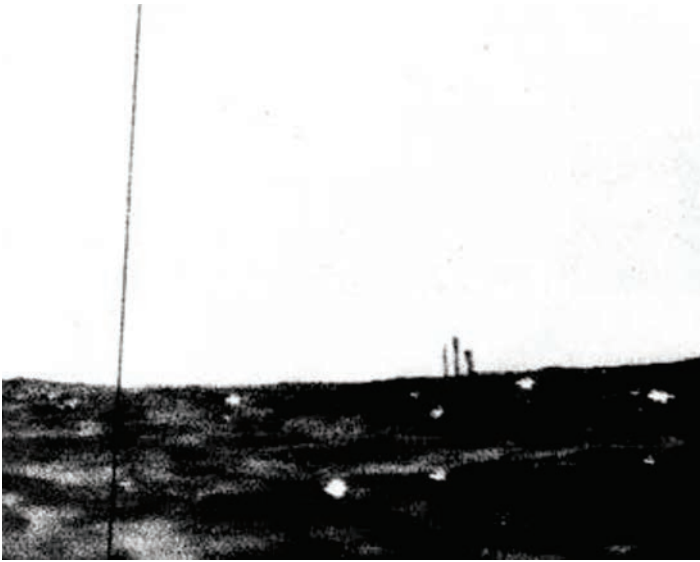
Fortunately, everything worked out and they accepted the fact that Nixon was going to come and they wanted to go. I was told from a very good source that Kissinger met with Brezhnev in a side room during the conference and told him we know you've got submarines down there. I don't know how that ratcheted up, but ultimately, Admiral Berzin says, all the submarines were told you're all being trailed. We knew none of the rest were being trailed, but that was okay as long as they reacted to that.

The day after that meeting in Moscow the submarine here departed leaving the area headed back for the Boschi Channel and headed north. I was elated because one, I had never run a SpecOp [Special Operation] before this.

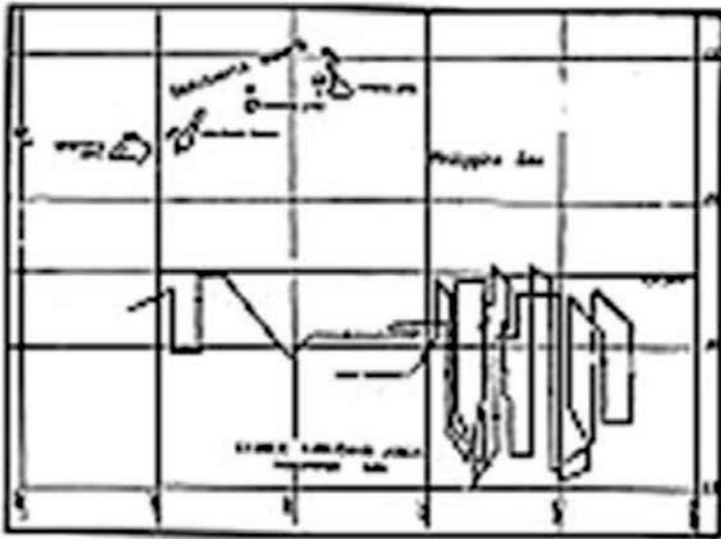
We had been a long time at sea, and this was an intense period of time. We were tired. The submarine was tired. We had a lot of maintenance work we needed to do and we couldn't do because of the noise it would create.

So, I thought, boy, this is going to be great. He's going to go back to Vladivostok, I'll ride up with him, and that will be the end of that. Well, it turned out it didn't work out that way. One more slide.

Also, he came to periscope depth one time, a few times, when I was up. I took a photograph of him just to guarantee I really was tracking that guy. Sometimes you can make mistakes and track things that aren't



what you thought they were. This proved it. This is clearly a Soviet submarine. Next slide.



After heading north, now he's in the Philippine Sea. He established another area that put him in a hold there. Next slide.

At that point, I was in a position that I could not continue the trail, because I was running out of oxygen. The way submarines of the Permit-class generated oxygen was with oxygen candles that burned and gave off oxygen. I only had so many candles. From the very start of the trail I knew how long the trail could possibly go, even if I used the oxygen in the emergency tanks. There was just a finite amount of time.

SUBPAC figured out that that was a problem, and so they decided to write a procedure to transfer the trail from Guardfish to another submarine. This procedure was a humungous procedure. They sent it in three parts. Again, when you're up and he's down, you don't know where he is. So, I was up getting the last part of this damn message. I used to stand in the radio room trying to will the machine to finish and get this thing over with.

(Laughter).

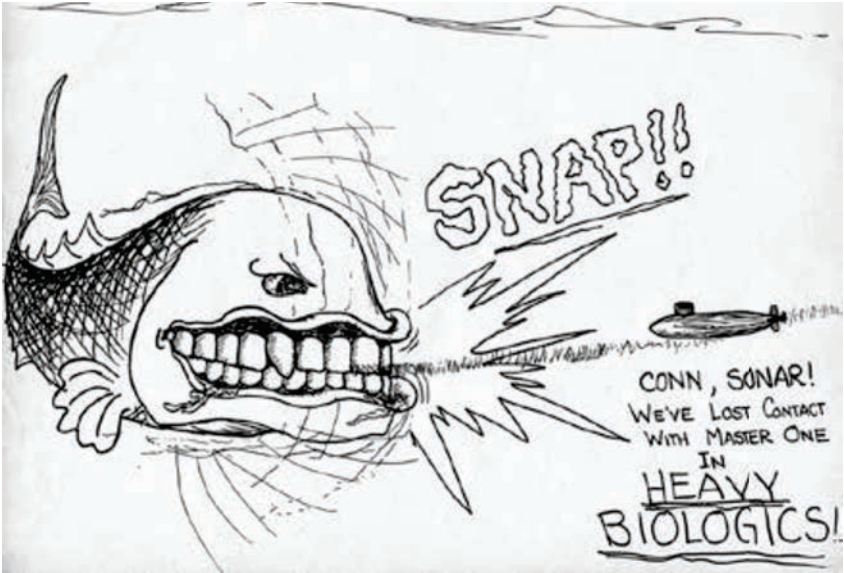
As a result of that, we were up when he came up. He spotted my periscope. We didn't see him, I was on the way down at the same time.

After that, the whole thing went to hell in a handbasket. This alerted submarine, even with as poor a sound characteristic as the Echo II, was hard to follow and keep track of. I ended up losing him, and I was devastated.

We searched and we drilled holes through the ocean like it was going out of style. In fact, Admiral Berzin said that was probably the most dangerous thing that happened during the whole time. We didn't have good contact with him, and he didn't have any contact with me, and we were both running around at high speed. Just terrible.

The problem with the area that we were in in the Philippine Sea was the biologics at night. Shrimp and God knows all the different types of fish that made noise, all came up at night. And there were rain squalls and all, and sonar, because of this, lost contact in heavy biologics. Next slide.

That depicts clearly how we felt. It's just very difficult to hold contact in those conditions. That's why I was going to periscope depth for my sched in the daytime, because I could not maintain contact and be



up in the biologic conditions we had, and stay down where I probably should have been. Hindsight is great.

So that was the end of the operation. I was told by SUBPAC -- I reported what had happened -- and SUBPAC sent me to Guam -- for a four-letter word [I was referring to crew's and my disappointment].

(Laughter).

In any event, Admiral Berzin, his submarine, thought I was still in trail. I have no idea what he was listening to. I had suggested some of the contacts he had were surface ships, and he got very indignant about that. He said, on my submarine we had professionals that could do this, and we can make the differentiation between a surface ship and a submarine.

You can't argue with a guy like that, but clearly it wasn't me. He even thought that maybe I had a secret I wasn't telling him, that another submarine was in fact trailing him. I don't know. I was never cleared for that.

So that was the end of my trip. It was a wonderful trip. To the whole crew, it was a very uplifting accomplishment.



Everyone teamed to do this trip. I had a fantastic crew and the support of people under really tense situations. They were marvelous.

I quit referring to officer and enlisted. I refer to everyone as shipmates. We'd been shipmates on a wonderful adventure, one that very seldom does one ever get that type of opportunity.

Through the blessings of the Navy, being able to declassify this, I have a book that I've written with Admiral Berzin co-authoring, which tells the story of both of our lives, our careers, our families, and of the trail. I think it's a damn good book.

(Laughter).

It will be coming out this next year, and the book's title is *From Opposite Sides of the Periscope*. Thank you.

MR. ROSENBERG: I just want to point out, this isn't the first time that this thing has really been told publicly. There are bits and pieces on the Sonalysts program, certainly in the book. When you think about this, this is something not unlike the Cuban Missile Crisis. Think about this, what was President Brezhnev or Admiral of the Fleet Sergey Gorshkov thinking? Why did they do this? What were they about?

We don't have those larger answers. But this is one of the reasons why we have the submarine force. I also want to note one other thing, it's in his biography.

I just want to point out Commander Minton, as captain of *Guardfish* for this [mission], was awarded the Distinguished Service Medal. This is something that many admirals go through an entire career and never see. To give it to a commander is a truly rare occasion, and *Guardfish* received the Navy Unit Commendation.

(Applause).

We have the side of the story at sea, but the other side of the story -- most of the rest of it that we know of -- is going to be provided by Rear Admiral Dave Oliver, who as Lieutenant Commander Oliver witnessed a good bit of this and will also provide even more context. Sir.

RADM DAVID OLIVER: Before I do, for all of those who support David, the biologics that he was experiencing in that area are called snapping shrimp. Beds of those rise and fall between the daylight. So, all of

you who really support David and support the submarine force, should eat more shrimp.

(Laughter).

They are really a pain in the butt. Let's review -- it's important to place Dave's story in historical perspective. His patrol, which surely was a great event, took place in 1972. What was going on in 1972?

It was the 15th year of the Vietnam War. It was the 18th year of the Cold War. If you had been in high school, you hadn't lived a year of your life in which you had not been experiencing a world at war, both a tactical and strategic war. That was your experience of the normal.

In the submarine world, 1972 was the first year in which the number of nuclear submarines became greater than the number of diesel submarines in the United States Navy, 69 to 65. Only a generation earlier, the diesel submariners had won the war in the Pacific. Those grand men with those delicate ships -- those brave men had won the war in the Pacific, and now there was this culture change in which they were being replaced. And if you do not think that that culture change was emotional, then you did not go through it. And if you do not think it was a peaking at the point, that the number of nuclear SSNs became greater than the number of diesel submarines, then you were not a part of that history, because it was.

At the same time, the rest of the Navy had not yet accepted submarines truly as capital ships. Admiral Zumwalt was the CNO. Remember that the previous year, 1971, was the first year that you had an OP-02. Before that the submarine force was a part of the surface force, OP-03. But in May of 1971 Admiral Phil Beshany had been assigned as the first head of the Submarine Directorate. That's the first time it had been split off from the surface force, and that was not due to the fact that Admiral Zumwalt was fond of submariners because, by God, it was not his favorite force. And certainly, Admiral Rickover was not his favorite person.

(Laughter).

Fortunately, one of his favorite persons was Captain Kin McKee, who would eventually, when he was a four-star, relieve Admiral Rickover. Admiral Kin McKee was not only close to Admiral Zumwalt, he was essentially Admiral Zumwalt's right-hand, or his man Friday, and he was installed on the organizational chart as OOK and was hidden away behind a cyber lock over at Crystal City where no one could find him.



He was given whatever responsibilities Admiral Zumwalt could give to him and whatever Admiral McKee could steal.

One of the responsibilities Admiral Zumwalt gave him one morning was when the President called and said I need to drive the North Vietnamese back to the bargaining table. This was on May 7, 1972. Admiral McKee, as was his want, gave that to me because I was more foolish than anybody else he had working for him, and I had a GS-14 from the State Department working for me.

So, Admiral McKee gave that to me, also with a list of 99 things which people thought would be good ideas. One of them was -- the only one I can remember from the list was -- to drop bales of thin plastic sheets into all the harbors to go into the intakes of the engines and supposedly stop the engines. Instead, I called him at about four o'clock and I said, how about if we mine the harbors instead?

He said, that sounds good. So, I wrote it on a three-by-five card and I gave it to Admiral Zumwalt as he got in the car to go over to meet the President. He said, wait here, and so I sat on the steps outside of the Pentagon and waited.

He came back and handed the envelope back to me and said, do it. So, I went down and called 7th Fleet and said, mine Hanoi and Haiphong Harbors. And he said, as you would expect, who the hell is this?

(Laughter).

And we had a conversation about that. I then got transferred and was working for Captain Al Baciocco as an additional duty assigned in Flag Plot, when Dave made his critic report, which was the first one that ever was made, when he reports that there's an imminent attack on the United States. As he said, he makes his report and we go through this process of passing the word to the President's special adviser, Henry Kissinger. And Henry Kissinger is having this negotiation with the Ambassador first, and then with Brezhnev.

The key to all this, of course, from my perspective at the time, and then later on in my life, is here we have for the first time the nuclear forces -- the submarine nuclear forces -- which are essentially tied up doing the Cold War, admiring the Soviet SSBN forces, in the main. There's some other missions. They are now involved in the tactical war, and in protecting the carriers that are down off Vietnam.

For the first time, you have a mix of the strategic and the tactical war. And it was all due to David's initiative, because he had no orders to leave that area. In fact, those guys were turning south and there was no reason to follow them at all.

For those of us who have been there, it is a miserable, rotten area in which to try to follow a submarine, in the event that one does that sort of thing in a submarine. I am telling you, you would choose another place to do it.

It's a miserable place to be because it's shallow and there are all sorts of uncharted places. There are mines and reefs and currents and volcanoes and terrible things. I'm sure there are dragons.

(Laughter).

Tom saw one and reported it back once to me. And David did this by force of personality and professionalism. It was an extraordinary patrol.

(Applause).

MR. ROSENBERG: Thank you, sir. You still have to know the rest of the story, but you've got a good start on this.

Our next speaker is Admiral Tom Fargo. Admiral Fargo, as Commander Fargo, was the skipper of USS *Salt Lake City*, and he's going to tell you the story of how he got tasked to host the cast of *The Hunt for Red October* as well as a few other people in the late 1980s. Sir.

ADM. THOMAS FARGO: Thank you, David. I was the commanding officer of *Salt Lake City* from 1987 to 1989. To kind of put that into context, this was really the end of the Cold War. The Berlin Wall, of course, fell in 1989 and the Soviet Union collapsed shortly thereafter. But my period of time, of course, was the Cold War.

As people talked about earlier, David in particular, the Soviet submarine force was a very capable adversary. But we didn't talk about submarine operations. The one thing that you learned from day one when you walked onboard a submarine, and after you signed the piece of paper that said you would spend a lot of time in prison if you did talk about submarines, was you just didn't talk about it.

Your family didn't understand really what you were doing, other



than you were never home. You didn't talk to your friends. You didn't talk, as Dave said, to the rest of the Navy.

So, when *The Hunt for Red October* came out, the book and then the movie, it was the first real window of visibility into submarine operations, especially covert submarine operations against the Soviet Union, that the American people had ever seen. The book made an impact, but the movie really gave everybody a chance to see it up close and personal.

I had a relationship with Admiral Oliver because he was my boss. He was the Submarine Group Five Commander when I was CO of *Salt Lake City*. Somebody said he lived an exciting life working for Dave. I lived a tremendously exciting life.

You never knew what was up from day to day, and I can't tell you what I was doing in the local submarine operating areas when I got a message from Admiral Oliver that said, stop whatever you're doing, return to port, and you're going to embark the cast of *The Hunt for Red October*. What he didn't mention earlier was there was an ABC camera crew headed by a guy named Fred Francis. One would have thought that *The Hunt for Red October* movie was a great opportunity, one that we could never pass up, especially with *Top Gun* having all the success it did?

But there was some consternation about doing this movie, and there was even more consternation about taking an ABC camera crew under the water for the very first time. We had never done that in the past. But one of the real disciples of this was Dave Oliver. I've got to hand it to him. We pulled out all of the stops to make sure that the movie was supported at a level that was probably never imagined before in the submarine force.

I didn't know Alec Baldwin other than I'd watched a movie called *Beetlejuice*.

(Laughter).

I didn't know Scott Glenn other than I remembered some guy that looked like a cowboy riding a mechanical bull in *Urban Cowboy*. So, the first time that I met either of them was when they came to the bridge on a Sunday afternoon in San Diego. Many of you in this room will remember what Sunday afternoons were like. The channel was just chock full of sailboats, all trying to see how close they could get to a nuclear

submarine. I remember one day vividly when one of these windsurfers, which were kind of in vogue at the time, actually crossed between the turtleback of my submarine and the rudder, just to prove that he could get close.

(Laughter).

So, we came down from the bridge and as you could imagine the control room was just chock full of people. I mean, there are people all over the place. We submerged the ship, and there's Fred Francis and the ABC camera crew and they're working really hard to get all of the impressions, all of the b-roll so to speak, that they can because they knew their time was limited.

I thought Fred Francis was a pretty straight up guy, and I thought everything that he did was both honest and tried to portray the situation properly. But you had to know the angle of his story, and Admiral Oliver had shared that with me, which was that the submarine force is giving all of this away for free. I mean, the filming of the Houston, the ride on *Salt Lake City*, all the video from the drydock.

And you know what, he was exactly right. We're doing that because we recognized it would hugely serve our purposes and make an impact not only externally, but also internally within the submarine force. So, while everybody was in the control room and ABC's cameras were rolling, I decided it was time to get out of there and to leave that scene.

I grabbed Scott, and I said, "Scott, let's walk around the ship and take a tour and meet the crew." As you could imagine, the first place I took him was sonar, because it was going to play a huge part in the movie. Believe it or not, we had our own version of Jonesy.

We had Sonarman Second Class Tim Hella. Tim Hella had made the last special operation with *Salt Lake City* and me. He was one of these guys that you trusted emphatically. I mean, when he came to the con and said, captain this is our guy, you believed it and you took action accordingly.

Many of you here may have actually gone to sea with Tim Hella. I retired him about five or six years ago after he had served nearly two decades as an acoustic intelligence specialist with the Naval Intelligence Command. He was the best at that job of anybody. So frankly, we couldn't have had a better person to pattern the film against than Tim Hella.



As we walked around, Scott met the torpedo men, the A-Gangers, the navigation team. You'd think he would ask a million questions, but he didn't. He occasionally asked something for clarification, but he listened and he watched and picked up all of the little nuances of the relationship of the commanding officer and his crew. As you saw in the movie, he absorbed everything that he saw in those couple of days.

That afternoon we returned to port in San Diego. The deal that had been cut was ABC camera crew got the first day and then they were off the ship. I would tell you there was a tremendous sense of relief that occurred as Fred and his crew moved across the bow, and not just my crew, the actors all of a sudden started to talk more freely. You'd have thought they loved to be in front of that camera, but that wasn't part of their job, being with ABC, and all of a sudden, the conversations got fuller and freer, and we headed back to sea.

On the way back, and I mentioned the sailboats in the harbor, Alec Baldwin came to the bridge. And, of course, by now it's 4:30 p.m. and most of those folks skippering sailboats were pretty well oiled. Their crews were all very attractive and they started to yell to the bridge. Baldwin, of course, is an energetic, affable, engage-able person, and they yelled, "Who are you?" And he says, "I'm Tom Cruise."

(Laughter).

So, we dove the ship and headed back down to the wardroom. I took Scott aside and I said, "We're going to change the format here a little bit. From now on, you're going to serve as the commanding officer of this submarine and take all reports and provide all the orders and direction to the crew." He said, pardon me. I said, "It's going to work out, trust me."

So, we walked into the wardroom and just to make the point, I said, "Scott, sit down here at the head of the table, the captain's chair." For all of you that spent time in submarines, you recognize nobody sits in the captain's chair, not even the admiral. But I wanted him to get a feel for the responsibilities and the authority, and there was no better way to do it than to put him in the seat at that point in time.

I had a secondary objective, and that was we were about to allow Scott to give his very first order. The evening meal wrapped up and we were talking about submarines and capabilities, and every once in a while, a Hollywood story would come to the forefront. Then the phone

rang at his [Scott's] right knee. You've all been there; it's a buzz that goes off and he says, "What's that?" I said I think that's your phone and it's probably the officer of the deck trying to get a hold of you. He goes, "What do I do?" I said, pick it up and maybe in your very best voice go, "Captain."

Scott picks it up and the officer of the deck says, "Captain, we have a contact coming out of our starboard baffle area. We have not been able to classify it yet, but it's very probably a Soviet submarine."

(Laughter).

Scott takes the phone and puts it across his chest and says, "What do I do?" I said, "If I were you, Captain, I'd man battle stations."

(Laughter).

"Man battle stations!" Bong, bong, bong. And, of course, we head to the control room for the typical scenario that many of us have run to train the crew on covert submarine operations. After the scenario played out and we spent a little bit of time in the control room, we headed back to the wardroom, and I would guess we talked until 1:30 a.m. in the morning.

I looked around in the wardroom, and, Scott will remember this well, there must be 26 or 27 people within earshot of the wardroom. The engineer, we let him in, but the rest of the people had their heads sticking through the little pantry hole and leaning and they're all listening to this conversation that's going back and forth.

The next day we went through all the evolutions that you would expect. We ran at flank speed. We maneuvered the ship, angles and dangles, and of course did an emergency blow to the surface, just to make sure that they got the feel for exactly what they were going to see, and moving all those gimbals that Mace put together to make it come out right.

The most amazing thing was that Alec, Scott and the rest of the cast internalized all this, the little things that they picked up. Many of us that were in command during that period of time had a pair of standard Navy issue -- I would call them aviation frames that we wore. Of course, we were always moving them on our head and off our head depending if we were on the periscope or the navigation stand or looking at the fire control displays. The first thing I noticed in the movie was Scott Glenn



moving his glasses up and back to make sure that he was properly in character.

Tim asked me to talk just a little bit about the impact of the movie to the submarine force. I think it impacted in a lot of ways, but I sat down and had a beer before I came out here with two Pearl Harbor submariners that were junior officers during that period of time. I said, what was the impact? What did you guys think of the movie?

The first thing that came out of their mouths was -- they may have used a different term -- but they said it wasn't hokey. It was a pretty fair rendition of what we do day-in and day-out. They said maybe that trip through the sea canyon at flank speed may have been a little bit on the edges, but that's what we do.

The second thing was it did have an impact on morale, on the ship. As I said, we weren't able to talk about this and nobody really knew what we do. It provided those junior officers -- they had a sense of purpose, but a sense of pride that other folks, their families and the average American, understood what they were doing.

The third point they made was that it really did capture the relationships. Submarines are different, as we know, the dependencies of everybody on each other, the relationship of the captain and the crew, and the relationship of each crew member to each other. They felt that was an especially important point of the movie.

The last thing they said was that -- the last thing that I would point out -- is that the timing was really good. As I mentioned earlier, the Berlin Wall had fallen and the Soviet Union was going away, and this was a point in time where people were starting to write the history of the Cold War. It was important for them to understand what a key element of our success really was.

So, let me thank you all. I want to thank Mace for being here. I'm sorry Scott couldn't be here. We stayed in touch over the years and I know this has been very important to him. Mace and Scott and Alec did a fabulous job after the movie and even to this day, of talking to the attributes of the submarine force, our sailors and really our Navy, and its importance to our nation. So, thank you very much.

(Applause).

MR. ROSENBERG: Thank you, sir. Our last speaker is Mace Neufeld, who was the producer of *The Hunt for Red October*. We are very privileged to have him, for a number of reasons, not the least of which is this all came about very, very suddenly within the last two weeks, and we are delighted that you were able to make it here, because this is true of the rest of the story.

MR. MACE NEUFELD: *The Hunt for Red October* was not an easy film to make. At the end of 1984 I sent one of the young men who was working for me and my production company down to the Dallas book fair, and he came back with a book which he picked up at a small booth where the Naval Institute Press was selling their books about knot tying and engine maintenance, and this happened to be the first work of fiction that the Naval Institute Press had ever published. He said, this could make a movie.

So, I took it on and I put it on my night table, where it stayed for three weeks. I tried to pick it up once or twice, but I put it down and didn't pay much attention to it, until one day, Time magazine mentioned that President Reagan had a favorite book, which was causing a lot of excitement in Washington, D.C., and it was called *The Hunt for Red October*.

I said, I'd better read this book. So, I read the book very quickly. It's not easy to read that book quickly because Clancy has a lot of technical talk in the book. Actually, the way Tom wrote was he could take an entire chapter to explain how Jack Ryan could hit a golf ball.

(Laughter).

Everything was technical. But at any rate, I got ahold of the people who represented the Naval Institute Press and I offered them some money to option the book. I said, you've got to make the deal quickly. I don't think the agent actually had ever read Time magazine and knew that this was Reagan's favorite book, so I insisted that he close the deal as quickly as possible, and we closed the deal at the end of that week and now I had an option on the book.

At that time, I had what they call a first look deal at MGM, which meant that any material I developed I had to show them first. If they turned it down I could go elsewhere. So, I showed them the book and



they did what most studios do, they sent it to the story department because executives don't read books, they read synopses.

The Hunt for Red October was a difficult book to synopsise and MGM turned it down. I had an 18-month option on this, this was early 1985, so I went to each studio and each studio did the same thing. They turned it down. I had gone around to all the studios and I had an option on this book which nobody wanted to do.

However, I had a friend by the name of Ned Tanen, who was then the head of Paramount Pictures. I found out that Ned was flying to London the following day and I talked to him on the phone. I said, do you have any scripts or books to read on the plane? He said, no, I was planning on sleeping.

I said, I have this great book *The Hunt for Red October*. He said, I think I saw some coverage on that. We turned it down, didn't we?

I said, you did, but you didn't read the book. If you read the book and you land in London and you don't think this can make a great movie, you'll never have to return another call of mine. That was great incentive for him.

(Laughter).

So, he landed at Heathrow and he called me from Heathrow and he said, you're right. This could make a great movie, but it's going to be very expensive. I said, no Ned, it's not going to be.

He said, what do you think it will cost? I said, \$16 million. I just plucked that out of the air.

He said, you can't do that without the Navy's cooperation. I said, I'll get naval cooperation. He said, I'll put it in the contract, if you don't get it we won't make the move. I said, fine.

At the time I was shooting a film called *No Way Out*, with Kevin Costner, and we were shooting in Georgetown and in the basement of the Pentagon, the commercial area. *No Way Out* was about a naval officer who turned out to be a Russian spy. About that same time, I got a call from Washington that said the Secretary of the Navy would like to meet with you to discuss *The Hunt for Red October*.

So, I went up to meet with the Secretary of the Navy. We sat around a big table and on my right, was the head of the submarine force, I don't remember his name, and the Secretary of the Navy was very enthusias-

tic. He said, we'd love to make this movie, what do you think, sir?

He [head of the submarine force] said, well, I don't think so. We're the silent service. I don't want to talk about this very much. My stomach dropped to my feet because I knew I had a contract that said we had to get naval cooperation. And I didn't want them to know that we were shooting a movie about a Navy officer who turned out to be a Russian spy.

(Laughter).

Anyway, I went back to California and about four weeks later the phone rang and they said, it's the Secretary of the Navy calling, he'd like to invite you and your screenwriter for a ride on a sub. So, we flew down to Norfolk and we boarded the Rickover, which the captain at that time was Jay Cohen, along with the Navy chaplain, who had just finished Rickover's funeral service, and we went on a four-day cruise in the North Atlantic. I thought to myself, if I never get this movie made, it was worth optioning the book because I got this ride on this submarine.

(Laughter).

Anyway, if you'll bear with me I'd like to read you a letter that I got right after I optioned the book. The heading is the O.F. Bowen Insurance Agency. It says, "Dear Sir, back in September of 1983 I had lunch with Captain Edward Beach, U.S. Navy Retired. He was the first man to tell me that *The Hunt for Red October* would make, quote, 'one hell of a movie.' I took this seriously, since *Run Silent, Run Deep* enjoyed the same good fortune. You, however, are the professional who put money on the table and I must first of all express my deepest appreciation for your faith in my book's dramatic potential.

As you doubtless know, I am a rank amateur in nearly everything except insurance. *The Hunt for Red October* is my first novel and I still don't know a whole lot about the publishing business. My knowledge of the movie industry is limited to my experience sitting in theaters." That changed a lot later.

"Nevertheless, I hope you will give some brief consideration to including me in your team, if for no other reason I have acquired a good deal of knowledge about how the American and Soviet navies work. I've gradually accumulated a number of contacts within the naval community that might be of use to you. And I feel that my status as a civilian



would be beneficial here, since explaining all the jargon and technology to civilians is fast becoming my specialty.

One thing that might be of particular interest to you is the fact that the average crewman's age on American and Soviet submarines is under 23. The boats, parenthesis -- submarines are called boats, not ships -- close parenthesis, are driven by children. Like pilots and astronauts, they speak a special language for which there is a special manual which I have. As with NASA, their special language is actually rather dramatic sounding.

Whether or not my services would really be useful to your company is a business decision you must make for yourself. I could have no complaint if you make a successful production without me, but I learn fast and I'm a team player. I think I would be an asset to your company. In any case, I look forward to meeting you in the near future to express in person my gratitude for your decision to make my book a dramatic reality. Yours very truly, Thomas L Clancy Jr."

This was dated May 1985. I push forward to September of 1988. I still hadn't made this movie.

"Dear Mace, I was delighted to hear today that John McTiernan has been chosen as our director for *Red October*. I heard a few weeks ago he was interested in the project, and calling him learned he's the guy who directed *Predator*, which I thought was a damn fine bit of science fiction adventure. Soon after, I went to see *Diehard* and right after coming home I called him to say I wanted him to be my director. In addition to his obvious technical talents, his work evidences a remarkable awareness for the reasons why people do things, which is to say that his views largely coincide with mine, and are therefore brilliantly accurate."

(Laughter).

"Speaking with him only makes things look better. He makes my kind of movie because he's my kind of guy. Obviously, the current squabble with Paramount limits my ability to cooperate with your production." At the time, Paramount was trying to work out a deal to do his next book, which was *Red Storm Rising*, which they never did do. "I want to cooperate and having McTiernan on the project increases my desire to do so. I hope we can get this little problem settled and maybe I can help you deliver this movie. I'd like to see how you do your job and I'd like to think that I might make a useful guy to have around."

Things changed over the years. We finally made the movie in 1989. It came out in 1990, and it changed both of our careers. It was the first of six Jack Ryan movies that I made, and it was the first of the books that made Tom Clancy the best-selling author in the world at that point.

I was fortunate to meet Dave Oliver, who was in San Diego at the time. I went down to have dinner with he and his wife Linda, and with John McTiernan, my director. After dinner Dave said, come on, I've got a little surprise for you.

We went outside and we took a little walk, and he gave us construction helmets. We walked into a graving dock and there was a nuclear submarine. John McTiernan said, isn't that fantastic, can we shoot that? Dave said, well what do you think, I brought it in for painting, wink, wink?

(Laughter).

Sure, you can shoot it, but you can't shoot this part of it. So, if you see the movie, that's actually a nuclear submarine and we shot the screen in the graving dock courtesy of Dave Oliver.

The script was written by Larry Ferguson and Donald Stewart. I didn't realize at the time we were making it that it would be the beginning of a franchise, and after that we made five Jack Ryan movies with four different actors: Alec Baldwin, Harrison Ford, Ben Affleck and Chris Pine. Currently we've just finished an eight-hour mini-series for Amazon which will be streaming next June or July with John Krasinski playing Jack Ryan. That will be our fifth Jack Ryan, but it doesn't seem to matter.

Anyway, we had a wonderful time making this film. One major problem which I'll tell you now is that we had originally cast Klaus Maria Brandauer to play Captain Ramius. We started shooting the film and Brandauer was supposed to show up in the third week.

I had him on the phone and I said, Klaus you haven't sent your contract in. He said, well, I need 10 days off. I said, what do you mean you need 10 days off, you're supposed to be here in three weeks?

He said, I shot a movie for a friend and I am editing it and it has to be ready for the Cannes Film Festival and I've got to deliver it to him. I said, Klaus, I can't shoot the movie without your signing the contract. He said, well, I'm terribly sorry.



Here we were shooting this film, we were in the second week, and I have no Captain Ramius. I got a call from an agent by the name of Marty Baum who worked for Creative Artists Agency, and he said, I heard about a book you have and my client, Sean Connery, might be interested in it. Why don't you send it to him?

So, I said, okay, where do I send it? He said, he has a house in Majorca, send him the script. So, I faxed it. There was no email at the time, so I faxed the script over and waited anxiously, because we were shooting this film with no captain. Two days later the phone rang and it was Sean Connery.

He said, Mr. Neufeld, this is Sean. I said, yes, Sean. He said, I read your script but I don't think I can do it. I said, why not? He said, it's not politically correct. We have Perestroika now, there's no Cold War.

I said, well, the movie starts by saying before the end of the Cold War these events happened and been denied by the Soviet and the American navies. He said, I didn't see that. I said, I'll fax it over to you.

So, I faxed it over to him. He called me back the next day and said, okay, it makes sense now. But I need some big speeches for myself. There are no big speeches in this script.

I said, we'll get a writer to work right away. He said, who can you get? At that point -- believe me, it was just fate -- John Milius was passing my office door. I knew that John had directed Sean in *The Wind and the Lion*.

So, I said, John, come here. He said, what? I said, Sean Connery is on the phone. He wants some work done on the script. Here, talk to him.

So, he goes, yes, yes, yes, yes sir, yes sir. He said, he'll do it. I've got to write some lines for him.

So, we revised the script and I thought I was home free. Now we had Sean Connery, a great movie star, to play Marko Ramius. I left my office and I stopped in front of the commissary and there was one of the co-heads of production of Paramount.

I was all excited. I said, we've got Sean Connery to play Marko Ramius. He said, Sean Connery can't do a Russian accent. I said, he doesn't have to.

He said, well, he's got a Scottish brogue. I said, I know. He said, well, how will people know he's a Russian officer? I said, we'll put him

in a Russian uniform with a Russian hat.

(Laughter).

He said, I'll have to think about that overnight. I went back to my office and said, what's going on? We're shooting on stage seven and I don't have a Marko Ramius.

The next day the phone rang, I was in my office, I was not on the set, and Frank Mancuso, who was the chairman of Paramount, asked me to come over to the set. He had a set of papers in his hand. He said, look at these reports. These were screening reports for *Indiana Jones*, which had Harrison Ford and Sean Connery, and they were ecstatic.

He said, can you get Sean? I said, we can get him. I said, there's a problem. He said, what's the problem?

I said, he can't come next week because he's got a golf tournament in Scotland. He said, well, can we accommodate him? I said, give me half an hour.

I went back to the production office and we rearranged the shooting board. I came back, and he said, what will it cost? I said, it will cost over \$600,000. He said, do it, and buy him a set of golf clubs and send them to him with my complements.

So, we sent the golf clubs to Sean Connery. He showed up on the set. And we shot *The Hunt for Red October*, which almost didn't get made.

(Laughter/Applause).

MR. ROSENBERG: We're going to open the floor for some questions. Does anybody have any thoughts?





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INSIDE HUNT FOR RED OCTOBER

CAPT Jim Patton, USN, Ret.

This year's annual Naval Submarine League History Seminar on 31 October 2017 will discuss the declassified trail of an ECHO-II SSGN by USS *Guardfish* (SSN612) from Vladivostok down to, and partially back from its patrol station in the South China Sea during the summer of 1972. The ECHO had been deployed there to be a covert threat to US Naval Forces off Vietnam. In parallel to that discussion, similarities to the theme of the movie *The Hunt for Red October* will be addressed. The discussion panel will include Mr. Scott Glenn who played the role of CDR Mancusso - the CO of USS *Dallas* (SSN700) in the movie.

Having spent three years as the Technical Advisor to Paramount Studios during the writing of the script for, and during production of the movie, CAPT Tim Oliver, the Executive Director of the NSL, asked me if I would write this article to provide a little background for those who plan to attend the seminar. I was honored to have been asked.

I was fortunate to have served as Executive Office for then CDR Bruce DeMars on the USS *Cavalla* (SSN684) - a most rewarding experience. Years later, now VADM and the Pentagon's top submariner as OP-02, he invited me to dinner at his quarters in the Navy Yard. It was 1986, and I had been retired about a year - foolishly, in retrospect, since I was about to have three kids in college at the same time, having decided to be an independent consultant.

At the dinner, in addition to my wife Mary and me, were COMSUB-PAC, RADM Jack Darby and his wife and COMSUBLANT, VADM Bud Kauderer and his wife. Admiral Kauderer was about to retire. During the dinner, Admiral DeMars looked at Admiral Kauderer and me and asked, "Either of you interested in being the Technical Advisor to Paramount for *The Hunt for Red October* movie?". Admiral Kauderer enthusiastically replied "Sure!", and I just mumbled "Me too!" - figuring there was no chance. Some weeks later Admiral DeMars called to ask if I was



still interested. When I later thanked him for getting me the job, he said “I didn’t do that because I like you - it’s because you offer us ‘credible denial’”. In other words, if the movie was really a dog, the Submarine Force could totally disavow a retired four-striper, but hard to do if the Technical Advisor was a retired Vice Admiral.

Going back a bit, when a lawyer representing Paramount showed up in VADM DeMars office looking for a Technical Advisor, Admiral DeMars’ first impulse was to say “...go get Tom Clancy, he knows everything about submarines!” But then he reflected on the fact that *Top Gun* had literally wrecked our acquiring top-notch grads from the USNA and other engineering schools. First Class Midshipmen had gone home on Christmas leave all signed up for Nuclear Power School, saw the movie, then came back to change over to flight school. “This movie...”, he thought, “...could help us get even!”. As I was heading out to Hollywood to work with the first (of three!) screenwriters, Admiral DeMars gave me four “marching orders”:

- Try to help them make it entertaining, but don’t get in their way - they’re better at that than you are.
- Make submarines and submariners look good, but make US submarines and submariners look better than the Soviets.
- Don’t get hung up on classification. It’s a fictional movie based on a fictional book.
- Don’t let them violate Laws of Physics!

The first screenwriter was a gentleman named Don Stewart, who had won an Oscar for *Missing*, with Jack Lemmon and Sissy Spacek. He was a great mentor about the idiosyncrasies of Hollywood, including a very profound caution that ...”Every profession has its own vernacular, but in Hollywood there is no exact translation of the word ‘sincere.’”

He turned in the script (some 120 pages double-spaced. You can read a movie script in an hour) and took his \$400,000 or so and ordered a black Ferrari Testarosa. The script that Paramount now owned was good, but they judged it not exciting enough, and hired a second guy (can’t remember his name) to “spice it up”. It was getting to be an underwater *Rambo*, and I called Tom Clancy to warn him it would make both him and us (submariners) look bad. (Incidentally, Tom had nothing to do with the movie, since he had sold everything, movie rights included, to

the Naval Institute). By now Tom was quite famous, having had several books published, and I don't know whether it was because of him or nor, but suddenly there was a third screen writer - a ex-college wrestler named Larry Ferguson. Larry asked if I had seen *Beverly Hills Part Two*. I said "No.", and he replied, "Don't bother - it's a lousy movie - I wrote it - but my royalties so far have been fifteen million dollars!" Writers get 5% of the gross!

During this time in Hollywood I met Alec Baldwin, who wasn't well known at the time. He was living in New York City, and I convinced him to come up to New London to tour the SubBase and have lunch on one of the boats. He was a quick study - asked great questions and understood the answers. We went to the 'wet trainer', where an SSBN crew was about to undergo training. After it was explained to him what it was all about, he said "Sounds like fun - can I do it?". A set of dungarees were found and he was sent in with the crew. When a flange let go and sprayed him with 50 degree water, he had a "deer in the headlights" look until a Chief Petty Officer grabbed him by the scruff of the neck and said, "Hey dummy, get a wrench and tighten those bolts!" After the training, wet, bedraggled but grinning, he was introduced to the crew who were told what he was about to do.

The Submarine Force pulled out all the stops to help the movie go right. The Producer, Director and major actors were invited to go to sea on scheduled submarine ops. For instance, Scott Glenn went to sea with Skipper Tom Fargo on the *Salt Lake City* (SSN716), where he literally attached himself to the CO to watch and participate in everything the Captain did. Any knowledgeable submariner will admit that Scott nailed the part of a submarine CO.

The movie came very close to being cancelled. Larry Ferguson had not gotten many "pages" (the metric for progress) submitted when the screen writer's union went on strike. Karl Marx would have rolled over in his grave if he saw a Maserati pull up in front of the Paramount studios, the driver get out to picket with a sign "Management Unfair" for a while, then get back in his car and drive off. I was back in Connecticut when Larry called and asked, if he snuck out his computer and secretary, could I come to his apartment over a weekend and help him get some pages done. I did, and in a day and a half we finished 40 pages - the

middle 1/3 of the movie - all the “submarine 101” stuff about enabling runs, countermeasures and the like. Larry said the best he had ever done in the past was 2 or 3 pages a day, and I told him (with a smile) that was because he came to work late, took a long lunch, and went home early. Larry played in the movie as the Chief of the Boat of *Dallas*.

It had taken two years, but when the project was “green lighted” by the studio, things really started happening quickly. In a week or so, two gimbaled platforms were built upon which were to be built the *Dallas* and *Red October* Control Room sets (the ALFA Control Room was built on the *Dallas* platform after *Dallas* shooting was completed). These platforms could be hydraulically pitched and rolled 25-30 degrees using off-hull joysticks. All the sonar and fire control displays were “serviced” by scripted displays from off-hull computers, and all the indicators on the Ballast Control Panel and the Diving Stand were also functional, and driven from off-hull sources. A three-quarters full scale fiberglass shell of a TYPHOON, from the waterline up, was made. When, in the movie, you see the *Red October* going to sea escorted by two other ships, these two ships are towing the barge upon which this shell was placed.

I was asked if I could get a periscope, and I called a friend at Kollmorgen who sent an empty E&E Adapter for a Type 18 periscope. This was too heavy for the platform, so a vacuum-formed replica was made, fitted to the tiniest detail such as name-plate data. It truly appeared authentic until you touched it, and realized it wasn’t metal. It also raised and lowered hydraulically from off-hull, but I don’t think that feature was ever used in the movie. The periscope barrel was a cardboard tube covered in aluminum foil that was “scored”, and misted between shots to simulate condensation. Boats decommissioning at Bremerton were a ready source of Mark 19 plotters, collision, diving etc. alarm switches and the like - even plastisol coffee cup holders.

During “rehearsals” prior to beginning filming, it was apparent that the supporting actors playing the roles of submarine sailors and officers just didn’t convey a realistic appearance, and I suggested that we get some real submarine troops and officers. Again, the Submarine Force responded, and a number of personnel from San Diego came up on “basket leave”, joined the Screen Actors Guild, and began earning some \$500/day. I had called the CO of the *Dallas*, in overhaul in Portsmouth, NH,

since this was about *his* boat, and recommended he send someone over. He did, and his Second Class Quartermaster actually got a “speaking part” (Mancusso: How long to get from here to there at such and such a speed? QM2: 30 minutes Captain), which got him his own dressing trailer and a higher pay scale. First name Keith, last time I saw him he was a Senior Chief working at Sub Group TWO.

Shooting started about 0600, and continued as long as it took to get done what had been planned that day. Breakfast, lunch and dinner were catered “on the fly”, and in a nominal 12-hour day, some 45 minutes of film would be gotten, of which only about 2 minutes would make it to the big screen. Between multiple takes of the same 30-40 second scene, while cameras and other stuff was being repositioned, everyone knew not to bother the actors, who had their own methods of maintaining focus. Scott Glenn would go off in a corner and do Tai Chi, while Alec Baldwin would go somewhere alone and jump rope.

Periodically Don Stewart’s warning about “sincerity” in Hollywood was apparent. Although the actors and senior management like Producers (Mace Neufeld) and Directors (John McTiernan) were great, some of the middle management types bore watching. At one point early on, an Assistant Director told me that John (McTiernan) didn’t want me up on the set, but to stay down on the floor and he’d call me if he needed me. This didn’t make much sense, so after a while I went on up, and the Director asked, “Where’ve you been?”.

The hydraulic system that pitched and rolled the platform had an instability that caused the platform to vibrate noticeably when the joysticks were put in a certain position. I told John McTiernan that could be exploited on the next day’s schedule where Mancuso tries to get *Red October*’s attention by ordering “Back Full” from an ahead bell - something that in addition to making a lot of noise, would vibrate the submarine significantly. He was enthusiastic about that visual effect, but overnight the maintenance people had fixed the “problem”. Still, he said, “Get a bunch of people back on the corner of the platform and jump up and down to wiggle it.” We did, but I’m not sure there was much effect.

Since the “real” sailors and officers worked out so well on *Dallas*, Paramount ran nationwide ads for people who had served on Soviet submarines, and got a massive response. They asked if I would help sort



out the real ones from the phonies. One gentleman said he had been the Electrical Officer on a FOXTROT class diesel electric submarine. I asked him what type of battery the boat had “120 Volt AC” was his answer. Next! Another said he had been a Reactor Operator on an ECHO class SSGN. I asked some reactor theory questions, and he got enough right and had forgotten enough to make him credible. Finally, I asked him to tell me a little about the missiles the ECHO carried. “Wait!” he said, “I was a Reactor Operator, and was not encouraged - even allowed - to know much about anything but my job!” - this guy was real. No cross-rate training in the Soviet Submarine Force, like we do in the US, and this restriction has directly contributed to nearly all of their nuclear submarine losses.

After two years to get a script, shooting finished up in 5-6 weeks - the sense of urgency driven by the fact that the “money valve” was all the way open. It would take another year or so to edit all the film down to 2 hours or so.

When the *Dallas* shooting was finished, Larry Ferguson was gracious enough to rent a room at a downtown Los Angeles pub and invite all of the submarine sailors and officers to enjoy all they could eat or drink, on him.

2017 AWARDS PRESENTED AT NAVAL SUBMARINE LEAGUE SYMPOSIUM

The best in the Submarine Force were honored this year at the Naval Submarine League's 35th Annual Symposium and Industry Update, November 1-2, 2017, in Arlington, VA. The NSL gave out 8 awards to submariners from the fleet and support activities and honored three Distinguished Submariners and one Distinguished Civilian.

FLEET AWARDS

The Fleet Awards Luncheon began with a speech by Vice Admiral Robert P. Burke who had received the Rear Admiral Jack N. Darby Award for Inspirational Leadership and Excellence of Command in 2004. Those who were chosen by the Submarine Force (COMSUBLANT/COMSUBPAC INSTRUCTION 1650.6D) for awards come from all over the country. This year there appears to be a convergence of talent from New Jersey, as three of the eight fleet awardees hail from there.

TORPEDOMAN SECOND CLASS HENRY BREAUT AWARDS FOR SUBMARINE PROFESSIONAL EXCELLENCE

The first New Jersey native who was honored is the 2017 Torpedoman Second Class Henry Breault Award winner, EMNC(SS/DV) Keith Michael Ober, USN. Chief Ober was a petty officer when selected for this award. Newly pinned Chief Ober was unable to attend the Symposium because of his boat's schedule and was represented by his mother, who received his award on his behalf. Chief Ober, who entered the Navy in January 2002, was recognized for outstanding professional performance as Acting Electrical Division Leading Chief Petty Officer aboard USS *Texas* (SSN 775). He represents the very best of the sailors on-board *Texas* with his ability to inspire and focus personnel in the Engineering Department and throughout the ship. He accomplished several



significant tasks supporting the ship's operations and schedule with outstanding results during the past year. These events included a Western Pacific Deployment, a major Continuous Maintenance Availability, two Pre-Overseas Movement Maintenance Availabilities, an Operational Reactor Safeguards Examination, Submarine Command Course Operations, and a Tactical Readiness Examination. He maintained superior day-to-day standards, relentless commitment, and total dedication to the ship's mission. He is an expert electrician. During the four-month Continuous Maintenance Availability, he planned and supervised 200 preventive maintenance and corrective maintenance items and over 20 tests with zero rework. He skillfully coordinated the isolation of two low performing battery cells and flawlessly executed an infrequent discharge procedure to improve the ship's battery capacity. As the ship's Command Career Counselor, he was responsible for over 30 reenlistments. His mother, Sandra Ober, is one of the newest Naval Submarine League life members.

The Breault award was formerly the Vice Admiral Charles A. Lockwood Award for Submarine Professional Excellence (E-6 and Below), but was changed to reflect more of our submarine history. TM2 Henry Breault is the only enlisted submariner to receive the Medal of Honor. On 28 October 1923, Breault's boat USS *O-5* (SS-66) was involved in a collision with a ship and began to sink. Breault was awarded the Medal of Honor for uncommon valor in going to the aid of a shipmate who certainly would have died without his assistance. Torpedoman Breault was actually up the ladder and out on the main deck when he turned around to help his fellow crew member. Breault and the other sailor ended up going down with the boat and, after a day of recovery operations, were rescued from the torpedo room by a salvage crew.

CHIEF PAUL GOLDEN SAUNDERS AWARD FOR SUBMARINE PROFESSIONAL EXCELLENCE

ETRCSS(SS) Wayne Ryan, USN, another native of New Jersey, is the Chief Paul Golden Saunders awardee. Senior Chief Ryan enlisted in the Navy in February 2007 and was honored for his service aboard the USS *Springfield* (SSN 761) for superior professional excellence as Navigation

Department and Radio/Communications Division Leading Chief Petty Officer. Senior Chief Ryan's performance onboard Springfield has been superb. As the Communication Division Leading Chief Petty Officer, he has transformed a junior and inexperienced division into a top-notch team. His influence far exceeds the boundaries of his department and has made a positive impact throughout the ship. During a recent EUCOM deployment, the ship experienced 100% connectivity and earned special recognition from the operational commander. As a result of superlative performance, *Springfield* was awarded the Navigation/Operations "N" for 2016. Senior Chief Ryan has made a tremendous impact throughout the ship and played a key role in numerous successes both at sea and during a challenging overhaul. Recognized for his exceptional knowledge of advanced submarine operations, he was specifically selected to develop and implement operational plans in the ship's deployed Tactical Cell. His efforts made a significant contribution to the achievement of a Meritorious Unit Commendation for the ship's 2016 deployment. As a mentor he has used every teachable moment to pass on knowledge and experience. His comprehensive approach to training resulted in a high number of advancements in rate within his responsible divisions. His sailors are proud, well trained, and dedicated to furthering ship goals, the Navy, and themselves.

The Chief Paul Golden Saunders Award was previously the Vice Admiral Charles A. Lockwood Award for Submarine Professional Excellence (CPO). Chief Saunders is considered one of the most decorated enlisted submariners. He enlisted in the Navy in 1936 and served for 26 years. Over his career he was awarded two Silver Star Medals and a Bronze Star. He participated in a landing of military forces in Japan. His legacy certainly is of note and is an important part of our submarine history.

MASTER CHIEF FRANK A. LISTER AWARD FOR EXCEPTIONAL LEADERSHIP AND MOTIVATION WHILE SERVING AS A CHIEF OF THE BOAT

Master Chief Anthony P. Torres, USN is the recipient of the 2017 FLTCM (SS) Frank A. Lister Award for Exceptional Leadership and Motivation while serving as Chief of the Boat. ETVCM (SS) Torres was born in the



Panama Canal Zone and entered the Navy in January 1996. He was recognized for outstanding meritorious service as Chief of the Boat on USS *Columbia* (SSN 771). Master Chief Torres was the driving force behind the phenomenal success demonstrated by *Columbia* during his tour. He trained, mentored, and developed a superb team ready for any mission assigned. In preparation for mission assignment, he skillfully developed Ship Control teams that were able to operate safely in the most challenging environments. Through his efforts, *Columbia* conducted three highly successful National Security missions, collecting critical data in support of the Theater Commander's security objectives. His keen judgment in watchbill management and deckplate operational preparations were key factors in assuring success. His exceptionally high standards, a single-minded focus on improving basics, and a drive for improvement in all areas has established a legacy of excellence. He leads and inspires a team that strives to be the best. Under his supervision, *Columbia* executed multiple international ports of call with zero liberty incidents. His motivated crew demonstrated the best character of American youth while ashore and when reaching out to local charities to demonstrate America's goodwill. His leadership was instrumental in achieving high results in career advancement and retention in service. The improved overall attrition and retention rate during his tour reflect his direct involvement in mentoring his crew. His direct involvement in the day to day operations in *Columbia* has resulted in high morale and a positive command climate.

REAR ADMIRAL FREDERICK B. WARDER AWARD FOR OUTSTANDING ACHIEVEMENT

Mr. Mark Cook is the winner of the 2017 RADM Frederick B. Warder Award for Outstanding Achievement. A native of Woodbridge, Virginia, Mr. Cook attended Virginia Polytechnic Institute and State University where he majored in Mechanical Engineering. In June 1982, he started his shipbuilding/ship repair career at Newport News Shipbuilding and Drydock Company. In 1987, he started work at the Norfolk Naval Shipyard. He was recognized for outstanding meritorious service in the performance of duties as Project Superintendent for the FY 2016 Engineered

Refueling Overhaul (ERO) of *Rhode Island* (SSBN 740) at the Norfolk Naval Shipyard. Mr. Cook's leadership of the Rhode Island project team set the standard for SSBN ERO execution. His efforts maintained *Rhode Island* on schedule to be the first ever on-time completion of an SSBN ERO. Mr. Cook maintained this high level of performance by focusing on critical and controlling path tasks. He engaged middle management leadership throughout the Norfolk Naval Shipyard (NNSY) at timely intervals to ensure that priorities were aligned throughout all NNSY projects. Mr. Cook has the extraordinary ability to recognize potential problems that affect schedule completion. He effectively described problems to senior NNSY managers and developed plans of action to prioritize strained resources to address the most important requirements. Mr. Cook was extremely effective in supervising work from the deck plates. He was often seen in the tightest corners of the submarine cleaning jobsites with the work force. He is not afraid to roll up his sleeves and show others the right way to do business. He creates an environment where subordinates are encouraged and empowered to accomplish their responsibilities and create work practices that accomplish tasks correctly and on time. Mr. Cook realizes the importance of the strategic mission and has maintained the schedule towards on-time delivery despite hazardous weather, institutional inertia and conventional wisdom.

VICE ADMIRAL LEVERING SMITH AWARD FOR SUBMARINE SUPPORT ACHIEVEMENT

Hailing from Green Bay, Wisconsin, Lieutenant Zachary J. Prefontaine, USN, is the winner of the 2017 VADM Levering Smith Award for Submarine Support Achievement. LT Prefontaine earned a Bachelor of Science degree in Nuclear Engineering and a Technical Communications certificate from the University of Wisconsin-Madison in 2009 and was commissioned through Officer Candidate School in 2010. LT Prefontaine was recognized for outstanding meritorious service in the performance of his duties as a Tactics Instructor at the Naval Submarine School, New London, CT. LT Prefontaine has a superior knowledge of the employment of submarine sonar and fire control systems. His ability to explain complex tactical guidance to more senior officer students earned him



the assignment as instructor in the Submarine Advanced Officer Course (SOAC). As a SOAC instructor, he has been extremely effective and has gained notable praise from the students and submarine school staff. He developed and assisted in the implementation of major changes to the SOAC curriculum so that newly reporting submarine Department Heads were trained on the most up-to-date tactical guidance. LT Prefontaine is consistently called upon to support training for Groton-based submarines. In the last year, he tailored over 500 hours of fleet-responsive training to address the needs of submarine crews and supported 31 Intermediate and Advanced Pre-deployment training periods. He volunteered and spent two weeks underway with a unit in need of pre-deployment training. He assisted in revising the unit's operational plans, trained and mentored the wardroom, and provided instruction during onboard training events. His support met their advanced pre-deployment needs, allowing the ship to make its scheduled deployment date. LT Prefontaine's uncommon desire to go far beyond the requirements of the job and to seek out opportunities to make a difference in the submarine force set him apart from his peers.

VICE ADMIRAL CHARLES A. LOCKWOOD AWARD FOR SUBMARINE PROFESSIONAL EXCELLENCE

The 2017 VADM Charles A. Lockwood Award for Submarine Professional Excellence was presented to Lieutenant Commander Matthew S. Thatcher, USN, another native of New Jersey. Thatcher earned a Bachelor of Science from the Naval Academy (2002) and an MBA from the University of Southern California's Marshall School of Business. He was recognized for outstanding performance as Executive Officer aboard USS *California* (SSN 781). His outstanding preparations of the ship resulted in California deploying one month early on a 2016 EUCOM and Sixth Fleet Area of operations deployment. During the deployment, he served as Command Duty Officer and the Commanding Officer's right hand man, expertly leading the ship through three missions vital to national security. He demonstrated flawless judgment and impressive tactical savvy while conducting shallow water high contact density operations in pursuit of theater and national security objectives. *California* performed admirably, gaining several high-interest CNO priority list col-

lections. The crew under his leadership performed as effective ambassadors while on liberty in foreign ports. LCDR Thatcher has demonstrated remarkable leadership which has produced measurable results. Significant achievements include *California's* Battle Efficiency "E" award and COMSUBLANT's selection for the 2016 Battenberg Cup. He molded a team of Junior Officers into the top waterfront team as recognized by the 2016 RADM Momsen Award for the second year in Commander Submarine Squadron Four. Throughout his tour he trained and mentored six submarine Department Heads, furthering their careers and providing force-wide development of these officers for the future of the submarine community.

REAR ADMIRAL JACK N. DARBY AWARD FOR INSPIRATIONAL LEADERSHIP AND EXCELLENCE OF COMMAND

Commander Davis S. Forman, USN, of Agoura Hills, California, is the 2017 RADM Jack N. Darby Award for Inspirational Leadership and Excellence of Command awardee. His previous sea assignments include Junior Officer on USS *L. Mendel Rivers* (SSN 686), Engineer on USS *Wyoming* (SSBN 742) (Gold), and Executive Officer aboard USS *Columbus* (SSN 762). CDR Forman was recognized for exceptionally meritorious service as Commanding Officer, USS *Alaska* (SSBN 732) (Blue). CDR Forman has established a superlative record in safely executing the nation's number one mission, strategic deterrence. His leadership achieved record high results in an INSURV Inspection and Technical Proficiency Inspection evaluations. *Alaska* (Blue) accomplishments were recognized by winning the Commander Submarine Squadron 20 Battle Efficiency "E" and the Commander USS Strategic Command Omaha Trophy as the top SSBN in the force for 2016. *Alaska* (Blue) provided the Submarine Force with valuable lessons and tools in the areas of operational safety and crew watch rotation. These recommendations have been adopted by several other units on both coasts. CDR Forman has set the standard in sailor and family recognition. Through a tiered program of personal recognition and routinely coordinating family-inclusive events, *Alaska* (Blue) established extremely high morale. These achievements were recognized by two positive climate surveys, a Submarine Culture workshop,



and a high ranking within COMSUBFOR's "people-centered-metrics." By effectively teaching his crew the importance of their mission and clearly communicating the expected standard of professional behavior, CDR Forman led his crew to over 732 days free of destructive behavior. These achievements clearly demonstrate CDR Forman's conspicuous contributions to leadership in the Submarine Force.

VICE ADMIRAL J. GUY REYNOLDS AWARD FOR EXCELLENCE IN SUBMARINE ACQUISITION

The 2017 VADM J. Guy Reynolds Award for Excellence in Submarine Acquisition was presented to Captain Scott E. Pappano, USN. CAPT Pappano is a graduate of the Naval Academy (1989 Bachelor of Science in Marine Engineering) and the Massachusetts Institute of Technology (Master of Science in Nuclear Engineering). His sea tours include USS *City of Corpus Christi* (SSN 705), USS *Albuquerque* (SSN 706), USS *Michigan* (SSBN 727) (Gold), USS *Ohio* (SSGN 726), and USS *Buffalo* (SSN 715). He was recognized for exceptionally meritorious service as Manager of the Strategic and Attack Submarine Program Office (PMS 392). CAPT Pappano is responsible for the coordination of stakeholders to combine technical requirements and Fleet priorities to manage submarine configuration, maintenance and modernization, design, procurement, installation, and life cycle management for equipment across all in-service submarine classes. He effectively led the NAVSEA team and stakeholders to influence and optimize projected service life extensions in OHIO Class submarines. This effort is critical to the sustainment of OHIO Class operational availability in support of COLUMBIA Class readiness to assume nuclear deterrent tasking. Significant accomplishments in the improvement of the OHIO Class service life extensions led by CAPT Pappano included the design development of a replacement navigation processing unit, design development and replacement of the ship control system, and improvements to ventilation monitoring, hovering, and missile heating and cooling systems. CAPT Pappano led a team of technical managers and manufacturers to improve submarine battery performance. This team was instrumental in the acquisition and funding of new manufacturing infrastructure that will lead to more consistent and

better performing battery cells. CAPT Pappano provided leadership to efficiently complete the transition of the VIRGINIA Class Planning Yard with the In- Service Engineering Agent. This action supports effective maintenance planning which will sustain the VIRGINIA Class through end of life. CAPT Pappano exemplifies the finest attributes for an acquisition professional.

NAVAL SUBMARINE LEAGUE DISTINGUISHED CIVILIAN AND DISTINGUISHED SUBMARINER AWARDS

The individuals selected for Distinguished Civilian and Distinguished Submariner were recognized at the banquet at the closing of the 35th Annual Symposium and Industry Update.

NAVAL SUBMARINE LEAGUE DISTINGUISHED CIVILIAN AWARD

The 2017 Distinguished Civilian Award was presented to Mr. G. Daniel Tyler, senior advisor in the Force Projection Sector at the Johns Hopkins University Applied Physics Laboratory. Mr. Tyler joined JHU/APL in 1970 as a member of the SSBN Security program. His efforts in underwater acoustics established limits on the performance of high-gain sonar systems and provided the basis for an assessment of the vulnerability of U.S. submarines to acoustic detection. Since his initial assignments, Mr. Tyler has had numerous line supervisor and program manager assignments. He is an expert in aligning the staff to address a myriad of new tasks and challenges. In 1998 he was tasked to restructure and lead APL's Submarine Technology Department. Mr. Tyler effectively broadened and grew the Department's tasking across all areas of Undersea Warfare. In 2000, he established a charter for APL in Homeland Protection, including chemical, biological, radiological, and nuclear defense and in 2001 he was tasked to refocus APL's declining efforts in biomedicine. The team he assembled transformed this activity from a low-level grant-based effort into a thriving technical enterprise. The Submarine Technology Department was renamed the National Security Technology Department, and now includes three APL business areas in Undersea Warfare,



Homeland Protection, and Biomedicine and the Department has tripled in tasking and staffing. Mr. Tyler recently served as Head of JHU/APL's largest department, Force Projection, comprising three of APL's eleven Business Areas. He had line responsibility for approximately 1000 staff and program responsibility for \$350M in Research, Development, Test, and Evaluation. He currently serves as that sector's senior advisor.

NAVAL SUBMARINE LEAGUE DISTINGUISHED SUBMARINER AWARDS

Three submariners were presented with the Distinguished Submariner Award.

The late Admiral Powell Carter was selected for Distinguished Submariner. ADM Carter passed away on June 28, 2017. His contributions to the navy and the submarine service were truly outstanding and worthy of recognition by this award. His military career started at the lowest level - an enlisted seaman apprentice - and culminated at the highest level - a four-star admiral. He graduated from the U. S. Naval Academy with the class of 1955 and served with distinction in a number of billets on board various submarines, including a superlative command tour on USS *Hammerhead* (SSN 663). *Hammerhead* became the first nuclear submarine to navigate and surface through the ice at the North Pole during the winter period of total darkness. His first shore assignment was as Executive Assistant and Senior Aide to the Chief of Naval Operations, Admiral Holloway. He subsequently served as Commander Submarine Squadron Sixteen in Rota, Spain. After selection to flag rank, he was assigned as Commander Submarine Group Two and following that tour was selected to form a new directorate, the Strategic and Theater Nuclear Warfare Division in the office of the Chief of Naval Operations. Later flag assignments included duty with the Joint Chiefs of Staff as Staff Director and assignment as the United States Representative to NATO. ADM Carter's last assignment was as Commander in Chief of the U.S. Atlantic Fleet. He retired in 1991. Admiral Carter has been described by his fellow admirals as a quiet individual who seemed to have almost no ego. They also remarked that behind the plain façade lurked a brilliant

mind that was unmoved by anything but cold logic. ADM Carter retired to Harpers Ferry, West Virginia, and served in numerous volunteer capacities. His daughter, Gretchen, attended the banquet and received his award.

As a 2017 Distinguished Submariner, Vice Admiral Dan Cooper was recognized for outstanding and continuing meritorious service in support of the Navy and the submarine force. VADM Cooper served the Navy and his country with great distinction for over 37 years of commissioned service. Following graduation from the United States Naval Academy in 1957 and after a period in the amphibious force, he served in four submarines including *Trigger*, *Haddo*, *Simon Bolivar*, and command of *Puffer*. Following a very successful command tour, he was assigned as Commander Submarine Squadron Ten. Significant flag assignments included duties as Commander Submarine Force, U. S. Atlantic Fleet and Assistant Chief of Naval Operations for Undersea Warfare (OP 02). He served with considerable expertise and skill in a number of financial, budgeting, and planning staff billets in Washington, D.C. These included Comptroller, Naval Sea Systems Command; Director, Navy Budgets and Reports; and Director, Navy Program Planning. He retired from the Navy in 1991. Following retirement, he served on several corporate boards including the Navy Federal Credit Union, United Services Automobile Association, the Philadelphia Electric Company, and the Exelon Corporation. He also served as President of the Naval Submarine League and on advisory boards for the Johns Hopkins Applied Physics Laboratory. He served for six years as Undersecretary for Benefits at the Department of Veterans Affairs, supervising Education, Insurance, Pension, Home Loan Guaranty, and Vocational Rehabilitation programs for all veterans. He is currently working to develop the America's Heroes First Foundation, a charity to benefit veterans in need.

Vice Admiral Ron Thunman was recognized as a Distinguished Submariner for outstanding and continuing meritorious service in support of the Navy and the submarine force. VADM Thunman served the Navy and his country with great distinction for over 34 years of commissioned service. He is a graduate of the United States Naval Academy, graduating



in 1954. After initial duties in the surface navy he entered the submarine service and served with distinction in four submarines including *Volador*, *Robert E. Lee*, *Snook*, and command of *Plunger*. His outstanding service was recognized by numerous awards including two Distinguished Service Medals, three Legions of Merit and numerous unit commendations. After command, he served as Commander Submarine Squadron 15 in Guam. Following promotion to flag rank, he was assigned as the Assistant Chief of Naval Personnel for Officer Development and Distribution. He became Commander Submarine Force, US Pacific Fleet in 1979. Assignment as Deputy Chief of Naval Operations for Submarine Warfare (OP 02) followed. His achievements as OP 02 were significant and included development of the Tomahawk Cruise Missile, Trident II Missile, the improved SSN 688 Class Submarine, and the design of the SEAWOLF Class Submarine. He became Chief of Naval Education and Training before retiring in 1988. Following retirement, VADM Thunman continued to serve the nation in several responsible positions, including as Superintendent of the Valley Forge Military Academy and as President/ Director of several corporations and government services.

ESSAYS**BATTLE OF THE ATLANTIC:
COMMAND OF THE SEAS IN A WAR OF ATTRITION***LCDR Ryan Hilger, USN*

LCDR Hilger is serving on the OPNAV N97 staff. This essay was submitted for the CNO Naval History Essay Contest. –Ed.

Captain Gallery picked up the radio: "Ride 'em cowboy." Lieutenant David's boarding party worked quickly to clear the submarine and make up Pillsbury's towline, despite the rudder being jammed hard over and the submarine still making ten knots. Chatelain and Jenks broke off to pick up survivors. Commander Trosino, Guadalcanal's Chief Engineer, and another boarding party made for the submarine to begin salvage efforts. Flooded compartments and potential booby traps slowed repair efforts. Pillsbury radioed back that the destroyer didn't have the power to maintain the tow and keep the submarine afloat. Gallery ordered Guadalcanal into position, taking up the tow. After a challenging several days, U-505 was turned over to Naval Operating Base Bermuda for evaluation.¹ The capture of U-505 on June 4th, 1944 was the zenith of Allied anti-submarine warfare efforts, indicating that German submarines would not play a decisive role in what became the final year of the war.

The Battle of the Atlantic spanned the entire duration of the war, stressing the endurance and resourcefulness of all involved, from fleet commanders to heads of state to cryptographers to ordinary seamen in anti-submarine trawlers and U-boats everywhere. British Prime Minister Winston Churchill, worth quoting at length here, frames the issue:

The only thing that ever really frightened me during the war was the U-boat peril. Invasion, I thought, even before the air battle, would fail. After the air victory it was a good battle for us. We could drown and kill this horrible foe in circumstances favour-



able to us, and, as he evidently realised, bad for him. It was the kind of battle which, in the cruel conditions of war, one ought to be content to fight. But now our life-line, even across the broad oceans, and especially in the entrances to the Island, was endangered. I was even more anxious about this battle than I had been about the glorious air fight called the Battle of Britain.ⁱⁱ

This unforgiving war at sea challenged the conventions of Mahan and Corbett on the meaning of sea control and, in that philosophical struggle, informs strategic thought as we face asymmetric threats abroad. Several anecdotes from this long, grinding campaign provide insights as American naval forces grapple with the nascent possibility of a modern, protracted war of attrition at sea.

The Essentiality of War Games

Convoys HX-229 and SC-122 were eastbound for Britain. Their air cover had lapsed until the Liberator squadron in Iceland could reach them. The base courses of the convoys were continually altered around wolfpack locations revealed by Ultra, the Allied radio intercept and cryptanalysis program.ⁱⁱⁱ But this time, the routings had placed them on a collision course with each other and three wolfpacks, the U-boats still high after battering SC-121 and HX-228 the day prior. On March 16th, 1943, they "hurled themselves like wolves first on the Halifax convoy, then on the Sydney convoy as soon as it was sighted, and finally on the great combined mass of ships."^{iv} 38 U-boats exploited the next three days, relentlessly attacking day and night, sinking 21 of 61 ships.

The massacre of convoys SC-122 and HX-229 began twenty-five years prior to the coup de main, southeast of Sicily with then Lieutenant Commander Karl Doenitz in UB-68 and his near death at the hands of a British warship escorting a convoy just out of the Suez Canal. UB-68 was hit, but managed to blow her ballast tanks to the surface, where the submarine sank beneath him, the convoy continuing on to Britain unmolesed. At that moment, floating in the warm Mediterranean waters with his lifejacket and a piece of salvaged cork, Doenitz recalls,

That last night, however, had taught me a lesson as regards basic principles. A U-boat attacking a convoy on the surface and under cover of darkness, I realized, stood very good prospects of

success. The greater number of U-boats that could be brought simultaneously into the attack, the more favorable would become the opportunities offered to each individual attacker.^v

The seed of wolfpack tactics had been planted. Several other German submariners would come to the same conclusion independently during the Great War, but none seemed to gain traction with the German High Command. Revolutions do not come about overnight.

Doenitz would rise slowly during the interwar years, eventually being selected to take over the first reformed U-Boat Flotilla in 1935. He found like-minded officers under his command and proceeded to develop cooperative tactics. In 1937, during the German Armed Forces Maneuvers, U-boats operated for the first time together, tasked to "locate, concentrate and attack an enemy formation and convoy somewhere on the high seas to the north of the coasts of Pomerania and West and East Prussia."^{vi} The operation was wildly successful, and U-Boat Command continued with large-scale exercises into 1939, including under the review of Admiral Raeder, the Commander in Chief of the German Navy, until the Second World War started a few months later. The exercises provided Doenitz with the opportunity to further refine the span of control, communications, and tactics the U-boats would need in combat to bring wolfpacks to their highest potency.

Interestingly, Doenitz reveals that the British were caught largely unaware in the first year and a half of the war that the Germans were employing cooperative tactics against their convoys. Citing Captain Stephen Roskill, the eminent British naval historian, Doenitz writes,

But as the numbers controlled by Admiral Doenitz increased, he was able to introduce attacks by several U-boats working together... The change caught us unawares... but the Development was, from the British point of view, full of the most serious implications since the enemy had adopted a form of attack which we had not foreseen and against which neither tactical nor technical countermeasures had been prepared.^{vii}

This is shocking revelation for the preeminent Navy in the world at the outbreak of the war. The roots of this negligence, Roskill continues, are found in the interwar period:

When British naval training and thinking in the years between



the wars are reviewed, it seems that both were concentrated on the conduct of surface ships in action with similar enemy units and that the defence was also considered chiefly from the point of view of attack by enemy surface units.^{viii}

Doenitz theorizes that the invention of active sonar lulled the British into thinking that oceans had been made transparent and that the submarine became instantly irrelevant.^{ix} In conjunction with the technological advances, the development of wolfpack tactics also reveals the grave threat presented by sclerotic British thinking during peacetime. The bold and decentralized command of the Nelsonian navy had slowly devolved over a century into untested, theoretical doctrine, the fleet "[enjoying] a peace routine and that its title of Mistress of the Seas [not having been] seriously challenged."^x Arthur Marder relates the state of the Royal Navy in 1897 prior to the reforms of Admiral Jackie Fisher: "the British Navy at the end of the nineteenth century, numerically a very imposing force, was a drowsy, inefficient, moth-eaten organism."^{xi} The ramifications of stultified strategic thought and the unacknowledged strategic draw at Jutland in 1916 further ossified British tactical development for the next twenty years.^{xii} Doenitz, on the other hand, presents a case for the importance of war games for tactical and operational developments, and the consequences for the navies that spend the peacetime steaming around the world to "show the flag," fueled by achievements of past wars while the gun rust from lack of meaningful combat exercises.

Tactical Innovation and Credulity in Technology

In the Clausewitzian sense, the nature of the Battle of the Atlantic changed little over the course of the war. The merchant ships plodded along the routes provided by the Allied convoy routing commands, ever in existential peril, while the U-boats prowled about the waves in search of prey. However, a closer examination of the operational level of war provides a plethora of examples of technical innovation—focusing on the development of active sonar here—the first applications of operations research, and a clear warning about immature faith in technological advancements without any corresponding evidence of efficacy beyond first principles or development of doctrinal employment.^{xiii}

The first hydrophones were fitted to warships for submarine detec-

tion as early as 1915, but provided such inaccurate bearings, and without a suitable close attack weapon, to render then operationally irrelevant. In September 1918, the British formed a scientific committee, the Anti-Submarine Division International Committee (Asdic) to develop echo-ranging methods to fix a submarine's position. The system was fielded shortly before the war ended in 1918 and continued to be developed during the interwar years, now able to provide both bearing and range.^{xiv} Prime Minister Winston Churchill recalls his experience with the refined Asdic sets:

On June 15, 1938, the First Sea Lord took me down to Portland to show me the Asdics [*italics original*]... Standing on the bridge of the destroyer which was using the Asdic, with another destroyer half a mile away, in constant intercourse, I could see and hear the whole process, which was the Sacred Treasure of the Admiralty, and in the culture of which for a whole generation they had faithfully preserved.^{xv}

The British began World War II with 220 sets installed on various small combatants and trawlers, with many more sets waiting for ships to install them on—Churchill's maritime building program would take a year or two more to reach fruition.^{xvi} Of note, Churchill does not record the doctrinal development of anti-submarine warfare in the same way that Doenitz discussed the refinement of tactical and operational doctrine for submarine wolfpacks. Doenitz records in his Memoirs the seeming blind faith by the British that the new technology would render submarines useless as a weapon of war: "in 1937 the Admiralty reported to the Shipping Defence Advisory Committee that 'the U-boat will never again be capable of confronting us with the problem with which we found ourselves faced in 1917.'^{xvii} Churchill, at the outbreak of the war, agreed:

I had accepted to readily when out of office the Admiralty view of the extent to which the submarine had been mastered. Whilst the technical efficiency of the Asdic apparatus was proved in many early encounters with U-boats, our anti-U-boat resources were far too limited to prevent our suffering serious losses.^{xviii}

This failure to grasp the limitations of the new technology, both in technical performance and the employment of it, required a rapid development program and the founding of operations research.^{xix}



The British anti-submarine forces had dwindled in the interwar period to less than ten percent of the forces available to the Allies at the signing of the Armistice in Versailles. The shortage would cost them dearly in operational tempo and merchant shipping lost while waiting for the Americans to enter the war or their own shipbuilding program to start delivering. Even with Asdics on their warships, merchant shipping losses totaled more than 900 ships and 4,000,000 tons by the end of 1940.^{xxi} Yet a significant inventory of Asdics still sat on shelves, waiting for ships to enter service, and in that lies another lesson for gaining superiority in the war of attrition—cooperation with allies.

Allies and the Fielding of Capabilities

In May 1940, Churchill first laid bare the British needs to President Roosevelt: "All I ask now is that you should proclaim non-belligerency, which would mean that you would help us with everything short of actually engaging armed forces. Immediate needs are, first of all, the loan of forty or fifty of your older destroyers to bridge the gap..."^{xxii} The use of mothballed destroyers seems a logical and prudent policy to pursue, but the American political scene then, records Samuel Eliot Morison, was still rooted in the quasi-pacifism.^{xxiii} It would take President Roosevelt a great deal of time and political capital to secure the Lend-Lease program.

Churchill pressed again several months later, indicating how their mutual, albeit still private, goals could be served: "We can fit [the older destroyers] very rapidly with our Asdics, and they will bridge the gap of six months before our war-time new construction comes into play."^{xxiv} This string of discussion would continue between Roosevelt and Churchill for the remainder of 1940, even with the offer of British crews to man and transport the destroyers across the Atlantic.^{xxv} President Roosevelt would eventually find a loophole in the Neutrality Act of 1939 and sign a bilateral agreement with Churchill on September 2, 1940, on the trade of fifty older American destroyers for 99-year leases for naval bases from Great Britain. British sailors would bring the American ships back to life and take the fight to their common enemy in a shining example of the importance of bringing capabilities rapidly to bear in a war of attrition to gain a tactical edge.

The Unbiased Tyranny of Geography

It is rare for terrain in war to be so unfavorable to the contesting parties. Both Sun Tzu and Clausewitz speak of the ground as preferential to a particular side depending on the value accorded to it.^{xxvi} The sea, however, retains the ability to be the great equalizer, especially in the modern, globalized era, while simultaneously being supremely cruel to those who lose their respect for it. The Atlantic Ocean and the martial contest for it offered different challenges for all involved—British, German, and American. For Britain, the sea was survival. For Germany, the sea presented the longest contiguous battlefront. For the Americans, the sea represented the lifeline to Britain, under constant threat which, for the majority of the war, they lacked the necessary escorts to fully protect. Not until the summer of 1943 did the Allies begin to achieve sea control.

Corbett puts this battle into theoretical prospective:

By general and permanent control [of the sea] we do not mean that the enemy can do nothing, but that he cannot interfere with our maritime trade and overseas operations so seriously as to affect the issue of the war, and that he cannot carry on his own trade and operations except at such risk and hazard as to remove them from the field of practical strategy.^{xxvii}

Corbett, vice Mahan, defines the heart of the struggle: "By occupying her maritime in which they terminate we destroy the national life afloat, and thereby check the vitality of that life ashore so far as the one is dependent on the other."^{xxviii} Britain needed the sea for survival and Germany rightly discerned that the sea was the key to Britain's destruction. Thus, the Battle of the Atlantic was not simply another battle on the road to victory, but rather an extended campaign at the operational level of war, and a matter of national strategic policy for all contestants.

Churchill, never shy at communicating the necessity of commerce to the survival of Britain, again indicates the British national policy to President Roosevelt: "North Atlantic transport remains the prime anxiety... I am sorry about [stopping food subsidies to Eire], but we must think of our own self-preservation, and use for vital purposes our own tonnage brought in through so many perils."^{xxix} The American policy, still protected by pre-war isolationist policies, took more time to develop. Admiral Stark, then the Chief of Naval Operations, submitted his



thoughts on American grand strategy to Secretary Knox in late 1940: "Our major national objectives in the immediate future might be states as preservation of the territorial, economic, and ideological integrity of the United States...the preservation of the disruption of the British Empire with all that such consummation implies..."^{xxx} These views would be fully developed and codified in the American-British Conversation (ABC) agreements, first completed in March 1941.

In the years prior to the war, Germany began finalizing how they would structure the Navy to strangle the British islands. Admiral Erich Raeder, the Commander in Chief of the German Navy, saw the unfolding situation plainly: "Britain imported fifty million tons of goods annually and her very existence depended on the keeping open of her supply lines. An effective attack on Britain's overseas supplies therefore had to be the main aim of any German naval building programme."^{xxxi} In contrast, Raeder believed that "[as] for our surface forces, they were so inferior to the enemy in strength and numbers that about all they could hope to do was go down fighting."^{xxxii} Raeder has grasped the four Clausewitzian factors of success in war.^{xxxiii} This attitude shaped the shipbuilding program in the final years of prior to the war, resulting in Germany beginning the war with near four times as many submarines as all surface ships combined.^{xxxiv} Geography shaped the battle, forcing widely distributed forces against a highly distributed threat.

For Germany, though, the execution of the maritime strategy would be anything but trivial.^{xxxv} The development of wolfpack tactics and the technological advances added the efforts at the tactical and operational levels, but the distances involved pressed the strategy to its limits. Due to distance, geographic positioning, maintenance, and training cycles, only eight of the 57 U-boats in commission could be engaged in the Atlantic for the first year of the war. The early fall of France and capture of the French ports on the Bay of Biscay provided a significant improvement, both in geographic position as well as the addition of dockyards and repair facilities. Doenitz summed up the strategic value of this gain:

Before July 1940 the U-boats had to make a voyage of 450 miles through the North Sea and round the north of Great Britain to reach the Atlantic. Now they were saving something like a week on each patrol and were thus able to stay considerably longer in

the actual area of operations. This fact, in its turn, added to the total number of U-boats actively engaged against the enemy. It was thanks to these direct efforts of the possession of the Biscay bases....^{xxxvi}

The improvement in position, combined with the building program, allowed Germany to eventually keep nearly one hundred U-boats at sea.

Control of the Sea

Captain Roskill records that the utter destruction of HX-229 and SC-122 "made a profound impression upon the British Admiralty, which later recorded that 'the Germans never came so near to disrupting communication between the New World and the Old as in the first twenty days of March 1943.'"^{xxxvii} Yet the German euphoria and Allied dejection would decisively reverse in the subsequent two months as the Allies shifted the balance of power with the introduction of additional long-range aircraft. Roskill recalls,

[A] sweeping victory was gained in April and May; and of the 56 U-boats sunk in those two months 36 were destroyed by ships and aircraft operating as convoy escorts or in support of convoys. Doenitz thereupon abandoned the battle of the convoy routes. The reason was, so he said, that his losses had increased to about one-third of all the submarines at sea— losses much too high.^{xxxviii}

Doenitz and his submarines would never again gain the upper hand.

The Allies would subsequently introduce greater measures to fight the U-boat menace, including the introduction of the hunter-killer groups like the one that captured U-505. The industrial machine in both Britain and the United States would pick up steam, churning out Liberty ships every 42 days and escorts even more rapidly, turning the tide of the battle through sheer numbers.^{xxxix} Control of the sea in the Corbettian sense would be achieved, but that control did not mean that hostilities would cease—quite the contrary. Both sides would continue to feed grist to the millstone until the end of the war; each side would lose roughly 30,000 Sailors or airmen.^{xl} Tenuous control at best.

The Battle of the Atlantic contains many more lessons for control



of the sea in a war of attrition.^{xii} But the essence of the battle should alert strategists to the necessity of exercises in merging revolutionary technologies into new doctrine and the need to deploy capabilities, not just platforms. Above all, strategists need to know that establishing and maintaining maritime superiority in today's environment, as in the Battle of the Atlantic, is more than the capacity to destroy the enemy in a fleet action—the Battle of the Atlantic repudiated Mahan. Captain Wayne Hughes provides the simple summation: "Naval battle is attrition centered. Victory by maneuver warfare may work on land but it does not at sea. At sea, first effective attack is the aim of every tactical commander."^{xliii} An enemy can fight a war of attrition at sea, a *guerre de course* in which he has many advantages and vulnerabilities. Force composition cannot be determined without due regard for the economic implications of the naval role in national strategy. Commanders must continue to innovate, experiment with new technologies, and evolve how they wage war at all levels. Failure to stay abreast of technology or properly incorporate it will engender strategic surprise on the battlefield, thus driving your forces from the sea, or to the bottom of it.

Notes:

i "Oral History-Battle of the Atlantic. Recollections of Captain Daniel V. Gallery, USN, commander of USS Guadalcanal Task Group concerning the capture of German submarine U-505 on 4 June 1944," Naval History and Heritage Command, August 2, 2002, <https://www.history.navy.mil/research/library/oral-histories/wwii/recollections-of-captain-daniel-v-gallery.html>

ii Churchill, Winston. *The Second World War, Volume II: Their Finest Hour*. London: Cassell & Co, Ltd., 1949, p. 529.

iii The Ultra program was the highly secretive cryptanalysis effort to break German radio encryption. See also "Ultra and the Battle of the Atlantic." National Security Agency. <https://www.nsa.gov/news-features/declassified-documents/cryptologic-spectrum/assets/files/Ultra.pdf>. Accessed on February 6, 2017.

iv Doenitz, Karl. *Memoirs: Ten Years and Twenty Days*. Boston, MA: De Capo Press, 1997, p. 329.

v *Ibid*, p. 4.

vi *Ibid*, p. 21.

vii *Ibid*, p. 22.

viii *Ibid*, p. 23.

ix *Ibid*.

x Marder, Arthur. "Admiral Sir John Fisher: A Reappraisal." United States Naval Institute Proceedings, March 1942, <https://www.usni.org/magazines/proceedings/1942-03/admiral-sir-john-fisher-reappraisal>.

xi Ibid.

xii See also: Gordon, Andrew. *The Rules of the Game: Jutland and British Naval Command*. Annapolis, MD: Naval Institute Press, 2013 and Hughes, Wayne. *Fleet Tactics and Coastal Combat*. Annapolis, MD: Naval Institute Press, 2000. Chapters 2 and 3 of Hughes, in particular, have a concise discussion of this topic.

xiii This essay focuses on the development of active sonar, but the list can certainly be expanded to include technological developments on both sides: radio direction finding, acoustic torpedoes, an air induction mast, or snorkel, the mathematically-based attack tactics for bombers and depth charging, and the prodigious industrial efforts of the American shipbuilding industry to churn out the Liberty ships and destroyer escorts. A myriad of resources provide greater information on these individual developments.

xiv Sternhell, Charles M. and Alan M. Thorndike. "Antisubmarine Warfare in World War II." Operations Evaluation Group, Office of the Chief of Naval Operations, Washington D.C., 1946, p. 2.

xv Churchill, Winston. *The Second World War, Volume I: The Gathering Storm*. London: Cassell & Co, Ltd., 1948, pp. 127-8.

xvi Sternhell and Thorndike, p. 2.

xvii Doenitz, p. 23.

xviii Churchill, p. 325.

xix See Part II of Sternhell and Thorndike for an excellent exposition on the various scientific approaches to anti-submarine warfare during the Battle of the Atlantic. This section truly summarizes the first operational application of operations research, at the time a nascent field. See also: Koopman, B. O. *Search and Screening: General Principles with Historical Applications*. New York, NY: Pergamon Press, 1980. Budiansky, Stephen. *Blackett's War: The Men Who Defeated the Nazi U-Boat and Brought Science to the Art of Warfare*. New York, NY: Vintage Books, 2013.

xx Sternhell and Thorndike, p. 2.

xxi Churchill, p. 569 and Churchill, Volume II: *Their Finest Hour*, p. 639.

xxii Churchill, Volume II: *Their Finest Hour*, p. 23.

xxiii Morison, Samuel Eliot. *History of United States Naval Operations in World War II, Volume I: The Battle of the Atlantic, 1939-1943*. Edison, NJ: Castle Books, 2001, p. 33.

xxiv Churchill, p. 117.

xxv Ibid, p. 361.

xxvi Tzu, Sun. *The Art of War*. Edited by Basil Liddell Hart, Oxford, UK: Oxford University Press, 1971, pp. 114-115.

Clausewitz, Carl. *On War*. Edited by Peter Paret. Princeton, NJ: Princeton University Press, 1989, p. 345.

xxvii Corbett, Julian S. *Principles of Maritime Strategy*. Mineola, NY: Dover Books, 2004, pp. 102-3.

xxviii Ibid, p. 91.



xxix Churchill, Volume I, pp. 535-6.

xxx Morison, p. 42.

xxxi Raeder, Erich. *Struggle for the Sea*. London: William Kimber and Co. Ltd., 1959, p. 128.

xxxii Ibid, p. 136.

xxxiii Clausewitz, p. 261.

xxxiv Showell, Jak Mallmann. *Fuehrer Conferences on Naval Affairs 1939-1945*. Gloucestershire: The History Press, 2015, p. 34.

xxxv See also: Showell, Jak Mallmann. *Fuehrer Conferences on Naval Affairs 1939-1945*. Gloucestershire: The History Press, 2015. This collection comprises the surviving documents that Doenitz ordered preserved, not destroyed, when he headed the German government at the end of the war. The volume shows the difficulties that the German Navy faced in executing the naval component of German national strategy given Hitler's general disposition toward ground forces and the influence of Hermann Goering and the German Air Force.

xxxvi Doenitz, p. 112.

xxxvii Ibid, p. 329.

xxxviii Roskill, Stephen. "CAPROS not Convoy: Counterattack and Destroy!" *United States Naval Institute Proceedings*, October 1956, <https://www.usni.org/magazines/proceedings/1956-10/capros-not-convoy-counterattack-and-destroy>.

xxxix Winston, George. "The Amazing Achievement of Baltimore's Shipyards: One Liberty Ship Every 42 Days." *War History Online*. November 24, 2015. <https://www.warhistoryonline.com/military-vehicle-news/baltimores-liberty-ship-legacy.html>

xl Morison, Samuel Eliot. *History of United States Naval Operations in World War II, Volume X: The Battle of the Atlantic Won, May 1943 - May 1945*. Edison, NJ: Castle Books, 2001, p. 363.

xli See also: Morison, Samuel Eliot. *History of United States Naval Operations in World War II, Volume X: The Battle of the Atlantic Won, May 1943 - May 1945*. Edison, NJ: Castle Books, 2001, pp. 361-4. Here Morison draws conclusions about the American role in the battle, which he generally confines to the development and deployment of escort carrier groups. He writes that the British and Canadian forces were on the whole more skilled and experienced than American forces, and that British and Canadian forces did more to contribute to victory in the Atlantic than did the United States. His full conclusions about the battle are worthy fodder for strategists to consider.

xlii Hughes, Wayne. *Fleet Tactics and Coastal Combat*. Annapolis, MD: Naval Institute Press, 2000, p. 310.

EMERGING THREATS TO FUTURE SEA BASED STRATEGIC DETERRENCE

CDR Timothy P. McGeehan, USN

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Background

Since 1960, the U.S. Navy's ballistic missile submarines (SSBNs) have been considered the most survivable leg of the nuclear triad. While land based missiles are stationary, and nuclear capable bombers are tethered to airbases, the sea based strategic deterrent is highly mobile and continuously deployed, presenting major targeting challenges to adversaries. As 2/3 of the planet is covered by ocean and its average depth is approximately 2 ½ miles, SSBNs have room to maneuver, disappear, and remain hidden. Unlocated and untargeted, U.S. Navy SSBNs broadcast the message that America has a robust and survivable second-strike capability. The capability is so trusted that SSBNs will soon carry nearly 70 percent of the U.S. strategic nuclear deterrent.ⁱ

Force structure planners have determined to make the massive investment (over \$97 billion) to recapitalize the SSBN component of the nuclear triad.ⁱⁱ As the new Columbia-class SSBNs will remain in service until 2080, it is imperative that this deterrent capability does in fact remain credible well into the future. However, emerging technology and changing environmental conditions are conspiring to threaten the survivability of the future submarine force in general and SSBNs in particular.

Emerging Technology: UUVs

Unmanned Underwater Vehicles (UUVs) are rapidly gaining capability. Improvements in sensor packages, data fusion, and navigation



systems, coupled with advances in onboard processing are enabling increasingly autonomous operations. Furthermore, improvements in power and propulsion to include more compact and reliable battery designs (like aluminum based batteries) are enabling significant gains in range and endurance, a critical enabler identified by the then Chief of Naval Operations (CNO), Admiral Greenert at the 2015 Naval Future Force Science and Technology Expo.ⁱⁱⁱ UUVs are being employed in increasingly complex tactical operations, evidenced by the USS *North Dakota*, which performed the first launch and recovery of a UUV from a submarine during an operational mission in 2015.^{iv} However significant they are in their own right, the tactical capabilities of UUVs will soon have even bigger, strategic implications.

Submarines continue to rely on stealth to protect them when deployed.^v The vast three-dimensional sea-space available for submarines to maneuver is analogous to the air-space available to airplanes; hence, some lessons learned in one domain may apply to the other. In his 1921 treatise *The Command of the Air*, air power theorist Giulio Douhet wrote “destroying an enemy’s airplanes by seeking them out in the air is, while not entirely useless, the least effective method. A much better way is to destroy his airports.”^{vi} Douhet argued that in an air war the advantage would lie with the attacker since he could attack from a range of approaches vice the defender who had to expend more resources searching a large volume just to find the attacker in the first place. Even if the defender did find the attacker he would have to be able to mass enough forces to effectively defeat the attacker, which is unlikely as his forces would likely be spread too thin during the search.^{vii}

Applying this train of reasoning to the undersea realm, it is far easier to attack a submarine in port before it gets underway than it is to locate and engage one in the open ocean. In 2015, Russian state TV “leaked” details of a Russian Navy UUV that was essentially a long range nuclear torpedo designed to “destroy important economic installations of the enemy in coastal areas and cause guaranteed devastating damage to the country’s territory by creating wide areas of radioactive contamination, rendering them unusable for military, economic or other activity for a long time.”^{viii} Such a weapon would be ideal for engaging an SSBN in port. However, while the weapon would impact that particular vessel,

the base, and the supporting infrastructure (not to mention population), there is still the consideration that there is redundant capability with other SSBNs already underway, and therefore the sea based strategic deterrent remains viable. Just attacking the submarines in port alone would not suffice to cripple the overall capability; there would also need to be a complementary attack capability to neutralize the SSBNs already deployed.

A variation of the “attack while in port” strategy is to have UUVs continuously loiter in the vicinity of an SSBN port. These UUVs could be equipped with explosive payloads and triggers, essentially acting as mobile mines and “blockading” the SSBNs in port. Yet another variation is for those loitering UUVs to trail SSBNs as they got underway. With sufficient speed and endurance, a UUV could trail an SSBN for the duration of its patrol. Depending on size, the UUV could carry a weapon of its own or simply have a means to broadcast the SSBN location to its own forces that could come in for the kill if and when required. Such a capability would negate the advantage of SSBN stealth. While these UUV capabilities may sound far-fetched, a vignette in the DoD’s Unmanned Systems Integrated Roadmap FY2011-2036 describes a UUV that could tether itself to the submarine and periodically adjust the tether to glide to the surface to broadcast its position and receive new instructions.^{ix} A related concept, DARPA’s AntiSubmarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) is an autonomous surface vessel that provides long-range (10,000 nautical miles at 12 knots) and long-endurance (months) for continuous tracking of submarines.^x ACTUV is not just a concept; the prototype is in the water and was christened the “Sea Hunter” last year.^{xi}

Other Emerging Technologies

With the introduction of the P-8A Poseidon maritime patrol aircraft, the U.S. Navy has led the way into high-altitude Anti-Submarine Warfare (ASW), which other nations are likely to follow (indeed, several other nations are already buying the P-8 itself).^{xii} Operating well above the traditional operational height for maritime patrol aircraft, high-altitude ASW aircraft allow faster transits, greater range, and more time on station. Furthermore, operating at higher altitude allows aircraft to



maintain line of sight contact to a more distributed sonobuoy field to hold more area at risk, especially when used in concert with other advances like Boeing's High-Altitude Anti-Submarine Warfare Weapon Capability (HAAWC). The HAAWC program couples the Mk 54 torpedo with a steerable folding wing assembly that will allow the torpedo to be deployed from 30,000 feet and glide (with GPS navigation) to the desired impact point, vice the aircraft having to descend below 500 feet to deploy a torpedo directly overhead.^{xiii} This capability will allow the P-8A to further increase its standoff range, as well as conserve fuel and time, again allowing it to remain on station longer. In the future, the HAAWC could even allow for dataupdates to refine the impact point as the torpedo glides through the air, further reducing the time and space available to the submarine to react and evade the torpedo. While these capabilities are valuable contributions to overall U.S. Navy ASW, it is only a matter of time before adversaries develop similar capabilities, which could be used to more efficiently target SSBNs.

In recent Congressional testimony, Bryan Clark of the Center for Strategic and Budgetary Assessments testified that other ASW technologies were proliferating, to include highly effective low-frequency active sonar. Furthermore, he described other potential advances in the development of non-acoustic ASW methods, such as employing "technologies that detect chemical or radiological emissions or bounce laser light off a submarine."^{xiv} In short, new technology is making it increasingly difficult for SSBNs to hide and remain hidden.

Changing Environment

In addition to emerging technology, changes in the environment itself may in some ways make SSBNs more vulnerable. Climate change has led to measurable changes in the physical properties of the ocean, which may impact underwater sound propagation, sonar effectiveness, and the ability of SSBNs to remain undetected.

Since the industrial revolution, rising levels of atmospheric carbon dioxide have led to increased oceanic uptake of carbon dioxide as it is absorbed by surface waters. This ultimately has led to the phenomenon of "ocean acidification."^{xv} On the global average, the ocean surface has already increased in acidity by 30% from pre-industrial times, and

is expected to double by 2100.^{xvi} Low-frequency sound attenuation is a function of seawater pH.^{xvii} As the ocean becomes more acidic the absorption of sound decreases, causing some frequencies to propagate slightly farther and therefore raising the chances of detection.^{xviii} While this effect is small, in his Campaign Design, CNO Admiral Richardson reminds us that in today's competitive security landscape "the margins of victory are razor thin – but decisive."^{xix} Any possible vulnerability to SSBNs, however small, must be considered.

Changes in the Arctic Ocean will continue to impact submarine operations, in particular those of potential adversaries. The Soviet and later Russian SSBNs leveraged Arctic sea ice to help form a protective bastion and increase their survivability. SSBNs loitered under the ice, ready to surface and launch if required.^{xx} There was a high barrier to entry for under-ice submarine operations, which required unique capabilities like ice strengthening and sufficient buoyancy to break through thick pack ice. Now, as the ice cover recedes the submarines are more vulnerable to harassment from ASW aircraft and surface ships. Other physical changes in the Arctic Ocean include the emergence of the "Beaufort Lens." This feature forms in the Beaufort Sea between warmed near-surface waters and a deeper warm layer entering the Arctic from the Bering Strait. Sound speed varies with temperature (as well as salinity and pressure), so sound refracts and becomes trapped between these two layers, leading to increased propagation ranges. Recent observations have shown acoustic propagation ranges four times as large as they were before emergence of the lens.^{xxi}

Implications for Deterrence

The increasingly capable submarine detection methods and weapon systems led the then Commander, Submarine Forces Admiral Richardson (now CNO) and Lieutenant Joel Holwitt to write in 2012 that "More than ever, it is easy to be "seen," which can lead to being targeted and, increasingly, hit."^{xxii} This sentiment is disconcerting for submarines in general but even more alarming for SSBNs. Threats to SSBNs are by their nature destabilizing. Both sides knowing that the other has a credible second-strike capability adds stability. Any doubt as to the survivability of the strategic nuclear deterrent could lower the threshold of



their employment; SSBNs could be employed sooner in a crisis instead of as the ultimate last resort, if they become a capability that one must use or expect to lose.

However, these threats to submarines go beyond impacts on strategic deterrence; they impact conventional deterrence as well. Potential adversaries have acquired Anti-Access Area Denial capabilities (A2AD) in an effort to keep U.S. forces at an arm's length and limit power projection capabilities. With A2AD systems presenting threats to surface forces, air forces, and forward bases, the submarine option has been considered a trump card that can penetrate A2AD zones and fight from the inside out.^{xxiii} This conventional capability deters adversaries as it allows the U.S. Navy to hold their forces, lines of communication, seaborne commerce, and infrastructure at risk. Submarine access is an asymmetric advantage that features prominently in thinking about the Navy's function of All Domain Access, and in the new Joint Concept for Access and Maneuver in the Global Commons (JAM-GC).^{xxiv}

However, a reassessment of A2AD implications may be in order in light of the emerging technologies described here. While it is unlikely that adversaries will post surface ships directly off of our coasts, future UUV technologies in particular could allow clandestine means to challenge the U.S. Navy's submarine access to contested spaces, and even their ability to put to sea in home waters. Just getting underway could be a challenge, and the entire transit to the battlespace could be contested.

Way Ahead: Counter-UUV Capabilities

Like an elephant harassed by a gnat, an SSBN would likely not be able to defend itself against UUVs. Therefore, counter-UUV capabilities will be critical enablers. However, with the size of the ocean battlespace the idea of individually hunting down particular UUVs or somehow seeking to engage them in a decisive Mahanian-style battle is impractical. Instead, a more appropriate course to pursue would be what Sir Julian Corbett described as temporary and local sea control, where one side would maintain superiority over an "operationally significant" region when necessary, which is essentially being able to accomplish missions at a time and place of one's own choosing.^{xxv} In this case that would mean securing the waterspace between the SSBN homeport and open

water beyond, and only doing so as an SSBN was getting underway, vice trying to control the entire volume of a major piece of the ocean all of the time. This control is localized and fleeting; the SSBN just needs time to run the gauntlet to get to appropriate waterspace that allows sufficient room and conditions to disappear. To secure the submarine component of strategic deterrence, the Navy should consider investing in the following counter-UUV capabilities:

1) *Port UUV detection and localization system.* SSBN home-ports in particular will need enhanced undersea surveillance capabilities to detect the presence and location of UUVs. The previous analogy to Douhet's air power theory showed that he was correct, but only to a point. He maintained that the advantage would lie with the attacker as the defender would have to search the entire volume of airspace to find the attacker, while the attacker could just focus on inflicting damage. However, this simplified model did not take into account the role of advancing technology. During World War II, the newly developed RADAR system allowed the Royal Air Force to detect and vector limited fighter assets to intercept German bomber formations during the Battle of Britain. A similar undersea capability, coupled with the limiting lines of approach dictated by geography and bathymetry will confine adversary UUVs to smaller regions and make sanitizing and defending the waterspace much more manageable (which could be done with manned or unmanned platforms of our own).

2) *Breakout capability.* Borrowing a page from the mine warfare playbook, the Navy needs a capability to breakout from UUV infested ports. Routine bottom surveys with "change detect" algorithms will be required to counter UUVs that are "pre-staged" (possibly years in advance analogous to DARPA's Upward Falling Payloads) on the bottom and just waiting for commands that direct them into action.^{xxvi} Sweep and neutralization functions will also be required to declare a transit lane officially sanitized (at least for the moment).

3) *Decoys.* Decoys (acoustic and otherwise) could be employed when SSBNs were getting underway to try and lure adversary UUVs away. These could also be deployed from the SSBN itself periodically while underway as a countermeasure for any trailing UUVs that it happened to pick up.



4) *Delousing capability.* In addition to decoys, the Navy needs to develop a “delousing” capability to deal with any trailing UUVs while underway. Whether this could be done during a rendezvous with a friendly ship, submarine, or swarm of friendly UUVs, the Navy needs an ad hoc mobile capability to use for SSBNs already on patrol. A fixed system (even deployed in a remote area) runs the same risks the SSBN faces getting underway from a port; adversary UUVs could just loiter in the vicinity of the “delousing station” and pick up the SSBN and trail after it departs the station.

5) *Standoff counters.* Just as it is more efficient to target an SSBN before it gets underway, some counter-UUV capabilities should apply before the UUVs are even on station. UUVs could be delivered via surface ships (military or civilian), submarines, larger UUVs, aircraft, or be self-deploying and travel under their own power from distant bases. Better maritime domain awareness (MDA) and focused intelligence gathering will play an increasing role in tracking and interdicting possible delivery platforms.

Way Ahead: Counter-Transparency Capabilities

Better awareness of the ocean’s physical properties will allow SSBNs to avoid areas with conditions that support extended acoustic propagation and could betray their presence. The following capabilities should be considered for targeted investments:

1) *Improved environmental sensing systems.* Better sensing and sampling systems will increase real time awareness of changing ocean conditions. Both in situ (buoys, moorings, drifters, wave gliders, etc) and remote (satellite, aircraft, etc) sensing systems are required to assure the coverage and fidelity of observations.

2) *Improved modeling capabilities.* To fully exploit the environment the SSBN force will need predictive capabilities that allow its boats to avoid waterspace with conditions that favor the searching party. This drives the need for enhanced modeling capabilities with higher temporal and spatial resolution and longer lead-times. Furthermore, this will drive the need for enhanced computing capacity due to the increased computational cost, and necessitate more supercomputing power.

3) *Improved Tactical Decision Aids.* Forecasts alone are not

enough. The SSBN force will require better tactical decision aids to reduce the cognitive load placed on commanders and decision makers to make sense of the environmental model output. Improved algorithms and decision aids will allow an SSBN crew to maximize the competitive advantage from the forecast environment, minimize the signatures they present, and manage their associated risks.

Way Ahead: Distribute the Deterrent Capability

The SSBN deterrent has historically also had numbers on its side (i.e. the capability was distributed across many platforms). Starting with “41 for freedom” back in 1959, the number of SSBNs has continually declined, through the Ohio-class that dropped to 16 boats and then 14 (with 2 repurposed as SSGNs), and to the new Columbia-class, which is planned to have 12 boats.^{xxvii} The SSBN component of the nuclear triad is becoming increasingly consolidated on fewer and fewer boats. An intriguing idea is to distribute the submarine launched ballistic missile (SLBM) capability across multiple platforms, not just the SSBNs. Block V Virginia-class submarines could be modified to carry the Trident SLBM within their Virginia Payload Modules (VPMs).^{xxviii} The Navy is planning to acquire 20 Block V Virginia-class submarines. At less than half of a Columbia, pursuing this option could reduce pressure on Navy shipbuilding accounts as well. This would allow a more widely distributed deterrent and complicate any attempt to threaten the continuous at sea deterrence capability in general. However, it is recognized that incorporating Trident onboard other submarine classes is non-trivial. There are extensive burdens related to personnel reliability, enhanced security, assurance of nuclear command and control, the need for specialized storage magazines, and more intensive training.

That said, there is a case that those costs would be acceptable to achieve a counterpart of the Navy’s surface community “distributed lethality”; this would be considered “distributed survivability.”

Conclusion

For almost 60 years SSBNs have been considered the most survivable leg of the nuclear triad. Emerging technology and environmental changes could pose future threats to that survivability. The Navy and



the Nation must act now to ensure that the SSBN remains a credible and viable component of strategic deterrence in the 21st century.

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**THE NEXT LEAP FORWARD:
INNOVATION IN COMMAND, CONTROL,
AND COMMUNICATIONS FOR UNDERSEA ASSETS**

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EXECUTIVE SUMMARY

Since the early days of submarine operations, the Navy has attempted to solve communication problems with submarines. Traditionally, submarines receive a commander's guidance and develop a plan to execute. Unlike our surface combatants, a submarine typically operates forward deployed with very little two-way communication to a parent command. If a submarine completes its mission or needs to contact its parent command, a submarine may come off-station and communicate at a safe distance to avoid counter-detection. While communicating safely at distance has been very successful in the past, emerging technologies could alleviate coming off station and potentially be an asset multiplier for the submarine force.

With the introduction of unmanned vehicles to the fleet, the undersea communications structure can adapt and include this technology. First, it is essential to develop the appropriate communications technology to leverage unmanned underwater vehicles (UUVs). Currently, the ability to transfer data to and from UUVs is slow, unless an UUV comes to the surface to transmit the data via satellite (Iridium) or possibly some other line of sight method. An UUV surfacing to transmit data increases the probability of detection. Instead, if UUVs could transfer data underwater quickly, a network of UUVs and a submarine could work in tandem,



providing real time analysis to each other while minimizing counter-detection. Researchers in industry and at universities are developing technology towards solving this underwater communication problem.

Besides developing and upgrading communications technology, submarine leaders should also consider how the force wants to pair UUVs and submarines. Does the Navy view the submarine as a potential command platform for UUVs, or does the Navy want to maintain the status quo and intend to have submarines operating independently? This paper addresses the command and control question and finds that a submarine is a suitable command and control platform for UUVs, increasing the capabilities of both the submarine and UUV while maintaining stealth capabilities. With near peer competitors developing better undersea technology, the Navy needs to develop and implement emerging technology to maintain undersea dominance.

INTRODUCTION

Throughout history, military leaders sought new technologies and tools to gain an advantage over the adversary. Whether that technology is a tool, such as a longbow, or a complex system, such as a submarine, new technologies disrupted conventional tactics and changed the way a war is fought on both an operational and strategic level. In modern warfare, a network of highly advanced and integrated manned and unmanned platforms is one new technology that has revolutionized warfare. Integrated communications, command, and control (C3) facilitated the development of precision guided munitions, such as the Tomahawk Land Attack Missile, and allowed the United States to remove some aviators away from the battlefield with unmanned aerial vehicles (UAV). The U.S. Navy (Navy) relies on the communications structure for disseminating orders, for fixing a position via Global Positioning System (GPS), and for weapons placement. Even though the Navy has dominated the seas with the current C3 structure, change is required to maintain an advantage. While networks and communications have brought a significant advantage to both the surface and air components of the Navy, the undersea domain lags behind due to the complexity of underwater operations. This paper explores these barriers and looks at new technology that can be leveraged for future use. The next technological leap in undersea war-

fare is the collaboration between submarines and UUVs, which should be leveraged quickly to maintain undersea dominance.

MOTIVATION

The changes required in the Navy's communications structure are due to an increasingly dynamic world. Globalization is occurring at a rapid pace. Currently, 50,000 merchant ships are registered for international trade and more than 150 countries have at least one merchant vessel flagged to their own country. International shipping is responsible for 90% of world trade and accounts for over half a trillion dollars annually in revenue across the world. With many countries dependent on maritime trade for food and raw materials, international shipping remains vital for world prosperity.

Besides traditional shipping, the maritime domain also contains a large amount of submerged cables that connect the world. Undersea cables transmit data, which allow global institutions and sectors of commerce to operate. Currently, over 400 submarine cables transmit 99% of all data across the internet at rates of up to 160 terabits/sec. With many American companies laying the cables, the Navy should periodically monitor these cables to protect national interest and prosperity.

U.S. prosperity depends on these maritime functions and both international shipping and undersea cables are at risk. Traditional adversaries, such as Russia or China, are rapidly improving their naval technology to disrupt operations. In September 2015, a Russian spy ship, *Yantar*, cruised along the east coast of the United States and sailed to Cuba with two deep water submersibles. Although intentions were not clear, the *Yantar*, with the deep-water submersibles, had the ability to cut undersea cables. Threats to the maritime domain can also come from non-state actors and terrorist organizations. In 2016, Iranian-backed Houthi rebels fired anti-ship cruise missiles at the USS *Ponce* and USS *Mason* operating near the Bab el Mandeb Strait, a strategic chokepoint. Both these instances highlight threats to different parts of the maritime domain. In both cases, the proposition of losing undersea communications or closing off a strategic chokepoint are unacceptable to the United States. The Navy is currently tasked with protecting these vital national interests. In order to adequately protect them, the Navy needs to incorporate and



integrate all available platforms in the monitoring and defense of these interests, including manned and unmanned undersea vessels.

CHALLENGE

To integrate submarines and UUVs, one must overcome the communication challenge. During World War I and II, German submarines communicated with command posts via shortwave radio signals. These signals were intercepted, and many German U-boats were sunk after the British broke the Enigma Codes. The breaking of the Enigma Code was a major turning point in the war. The United States and Great Britain were able to change strategy from convoy protection to hunter-killer groups. After the war, and with the advent of the nuclear age, the Navy developed various methods to maintain secure communications. Submarines utilize various mast and antennas to receive/transmit orders and instructions across the energy spectrum. These communications, however, require a mast out of the water, slowing the submarine and increasing the probability of detection. Other communication advancements allowed the submarine to tow a VLF wire or buoy to maintain VLF communications. These communications facilitated secure communications with less probability of detection, but still required that the submarine transits at slow speed in order to receive communications. Since the signal can only penetrate a few feet under the water, a speed restriction is also required to ensure the towed communication equipment remains near the surface. In the late 1950s, the Navy sought to address the speed challenge by testing extremely low frequency (ELF) communications. Although the data rate was low, the project proved that large antennas could communicate with a submarine at depth/speed. Following the end of the Cold War, the Navy ended the program due to the high cost and low data transmission rates. Submarines' ability to communicate and receive data at depth without speed restriction would be a tremendous advantage to the operational commanders on the battlefield.

DEVELOPMENTS

Innovations in undersea communications will allow multiple platforms to successfully operate underwater simultaneously. Researchers at SUNY-Buffalo are developing software to help increase data transfer

rates through waterproof modems. Underwater data transfer from UUVs is slow. In many cases, the amount of data that needs to be transferred requires the UUV to come to the surface and transfer data via Iridium or possibly a line of sight communication system. The researchers from SUNY-Buffalo have demonstrated data transfer rates up to 200 kilobits/sec at a distance of 200 meters. As research continues, data rates may increase to 300 kilobits/sec, along with range to 500 meters. Even though these rates and ranges seem small, they represent an exponential advancement of current technology and facilitate rapid data transfer, minimize counter-detection, and extend the life of the vehicle.

While researchers in Buffalo are attempting to solve slow data rate transfers, the Defense Advanced Research Projects Agency (DARPA) is attempting to develop a network through Tactical Undersea Network Architecture (TUNA). The TUNA program will establish a tactical network via buoys connected via fiber optic cables. Simulation, modeling, and preliminary sea tests have been completed in the past two years. While the intent of TUNA is to restore tactical network connectivity for a carrier strike group, it could be utilized for undersea applications. UUVs could transfer data to a receiver situated on a buoy and incorporate that data into the tactical network via TUNA. A possible situation could be placing passive acoustic sensors on a small UUV in the sound channel. The UUV could transmit its data to a receiver and incorporate the data into the tactical network around the carrier or near a submarine. In this scenario, an UUV is the first line of an anti-submarine warfare defense picket around a CVN in a designated operating area. Advancements such as TUNA and waterproof modems could make the immediate incorporation of UUV's data feasible, thus increasing their effectiveness and mission sets.

Besides advancements in communications, advancements in navigation are also being developed for undersea sensors. GPS is currently the main method to verify ships' position. While GPS has revolutionized operations, it is a vulnerability that must be mitigated for future forces. Near peer competitors, such as China, have demonstrated the ability to destroy satellites in low earth-orbit. The Chinese Dong Ning -2 missile is capable of striking high earth-orbit satellites, such as the GPS constellation in medium earth-orbit. One can assume that China would likely



target GPS satellites in the event of a conflict. To mitigate the effects on submarines and other undersea vehicles, DARPA is developing “underwater” GPS known as Positioning System for Deep Ocean Navigation (POSYDON). POSYDON would provide positioning and timing information to undersea platforms via a series of small acoustic sources in an ocean basin. DARPA is currently collaborating with BAE systems to complete the modeling of signal propagation in the water column. Even though the technology is still evolving, POSYDON represents a new communication ability that would change operational patterns for undersea vehicles.

VISION

In a 2011 *Proceedings* article, Admiral John Richardson and Lt. Cmdr. Brent Johnston advocated for incorporation of UUVs into the fleet and laid out some practical C3 recommendations. Their recommendations include having submarines utilize unmanned systems for transmitting communications, controlling UUVs with short range communications, and integrating UUVs into current C3 structure. Combining TUNA and the research at SUNY-Buffalo could fulfill the communication recommendations proposed in the article. During future operations, a SSN/SSGN on mission could utilize a series of forward deployed UUVs as a force multiplier. A mission commander onboard the submarine could task the UUVs for various mission sets. The submarine could then conduct its own mission and then meet the UUV at a preprogrammed rendezvous point. The data the UUVs gathered could be transferred at a quick rate wirelessly and analyzed onboard. If communications need to be transmitted to a parent command, the mission commander could task one of the UUVs to transit to an area safely away from the submarine and then transmit the message.

Command and control of the UUVs will become a priority once UUVs become more prevalent in theater. For the theater commander, UUVs should be treated as if they were a manned submarine, in terms of prevention of mutual interference and waterspace management. In other words, a mission commander would assign an UUV to operate in an area and the UUV would constrain itself to that area. In the event that an objective required multiple UUVs operating in the same area, depth restric-

tions could be placed on the vehicles to mitigate the potential risk of collision. If a submarine was operating in the area with a LDUUV or UUV detachment as part of a mission, the submarine commander should be given authority to task and operate undersea mission capable UUVs. The submarine commanding officer should be given authority and autonomy to utilize the UUVs in accordance with guidance and intent statements.

In a future conflict, a submarine could effectively utilize UUVs for targeting, communications, and intelligence gathering. In a potential scenario, a LDUUV operating independently in theater could deploy an undersea network, similar to the DARPA TUNA program. A nearby submarine, or even the LDUUV, could also deploy multiple small UUVs with a passive sonar to extend the reach of the submarine. The UUVs could acquire and potentially track an adversary submarine or surface action group and pass the real-time information through the network to the submarine. With tracking information, the submarine could move to an ideal attack position and fire a salvo of torpedoes, destroying the adversary submarine or surface action group, all the while minimizing the probability of counter-detection prior to firing a torpedo. The submarine could then designate a communication UUV to transit to an area away from the submarine and communicate further intentions to the theater commander.

This future scenario would require significant training for the submarine crew. Fleets could incorporate UUV operations as a part of the pre-deployment work up and certification process. The certification process will verify that the submarine crew could handle operations with UUVs while forward deployed. As mentioned earlier, a dedicated mission commander of the UUVs onboard enhances a submarine ability to conduct operations. A mission commander and their staff can assist the submarine commanding officer and wardroom in the planning and execution of missions incorporating UUVs. Whether the submarine crew or additional personnel with expertise controls UUV operations, the ability for a submarine to act as the command and control node of UUVs would mark an advancement in undersea warfare capabilities.



CONCLUSION

In a relatively short number of years, the Navy will operate with multiple UUVs in theater, conducting their own missions and tasks. UUVs represent a great force multiplier and allow the Navy to maintain an advantage over near peer rivals. However, in order for UUVs to operate forward deployed, communications and navigation advancements are required for successful deployment. Advancements in underwater data transfer capabilities could potentially allow a submarine and a series of UUVs to pass real-time information to each other, increasing situational awareness. The ability of TUNA to network multiple platforms underwater could potentially expand the area from which all UUVs operate in tandem. In order to have multiple UUVs operating in the same area, the UUVs must know its own position with accuracy. Through POSYDON, multiple UUVs and a submarine could operate inside a relatively small area with safety requirements met.

For command and control of UUVs, the submarine force is well situated to act as the command and control node. With the potential advancement of POSYDON, a submarine could task UUVs to a specific rendezvous point with high certainty that the UUV will arrive at that location for data transfer. This command and control ability would expand the submarine capabilities and situational awareness, all while maintaining stealth for the submarine and UUV. The advancement of communication and navigation capabilities underwater represent the next great technology leap that can combine the unique capabilities of both a submarine and UUV, resulting in a more lethal and capable force.

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SUBMARINE COMMUNITY**ODD JOBS: CANADA'S USE OF SUBMARINES
ON FISHERIES PATROLS, 1993-1995
PART 2**

Mr. Michael Whitby

We saw in Part One how, under OP AMBUSCADE, HMCS *Ojibwa* conducted a 'fishpat' on Georges Bank in March 1993, in large part to raise the profile of Canada's submarines. Gaining publicity was also an ingredient of a similar operation carried out the following year on the Grand Banks, but the fisheries situation was far more serious. Newfoundland's once bountiful cod fishery had collapsed, and in 1992 the Canadian government had declared a moratorium on that type of fishing. Canada laid the blame for over-fishing on members of the European Union (EU), particularly Portugal and Spain. They conceded stocks were in crisis and adhered to the moratorium, but they turned to fishing Turbot with the result that stock was soon under pressure. As the crisis escalated, in September HMCS *Okanagan* was tasked for OP GROUSE, a fisheries patrol off the 200-mile limit of the Grand Banks. *Okanagan* was commanded by LCDR Larry Hickey, a colorful, aggressive submariner who had previously carried out a demanding patrol against Soviet SSBNs in the Labrador Sea.

GROUSE proved a more formidable challenge than AMBUSCADE. Instead of patrolling the relatively short 60-mile section of the Hague Line across Georges Bank, *Okanagan's* area of operations covered the Nose and Tail of the Bank, Flemish Cap and adjacent waters; an area of some 65,000 square miles. It encompassed both deep and shallow water, each with its own distinct surveillance challenges. There were also more vessels fishing on the Grand Banks, and they were from several nations. Due to these challenges, additional naval and DFO assets supported *Okanagan*, but co-ordination proved seriously flawed—for example, although the destroyer HMCS *Fraser* was also deployed to the Banks,

there was no formal coordination with the submarine. Critically, unlike AMBUSCADE where the embarked Fisheries Officer only provided technical advice, in GROUSE he would actually direct *Okanagan's* movements. This highlighted a fundamental philosophical difference between the navy and DFO. Hickey outlined that “*Okanagan's* objective, as far as the Navy was concerned, was to effect the arrest of a violator”:

Of secondary importance was the gathering of intelligence on fishing vessels, and compiling a picture of their patterns of operating....Since enforcement is routine for DFO, they have a long-range perspective on the way they conduct business, ie. ‘if we don’t catch them this time, we’ll catch them later.’ On the other hand, naval units have a short-term desire for significant incident, eg. an arrest of a violator. The Navy’s perspective tends to view the patrol as a two-week window during which something has to be achieved, something concrete that can be pointed to and the statement made, ‘Look what we did.’

Confronting these challenges at sea, Hickey could only rely upon “flexibility and compromise” to make the most of the situation.

Okanagan departed Halifax on 26 September for her two day passage to the southeast extremity of the Grand Banks. Frustration soon arose. The DFO officer decided to initially head to the Tail of the Bank to verify if foreign fishing vessels were using Canadian swordfishermen as cover to fish illegally. He then wanted to head eastward into deep water to track vessels heading northwards from the 800 meter line towards the 200-mile boundary. When Hickey requested the schedule of DFO air patrols to ascertain the surface picture, he learned flight plans were not finalized until just before take-off to ensure optimal weather. Thus, the schedule was subject to change at short notice, which obviously affected the flow of intelligence. Moreover, Hickey was flabbergasted to discover he could not communicate with the aircraft since the “[frequencies] embarked DFO has on the back Fag [cigarette] packet don’t appear to work.” Given the distances involved, aerial support was critical to GROUSE, but it was to be available only sporadically.

On the evening of 28 September *Okanagan* discovered coordination with surface forces was equally poor. When Hickey took a routine all round look with the periscope while shadowing a Portuguese fishing ves-



sel from close range, he was startled to see the destroyer Fraser passing down the other side of the target. Hickey had no warning of her presence and raised the communications mast “to let her know we’re here, and try to determine her intentions.” Fraser informed *Okanagan* that she and the DFO vessel L.J. Cowley had been patrolling the area for two days and had boarded six vessels. That obviously bred caution amongst fishermen so the DFO officer decided to move elsewhere. Thus, poor mission planning eroded valuable submarine patrol time.

Okanagan headed towards deep water on the eastern side of the Tail of the Bank to intercept Spanish trawlers reportedly heading to that area from Flemish Cap. Before the patrol Hickey had expressed his intention to take more risks when shadowing fishing vessels than he normally would against warships, and his handling of one Spanish contact demonstrated his comfort in doing so. After sighting a trawler by periscope at about 8,500 yards and tracking it by sonar and radar, Hickey approached the target from ahead, starboard side to. He took *Okanagan* in close, all the while maintaining awareness of her fishing gear. With tongue in cheek, he signalled MARLANT that he made an “effing close pass. Not fessing up to actual CPA since squad[ron] boss may read. Will have fudged records by [return to] Halifax.” In fact, the patrol records remained “unfudged”, and show that *Okanagan* passed within 200 yards of the trawler. Sneaking quick peaks through the periscope Hickey was close enough to see the boat make sternway as it reeled in its net, and since he could clearly observe the crew concentrating on their work he knew there was little risk of counter-detection. Having collected imagery, *Okanagan* withdrew to about 2000 yards but the DFO officer asked to move in again to see if he could ascertain the species of fish being caught but the Spaniards recovered their nets before the boat could get close enough. As it was, the vessels were fishing legally.

For the next three days *Okanagan* remained in deep water on the eastern side of the Tail, patrolling along the 800-metre contour. She shadowed four Spanish trawlers, and an EU fisheries patrol vessel was observed trailing the same vessels. Her presence, reinforced by ‘Fishery Patrol’ emblazoned in huge letters on her hull, accounts for the fact that the trawlers fished legally. Exasperated yet again, Hickey and the DFO officer shifted their patrol area, this time to Flemish Cap, report-

edly “alive” with fishing activity. Incredibly, since the DFO office in St John’s had closed for the weekend, approval for the move could not be requested until Monday 3 October, four days hence.

Frustration also arose with the aerial surveillance. Hickey learned that a DFO flight on Saturday 1 October had “located two Spaniards fishing [illegally] up on the Bank but that information had not been shared with MARLANT, preventing the submarine from being cued to the location. Hickey noted that his fisheries officer is “getting as annoyed at DFO as I am.” MARLANT also expressed irritation. On Tuesday they informed Okanagan, “Still awaiting DFO flight info for this week. Expecting it yesterday.” At 1615Z on Tuesday 4 October MARLANT finally transmitted DFO’s approval for Okanagan to head to Flemish Cap. But, Hickey complained, this came “regrettably too late to make the dash. Would only have about 8 hrs daylight onsta[tion].” Instead, he requested intelligence of fishing activity on The Nose of the Bank and shifted to that area.

In the midst of this inertia, *Okanagan* had patrolled shallow water on the Tail of the Bank. Hickey later reported “the beauty of working shallow water is that no one is supposed to be here. Hence any vessel found here is suspect.” That description certainly applied to an American fishing vessel *Okanagan* encountered that evening. It was transiting across shallow water and Hickey explained in his patrol narrative, “DFO has a feeling he will start fishing soon. Intend to fall in astern and watch for this to happen. If he fishes for flounder, will call in [DFO vessel] COWLEY, although not breaking law per se, it is still a violation of moratorium. If he fishes scallops, we’ll arrest him.” The next few hours confirmed the unique capability of a submarine for the task. Night had fallen and it would have been difficult for an aircraft or surface vessel to conduct surveillance, but *Okanagan* monitored her acoustically and visually as she proceeded northeast at about nine knots with no evidence of fishing activity. After about two hours lines were finally sighted extending astern from the fishing boat. *Okanagan* immediately passed the information to the L.J. Cowley who boarded the vessel at first light.

With the end of GROUSE in sight, as on AMBUSCADE, debate centred on obtaining a photograph of *Okanagan* surfaced alongside a fishing boat to punctuate the deterrence aspect of the mission. MARLANT



sought to complete the mission covertly, but DFO wanted to publicise the submarine's presence, and as the lead agency that view prevailed. Politics also likely played a role. MARLANT instructed *Okanagan* the order of priority for the subject vessel was: first, European; second, any other nationality; and, third, Canadian; "US vessels are only to be used as a last resort." *Okanagan* soon found a candidate trawling on the eastern edge of the Tail of the Bank. Approaching to within 450 yards, *Okanagan* identified her as the *Pescamaro Uno*. When the DFO aircraft arrived, *Okanagan* surfaced 900 yards on its starboard beam. As Hickey signalled MARLANT, the Spanish were stunned when a submarine surfaced close alongside:

Sealand VHF 16 verified that OOW of *Pescamaro Uno* has commendable fluency of expletives in both English and Spanish. Synopsis of TX [text] goes like this quote Submarine Submarine four letter expletive referring to carnal knowledge times 3 followed by incoherent babbling in Spanish unquote.

GROUSE ended on that colourful note. Hickey informed MARLANT that *Okanagan* had "binted, fingerprinted and verified ID of sixteen vessels/ 10 Spanish/ 2 US/ 2 Cdn/ 1 Portuguese/ 1 Isle of Man. Detected one violator who was turned over to DFO surface patrol craft." *Okanagan* captured a wealth of intelligence and tactical information. For example, Hickey found he could snort within 6000-10,000 yards of a target without detection; that trawlers steered steady courses and speeds whereas scallop draggers moved unpredictably; and that vessels moved slow enough to be shadowed submerged. He also found that when trying to approach to within a CPA of 500 yards, closing from the quarter proved the safest, most controlled approach with little risk of counter-detection or getting entangled in netting. *Okanagan* also collected intelligence about fishing procedures, the particulars of individual vessels, crew positions, as well as acoustic and ELINT profiles, all of which were added to a data base. Overall, he thought GROUSE had been an excellent training vehicle since it was "a military surveillance operation whose targets of interest just happened to be fishing vessels."

Detailed post action analyses indicated a number of areas for improvements. Not surprisingly, Hickey had strong opinions about the

command and control problems, explaining that the patrol “was a fluid response to current intelligence” that “proved to be stale and time late.” The fisheries officer “was given free rein by DFO as he saw fit, and this took the form of requests to cover large distances at best speed.” As a result, the submarine “spent a considerable number of hours snorting at 8 to 10 knots to reposition”; not the optimal surveillance posture. Observing that surface assets and *Okanagan* worked at cross-purposes, Hickey recommended that surface vessels should “bait the trap” by operating in deep water, while the submarine positioned herself at least twenty miles away in shallow water, so as to catch vessels trying to take advantage of the absence of the patrol ship. Finally, due to DFO’s adherence to a five-day, 0800-1600 routine, “if a violation is detected outside normal working hours, apprehension would have to be delayed until DFO went back to work.” Addressing these and other issues, MARLANT dispatched personnel to St John’s to work out solutions with their DFO counterparts.

Despite the obvious drawbacks, GROUSE achieved one spectacular result. In the wake of the so-called ‘Turbot War’ between Canada and Spain in the first months of 1995, a photograph of a Spanish fishing vessel taken through the lens of a submarine attack periscope dominated the entire front page of the *Toronto Sun*, a popular Canadian newspaper. The accompanying headline blared, “Canada to Spain: We’re Watching You...And This Is How We Do It!” The message seemed apparent: a Canadian submarine had been at sea monitoring Spanish fishermen. In fact, no Canadian submarine deployed to the Grand Banks during the ‘Turbot War’ and the photo had actually been taken by *Okanagan* during GROUSE. Yet, AMBUSCADE and GROUSE had demonstrated that Canada did deploy submarines on fisheries patrols, and during the Turbot dispute, MARLANT used a variety of mechanisms to convince others they had sent a boat into the area. Whether or not the ruse worked remains unknown; however, the photograph convinced the Canadian public that one of their submarines had been at sea defending their fisheries. That probably garnered the submarine service more positive publicity than it had ever received before.

AMBUSCADE and GROUSE demonstrated that submarines could bring unique capabilities to fisheries patrols. Significantly, at a time when



the focus of the Canadian people was firmly fixed on fisheries issues, submarines played a perceptible role in tackling the problem, providing a positive outcome to the navy's desire to raise their profile. Moreover, unlike patrols against Soviet submarines or other military assets, fishpats were contributions average Canadians could understand and appreciate more readily. The experience was thus 'win-win' on a number of levels.

As it was, the 'O-boats' did not carry out any more dedicated fishpats—the only other such mission was a 'drive-by' fisheries surveillance *Okanagan* performed on her way home from the UK in November 1996. The Oberons' service was winding down and the navy was making way for the new Windsor class boats acquired from the Royal Navy. Unhappily, the transition to the new boats proved immensely challenging, to say the least, and the positive public glow around submarines dissipated. Only in the last few years have Canadian submariners been able to perform operations on a sustained basis, so the navy once again faces the challenge of creating positive profile for a platform that proved so valuable in the mid-1990s.

Michael Whitby is Senior Naval Historian with Canada's Department of National Defence. This study is largely based upon documents that remain classified as well as interviews with submariners. It is excerpted from "Boomers, Draggers and Black Boxes: The Operational Legacy of Canada's Oberon class Submarines, 1985-1998", The Northern Mariner Vol. XXIII (2013), which covers the full operational history of the Oberons during that period and includes full citations; any reader wanting a copy of that study can contact the author at michael.whitby@forces.gc.ca.

CAREER DECISION - SUBMARINERS

RADM Dave Oliver, USN, Ret.

If you want to be a naval officer, you should want to be a submariner. There is more challenge. There is more responsibility. There is more opportunity. Ultimately there is more career fulfillment.

The preeminence of a nuclear submarine career is not widely understood. The critical roles the submarine plays in the national defense requires a security which does not permit gratuitous publicity. At the same time there is a lack of submariners to proselytize. There are too many essential military billets that have to be filled by someone with a submariner's knowledge and training. There are thus insufficient nuclear submariners left for recruitment. The submarine force is the "Silent Service" in more respects than is good for the Navy.

A few months ago I tried to place my submarine experience in perspective. My ship was deployed to the Western Pacific, accomplishing the multiplicity of missions that only a nuclear submarine can do. I had met all the challenges of submarine command. It was an excellent time to reflect.

Had submarines been worth my time? Would I have been better in air, surface, or as a Marine? The answer is clear to me now; however, I can remember the chance basis on which I made my own service selection. I did not have sufficient perspective then. What can I offer those people looking at a career decision now? How can I best express the tremendous sense of achievement which comes to those who can reach submarine command? This short essay is my effort to help explain "Why a submarine career?"

CAREER DECISION. Your career choice is clearly one of your life's most important decisions. How do you make a selection that will affect



your entire life? How is it possible to anticipate the future? How can you look forward to decide what you will find satisfying twenty years hence? It is hard. But it cannot be ignored. You must make a choice.

I believe there are two important aspects of service selection – first you must choose a career which will be worth your life. It must be both challenging and inspirational. Secondly the purpose of your career must be in consonance with your personal basic value system. If you do not start out in a career which permits achieving both of these goals you do not have even a possibility of fulfillment. All of us have seen men and women in their late thirties and early forties who have significantly altered their life styles, changed careers and become strangers to their pasts. These are people whose career was not worth living. These are people who had not chosen a career which held true to their basic value system. Many people waste one-half of their lives because they disregard these basic tenets. It is a modern tragedy to see someone win a prize he never really desires.

You should realize that the quality of a career is not one of deciding how best you can use your talents to achieve material gains. That which comes easy has the permanence of early morning frost. In order for you to later find your life fulfilling – you must have chosen a career big enough to challenge you. You must have chosen a task difficult enough to inspire you. Set your goals high enough so that you can earn your own self-respect.

Concurrently you must ensure the work you do is worthwhile. To whom must it be worthwhile? There is only one judge in this court. Essentially, no matter what your ability to carry-on with life, no matter what your ostensible social and financial success, you cannot hide from yourself. Sooner or later, in the quiet of self-reflection, you will judge yourself by rather simple standards – what have you done to help your family, your neighbors, your country and mankind?

A submarine career will meet your standards. A submarine career is challenging – intellectually, physically, and morally. It is a game worth playing.

SUBMARINE UNIQUENESS. In examining the submarine career I believe it is necessary to look at the Commanding Officer's billet. The

submarine commanding officer is the result of the submarine career training program. He is, in addition, the focusing lens by which the effort of his wardroom are coordinated and directed. The challenges, responsibilities, and opportunities he faces are those which are inherent to a submarine career. Why are these significantly different in submarines? Because the submarine is unique.

You probably have some understanding of the demands of the submarine's nuclear propulsion plant – the need for unyielding high standards – the requirement for continued personal training – the sacred public trust involved. What you may not yet understand is that these same demands are reflected in all aspects of submarining. This is because of the essential uniqueness of the submarine platform. The submarine can carry America's interest anywhere in the world's oceans. The submarine does not need any support. She does not need control of the seas or of the air in order for her to proceed unchallenged. When operated by real submariners, she is a silent ghost. Therefore, to maximize her advantages, the submarine normally operates in radio silence (without outgoing communications). This operating policy obviates the need to leave the hidden depths and thwarts possible detection and localization technology. As an operational consequence of this policy, the submarine is seldom required to even acknowledge an order, much less discuss any possible (mis)understanding of the order's intent.

Also as a result of this unusual method of operations, the submarine force emphasizes self-reliance, independence of thought, and a willingness to make your own decisions and take responsibility for the results. Why? It is simple. The magic of communications has permitted the President of the United States (and all lesser echelons) to enter the bridge or cockpits of other commands and to provide real time direction of the Commanding Officer's efforts. This is not true aboard submarines. Science has not been able to effectively penetrate the surface of the blue ocean. As a result, submarines continue to use the same measures used by Lord Nelson. He knew he would have only limited communications capability after the battle was joined. Therefore he talked to his Captains before the battle and trusted in their training and judgement after the battle had begun. Operational experience with submarines, from World War II to the Iranian crisis, has proven again and again that the submarine is



at its most awesome when the submarine commander is also provided this same (unusual) degree of freedom.

Challenge of Submarining. Once at sea the submarine commanding officer knows that the success of his mission is completely dependent upon him and his crew. They must traverse the wide seas completely alone and self supportive. They will be gone for months without communication. They may cruise in regions literally thousands of miles from a friendly port. They can and will receive no help, no medical aid and no spare parts. They either have what they need, can make it or can fix it. There can be no blaming of bad luck or reliance on others. Their only friend is the ocean. Yet she is an environment inherently hostile. The safety of the ship and the lives of her crew are always at hazard. This is the challenge.

RESPONSIBILITY. Since Thucydides told of the Peloponnesian Wars, the concept of the commanding officer has always appealed to our ideal of man as an individualistic leader. The uniqueness of the submarine platform produces an equally unique responsibility for the submarine commanding officer. He is in an enviable position in our modern life – he is truly master of his fate. He controls his destiny through how well he prepares himself and his ship. He controls the size of the stakes by the risks and costs he is willing to assume.

The Commanding Officer by his ultimate responsibility is correspondingly given complete control over all of the ship's resources. He controls every facet of operations and every action of the people aboard. He has no routine to limit him or behind which to hide. His requirements are not structured, his time is not regimented. All of the ship is focused through and directed by his personal efforts. He cannot escape moral and legal liability. While success is personally his, so is failure. This is responsibility.

SUBMARINE OPPORTUNITY. The third significant uniqueness of submarine command is opportunity. The opportunity exists to be a true leader – to achieve accomplishments through others. How many men ever reach a leadership position in which they have ultimate responsibility? How many men ever reach the position in which they provide the

motivation which serves as the mainspring for others? The submarine commanding officer will – before he’s forty.

At the same time if you choose this path you must personally and physically command the ship into demanding situations in which the outcome is unknown. Alone at sea, far from America’s shores, the opportunity still exists to display steadfastness and resoluteness in the same type of hostile environment which characterized the settling of the western wilderness. The opportunity still exists to do feats of skill and bravery – to win honors. You will have a once in a lifetime opportunity to truly understand yourself. Your achievement will be directly dependent upon your personal capabilities and priorities. How well have you trained yourself? How well have you inculcated your crew? What care have you paid to your submarine?

Concurrently you will determine the depth of your personal commitment. What challenges will you face and which will you turn from? What is really important to your inner self? I assure you that you will answer all of these questions during a submarine command.

What other careers can offer you, while still in your youth, the opportunity to truly know yourself? What other career will offer you the personal peace which comes through a tested knowledge of your strength? What understanding is more important than understanding yourself?

HISTORICAL SIGNIFICANCE. Less than two hundred major combatant warships make up the entire striking force of the United States Navy. Each major warship is a significant portion of the nation’s military strength. As a submarine commander, you will have one of those ships. You will have the only ship type that can go anywhere no matter what the enemy’s strength. You will have the only ship that is completely self-sufficient – the most effective weapon of war ever made – the most effective weapon for peace which the world has seen. The submarine is our nation’s cutting edge on both offense and defense. The challenge is in submarines. The responsibility is in submarines.

FULFILLMENT. What is the deeper significance of a career in submarines? It lies in the immutable pages of history. In the rise and fall of civilizations, no form of individual liberty or government has ever been



safe from ravage. The teacher, the farmer, the statesman, are all necessary. The defender is essential. The Commanding Officer of a submarine is directly, personally, and significantly involved in the maintenance of this nation's defense, a defense which is the key to the balance of power that holds the world at peace. Can there be many careers which contribute more to the common good?

Challenge, responsibility, opportunity. Know yourself. Display courage. Serve mankind. Submarine career.

D. R. Oliver, Jr.
Commanding Officer
USS *PLUNGER* (SSN 595)
17 September 1980

STATES PUT TO SEA

Mr. Dick Brown

Last man down — hatch secured — prepare to dive! Make your depth one-five-zero feet. Dive! Dive!

As we dive deeper and deeper into the 21st Century, we continue to maintain our nation's undersea supremacy by deploying the world's most awesome submarines.

Our nation was born in a noisy war of muskets and cannons. Today we have exceptionally quiet undersea platforms, armed with torpedoes and missiles, ready at a moment's notice. We take great pride in these platforms — these silent sentinels of the deep — as they proudly carry our state names wherever they go. In the past, state names have been used for battleships and some cruisers, then for our Trident missile submarines, and now for our Virginia-class attack submarines, including one held dear and deep in the hearts of Texans.

TEXAS (SSN-775) was named by Secretary of the Navy (SECNAV) John Dalton and commissioned in Galveston, Texas. Her ship's sponsor is former First Lady Laura Bush. There is a set of eight-foot longhorns onboard to remind the crew of its Texas heritage and home state community support. In 2009, *TEXAS* made history during her east-west Arctic transit to Hawaii by being the first VA-class to surface through the ice. There she paused long enough to hold a re-enlistment ceremony for 12, a Dolphins pinning ceremony for one, and a touch football game for many. Texans by their very nature are a proud bunch. The legendary Admiral Chester Nimitz, a native Texan and an early submariner, after accepting Japan's unconditional surrender, commented that his greatest fear during negotiations was that he would not be able to persuade Texans to stop fighting!

The people of the Aloha state hold a special place in their hearts for the Navy. This is why SECNAV Richard Danzig selected the name *HA-*



WAI for SSN-776, our third VA-class and the first commissioned vessel to carry the name of our 50th state. Hawaiians descend from sea-going Polynesians who sailed the same waters as *HAWAII* sails today. The ship's sponsor is former Hawaii Governor Linda Lingle. The ship's christening included a kahuna's traditional Hawaiian blessing. *HAWAII* is the 100th nuclear submarine built by Electric Boat. A few months before *TEXAS* made her Arctic transit, *HAWAII* also made an east-west transit — through the Panama Canal and awarded Dolphins to three sailors while in the locks. She arrived in her homeport of Pearl Harbor in time for the 50th anniversary of Hawaii statehood. At *HAWAII*'s change-of-command ceremonies a Hawaiian warrior spear — Ihe Koa — representing both the fighting spirit of the Hawaiian people and the undersea warriors of the boat is passed along to the incoming Commanding Officer. With the ship's motto Kupale Aina meaning Defending the Land, *HAWAII* serves to protect our interests in the Pacific.

The ship's motto for *TENNESSEE* (SSBN-734), our 9th fleet ballistic missile submarine, is America at its Best and that motto is shared by the state of Tennessee. She is getting up in years but in her younger days *TENNESSEE* became the first SSBN capable of firing the Trident II D-5 missile. Submarine duty is voluntary and it is most appropriate that we have a submarine named for the Volunteer State, with volunteers like Andrew Jackson, Sam Houston and Daniel Boone — all of whom were honored with Polaris submarine names. *TENNESSEE* completed the Submarine Force's 3000th strategic deterrent patrol in 1992. Considering Regulus, Polaris/Poseidon and Trident patrols, that's very impressive!

As the United States geared up for its Bicentennial celebrations, SECNAV William Middendorf championed a replacement for the aging fleet ballistic missile submarines — the famed “41 For Freedom” boats. It is during his tenure that *OHIO* (SSBN-726) became the lead ship in a new class of submarine that carried the Trident missile. Admiral Hyman Rickover noted that “*OHIO* should strike fear in the hearts of our enemies”. The ship's sponsor is Annie Glenn, wife of the late Senator John Glenn. *OHIO* was converted to SSGN at Puget Sound Naval Shipyard and now the 36-year old submarine is capable of carrying Tomahawk cruise missiles and Navy SEALs.

Eighteen Ohio-class boomers were commissioned over a 16-year period. One of them is *MARYLAND* (SSBN-738), now a quarter century old, and sponsored by Admiral Charles Larson's wife Sally. In a way, the journey for a new state namesake begins in the state sharing its name, enabling a connection between its citizens and the officers and crew. The Navy is extending the life of the Trident II D-5 missile and the first two were recently integrated into *MARYLAND*'s arsenal. Before there was a submarine named after Maryland, there was a cruiser and then a battleship.

By law, battleships had to bear state names. However some cruisers were also named after states. As battleship construction progressed, the Navy began to run out of state names, just as it is today running out of state names for VA-class submarines. To comply with the law, cruisers were renamed for cities within their states, thus freeing state names for more battleships. For example, cruiser *MARYLAND* became *FREDERICK* in 1916, freeing the name for BB-46. By the 1920s, state names were reserved exclusively for battleships. Most of our boomers had state-named battleship predecessors.

VIRGINIA (SSN-774) is the lead ship in the newest generation of attack submarines. She was named by SECNAV John Dalton after the maritime state that is home to one of our two remaining submarine-building shipyards. In naming a submarine after a state, a special bond between the state and its namesake is formed. *VIRGINIA* was commissioned in her home state by ship's sponsor Lynda Johnson Robb, wife of former Virginia governor and Senator Charles Robb and daughter of former President Lyndon Johnson. The lead ship in the 4-submarine Block I contract is already 13 years old. *VIRGINIA* was selected as one of the first attack submarines to integrate female sailors into ship's company.

WEST VIRGINIA (SSBN-736) honors the mountain state of west of Virginia, in fact, the ship's motto, *Montani Semper Liberi*, means Mountaineers Are Always Free. The ship's sponsor is Erma, wife of the late Senator Robert Byrd. There is a very special bond between the submarine and the West Virginia Children's Home which provides social services to youth ages 12 to 18 years old. Some of the *WEST VIRGINIA*'s interior décor features memorabilia contributed by the West Virginia University Mountaineers.



Our VA-class submarines are being jointly constructed by General Dynamics Electric Boat and Huntington Ingalls Industries-Newport News Shipbuilding with assembly in alternating shipyards. *NORTH CAROLINA* (SSN-777) was named by SECNAV Richard Danzig and constructed in Newport News. Her ship's sponsor, Admiral Frank "Skip" Bowman's wife Linda, commissioned our fourth VA-class in her home state, not far from battleship *NORTH CAROLINA*. Some teak wood from BB-55 has been recycled and inlaid in select locations of the submarine's deck such as just inside the skipper's stateroom.

STRATCOM has a highly coveted award for excellence in strategic deterrence. It is called the Omaha Trophy and is awarded annually in the categories of strategic bombers, Minuteman ICBMs and Ohio-class fleet ballistic missile submarines which comprise our strategic nuclear deterrent triad. Since 1994, ten of our boomers — the sea-based leg of the triad — have won this prestigious honor; namely, *ALABAMA*, *ALASKA*, *FLORIDA*, *KENTUCKY*, *LOUISIANA*, *MARYLAND*, *NEBRASKA*, *PENNSYLVANIA*, *RHODE ISLAND* and *WYOMING*. But *ALASKA* has been honored the most, winning the Omaha Trophy in 2005, 2011, 2012, 2014 and 2016. It is interesting to note that three of the four Navy Admirals who have been STRATCOM commanding officers have been submariners. They are Admirals Hank Chiles (1994-1996), Richard Mies (1998-2002) and Cecil Haney (2013-2016).

The boomer *PENNSYLVANIA* (SSBN-735), now 28 yrs old, has distinguished herself by achieving several major milestones. In 2005, a year after winning the Omaha Trophy, she completed her 50th patrol and spelled out the news with an on-deck crew formation in whites. In 2014 her Gold crew made the longest patrol to date — a record 140 days! *PENNSYLVANIA*'s ship's sponsor is SECNAV H. Lawrence Garrett's wife Marilyn.

One of our submarines came under attack in the Arctic in 2003. *CONNECTICUT* (SSN-22), one of three Seawolf-class, surfaced through the ice and encountered a hostile polar bear that proceeded to gnaw on the ship's rudder. *CONNECTICUT* returned to the Arctic for ICEX-2011, presumably with a polar bear watch stationed. As former Connecticut Governor John Rowland's wife and ship's sponsor Patricia knows, a close partnership with its namesake submarine is highly important to the

state, especially a state like Connecticut that is home to our other submarine-building shipyard.

Our 5th VA-class and lead ship of the 6-submarine Block II contract, *NEW HAMPSHIRE* (SSN-778), also participated in ICEX-2011. Inspired by a bunch of letter-writing elementary school children, she was named by SECNAV Gordon England. New Hampshire has the shortest coastline of any state bordering on the sea so she was commissioned in the Navy's first shipyard — Portsmouth Naval Shipyard in Kittery, Maine which was established in 1800 and built its first submarine in 1917. *NEW HAMPSHIRE*'s sponsor is Cheryl McGuinness, widow of American Airlines co-pilot Thomas McGuinness who on 9/11 was forced to fly flight 11 into New York's Twin Towers. At commissioning, Cheryl emphasized the new submarine's mission in the War on Terrorism.

RHODE ISLAND (SSBN-740) had to wait ten hull numbers. Although the keel for SSBN-730 was laid as *RHODE ISLAND*, hull 730 was renamed to honor Senator Henry Jackson who died suddenly in office. Rhode Island is recognized for its maritime heritage and the pride it takes in forging strong bonds with the ship's Blue and Gold crews. The *RHODE ISLAND* ship's sponsor is Kati Machtley. The submarine was the first Trident to be commissioned at home, in this case, Newport, Rhode Island.

NEW MEXICO (SSN-779) was named by SECNAV Gordon England after being besieged by thousands of letters from the Land of Enchantment. The ship's sponsor is Admiral Ed Giambastiani's wife Cindy. The keel ceremony featured a blessing in the Navajo language by a Navajo Code Talker. The ship's motto is in Spanish, *Defendemos Nuestra Tierra*, the galley specializes in New Mexico cuisine, the state theme is instilled in the living quarters décor and the commanding officer for PCU *NEW MEXICO* was a native New Mexican — all emphasizing the state's tri-culture. After ICEX-2014, *NEW MEXICO* became the first VA-class to surface at the North Pole and there she conducted a burial-at-sea for a WWII combat submariner.

At the opposite end of the planet, in 2002, *MAINE* (SSBN-741) deployed below the Antarctic Circle. Then she really crossed the line in 2011 by transiting the Arctic Circle, always a navigational milestone where submarines enter the northern domain of the polar bear. A special



ceremony inducted the crew into the Order of the Blue Nose. *MAINE*'s ship's sponsor is former White House Chief of Staff Thomas McLarty's wife Donna. This boomer is known for long patrols — completing a 96-day patrol in 2008 and a 105-day patrol in 2010. The ship's crest has 23 stars as the 23rd state; 16 beams of light from a lighthouse represent Maine's 16 counties and *MAINE* being the 16th Trident submarine.

ALASKA (SSBN-732), appropriately, has also ventured north. She celebrated the Fourth of July in 1987 in her honorary homeport of Seward, Alaska. Besides winning many STRATCOM Omaha Trophies, *ALASKA* in 2014 became the first SSBN to ever win the Atlantic Fleet's Battenberg Cup for operational excellence. Her ship's sponsor is the venerable Senator Ted Stevens' wife Catherine.

MISSOURI (SSN-780) was named by SECNAV Donald Winter to honor a state known for continuous support of the military. The ship's sponsor is former SECDEF Robert Gates' wife Rebecca. There is another famous Missouri namesake, Mighty Mo, the legendary BB-63 that served as the venue where Admiral Nimitz and General MacArthur accepted the unconditional surrender of the Japanese in 1945. Missouri is the Show-Me State — Missourians don't just want to be told about a submarine named after their state, they want to be shown submarine *MISSOURI*, and of course they have had several occasions to see her during construction milestone ceremonies.

Many of our VA-class boats have been commissioned and have been in service for some time. Others are nearing completion but are not yet wet. Others have been named but their pressure hulls are still taking shape in the two shipyards. And yet four hulls; namely, SSN-802, SSN-803, SSN-804 and SSN-805 have been authorized for construction but at this writing (August 2017) have yet to be named.

MISSISSIPPI (SSN-782) was named by SECNAV Donald Winter as a salute to the state's long-standing shipbuilding tradition and the people's indomitable fighting spirit — together an inspiration to all sailors who embark on the Mighty *MISSISSIPPI*, and by the way, get to enjoy Mississippi cuisine. She was commissioned at home in Pascagoula, whose shipyard constructed 13 nuclear submarines from the mid-50s to the early 70s. The principal address was presented by former Mississippi Governor (and SECNAV) Ray Mabus. The ship's sponsor is Deputy

Assistant SECNAV Allison Stiller. The ship's crest appropriately includes an alligator — *MISSISSIPPI* can attack in the water and on land — like a gator.

Mississippi's eastern neighbor has been honored with a namesake boomer for 32 years. *ALABAMA* (SSBN-731) has been seen by everyone who has seen the 1995 movie *Crimson Tide* — that was her in the movie's outbound diving scene as the soundtrack played The Navy Hymn. Her ship's sponsor is Congressman William Dickinson's wife Barbara. *ALABAMA* completed the Navy's 100th Trident patrol in 1988. Her crew survived Pacific Shellback initiations in 1986 and 1989.

CALIFORNIA (SSN-781) was named by SECNAV Donald Winter after the Golden State to honor the many Californians serving in today's armed forces. The selection of this state name is a most fitting tribute to its long-standing support of the Navy, including Naval Station Point Loma in San Diego and former Mare Island Naval Shipyard in Vallejo, our first naval base on the Pacific coast. *MINSY* built many diesel boats during WWII, and seventeen nuclear submarines, including seven boomers, during the 50s and 60s. *CALIFORNIA*'s motto is *Silence is Golden* and her ship's sponsor is Admiral Robert Willard's wife Donna. On commissioning day, it rained on *CALIFORNIA*'s parade. The ceremony took place in a hangar at Naval Station Norfolk while the submarine, moored a mile away, weathered a ferocious nor'easter.

As the Soviet threat evaporated and the Cold War ended, we reduced our ballistic missile fleet from 18 to 14. Consequently, our four oldest Ohio-class ballistic missile submarines underwent extreme makeovers to provide unprecedented covert strike and special operations mission capabilities. They were converted to guided missile submarines, underwent mid-life refueling and a life extension from 30 years to 42 years, and returned to service as SSGNs during the period 2006-2008. Each SSGN can carry 154 Tomahawk cruise missiles and 66 Navy SEALs.

MICHIGAN (SSGN-727) was commissioned as our second Ohio-class SSBN. Her ship's sponsor is Mrs. Margaret Nedzi. Like *OHIO*, she was converted to SSGN at Puget Sound Naval Shipyard and returned to service in 2007. Ten years later *MICHIGAN* docked in Busan, South Korea as a show of force at a time of heightened tensions with North Korea. She is 35 years old. It is interesting to note that submarine *MICHI-*



GAN is hull 727 and battleship *MICHIGAN* was hull 27.

FLORIDA (SSGN-728), now 34 years old, was converted from SSBN to SSGN at Norfolk Naval Shipyard, recommissioned and returned to service in 2006. Her ship's sponsor is DEPSECDEF Frank Carlucci's wife Marcia. Florida loves the ocean; there is no point in the state more than 100 miles from deep water. Florida's Naval Ordnance Test Unit at Port Canaveral is a busy center for submarine operations. In response to Chinese missile testing in the contested East China Sea, *OHIO*, *MICHIGAN* and *FLORIDA* all surfaced simultaneously in the waters off the Philippines, South Korea, and the British Indian Ocean Territory, respectively.

GEORGIA (SSGN-729), our 4th SSBN, is named for our 4th state. Former First Lady Rosalyn Carter stepped up to the plate and presided over the keel authentication ceremony. The ship is sponsored by Admiral James Watkins' wife Sheila. After 65 deterrent patrols, *GEORGIA* was converted from SSBN to SSGN at Norfolk Naval Shipyard and returned to service in 2008. Presently the 33-year old submarine is homeported in her namesake state.

LOUISIANA (SSBN-743), our 18th and last boomer, is named for our 18th state, and accordingly, there are 18 stars in the ship's crest — a crest replete with crawfish and pelican symbols which serve as reminders to the crew of their strong bond to the people, culture and history of Louisiana. Her ship's sponsor is Patricia O'Keefe. *LOUISIANA* may be our youngest boomer but she is already 20 yrs old.

Just as the Ohio-class replaced our aging Polaris/Poseidon missile submarines, the need is coming for an Ohio Replacement Program. The *COLUMBIA*, named after the District of Columbia, now in the advanced procurement phase, will be the lead ship. ORP calls for a new fleet of 12 ballistic missile submarines, with *COLUMBIA* deploying around 2031.

Our 10th VA-class hails from the land of 10,000 or so lakes and its ship's crest, to the delight of her undersea warriors, includes a Viking warrior. *MINNESOTA* (SSN-783) was named by SECNAV Donald Winter in 2008 to honor the state's citizens and their non-stop support of our military. Her ship's sponsor is Admiral Gary Roughead's wife Ellen. SECNAV Ray Mabus was the keynote speaker at the commissioning ceremony. Like her sister ship *VIRGINIA*, *MINNESOTA* was selected to

integrate female sailors into ship's company. Crew members visiting the state have raved about the pride Minnesotans have taken in the submarine named after their state.

NORTH DAKOTA (SSN-784), the lead ship in the 8-submarine Block III contract, was named by SECNAV Donald Winter after a hard-fought naming campaign waged from Bismarck. Block III submarines have a reconfigured bow that houses 12 Tomahawk cruise missiles loaded in tubes similar to SSGNs, six in each of two Virginia Payload Tubes. In July 2017, in the spirit of the Old West, *NORTH DAKOTA* fired two Tomahawks — the first to exercise her twin six-shooters!

In June 2016, *NEVADA* (SSBN-733) celebrated the 30th anniversary of her commissioning. Nevadans take great pleasure honoring the history and heritage of their namesake boat and her crew members who sacrifice so much defending our freedoms. Her ship's sponsor is former Senator Paul Laxalt's wife Carol. *NEVADA*'s motto is simply Silent Sentry, just as simple as her namesake's nickname — the Silver State.

In Nebraska, there is tremendous support for *NEBRASKA* (SSBN-739). There, Cornhuskers work hard in honoring the legacy of their namesake boomer. In a recent crew visit, *NEBRASKA* sailors attended a College World Series game hosted by the Big Red Sub Club, Nebraska Land Days festivities in North Platte, an event sponsored by the Nebraska Admirals Association in Kearney, and a visit to STRATCOM in Omaha. *NEBRASKA* is our 14th SSBN and battleship *NEBRASKA* was BB-14. The ship's sponsor is former Senator James Exon's wife Patricia. *NEBRASKA* was the first Ohio-class to visit Europe and Halifax, Canada.

The Honorable Raymond Mabus, former naval officer, ambassador to the Kingdom of Saudi Arabia, Mississippi Governor, and our 75th Secretary of the Navy, had one of the longest SECNAV tenures in recent history (2009-2017). In 2012, SECNAV Mabus announced plans to name five VA-class after the states of Illinois, Washington, Colorado, Indiana and South Dakota.

ILLINOIS (SSN-786) was named in a ceremony at Chicago's Navy Pier, not far from the Great Lakes Naval Training Center. As the ship's sponsor, former First Lady Michelle Obama christened *ILLINOIS* on the third whack of a seemingly unbreakable champagne bottle.



WASHINGTON (SSN-787) was named to recognize Washington's significant Navy presence, in fact, the third largest fleet concentration in the country, with Puget Sound Naval Shipyard and Naval Base Kitsap-Bangor. In a way, *WASHINGTON*'s keel ceremony was a family affair as SECNAV Mabus introduced his oldest daughter Elisabeth as the ship's sponsor.

COLORADO (SSN-788) was named at the State Capitol in Denver. SECNAV Mabus' second oldest daughter Annie is the ship's sponsor. At christening she smashed a bottle of sparkling Colorado wine against the hull. Following New Mexico's lead, Colorado Navy Leaguers have done a magnificent job of instilling a Rocky Mountain theme in *COLORADO*'s crews mess.

Indiana was honored by our 16th VA-class. *INDIANA* (SSN-789) pays tribute to all Hoosiers who have served, or are serving, in the Navy. Admiral Kirkland Donald's wife Diane is the ship's sponsor. Vice President Mike Pence, who previously served as the 50th governor of Indiana, delivered the christening ceremony's principal address. It was a rather emotional experience for him to see the Indiana flag fluttering just below the American flag in Newport News. He commented that "USS *INDIANA* is a worthy inheritor of the name and legacy of our state. More than 100 Hoosier businesses have contributed to this boat's creation."

SOUTH DAKOTA (SSN-790) was named in a ceremony at the Battleship South Dakota Memorial in Sioux Falls. The naming has become a fitting tribute to battle-scarred BB-57, a highly decorated warship of World War II, and great source of pride for all South Dakotans. Army General Martin Dempsey's wife Deanie is the ship's sponsor. *SOUTH DAKOTA* is serving as a prototype for maintaining acoustic superiority.

Just to the west of South Dakota lies Wyoming. In 2009, the Trident submarine *WYOMING* (SSBN-742) had the honor of completing our Submarine Force's 1000th Trident patrol. Wyoming was the first state to approve women's suffrage legislation in 1869, then first to have a woman justice of the peace, then first to select women jurors and now its namesake submarine is one of the first to allow women in submarines. The crew love to visit the state during Cheyenne Frontier Days. *WYOMING* is 21 years old which happens to also be the average age of her crew. Her ship's sponsor is Admiral William Owens' wife Monika.

KENTUCKY (SSBN-737) was christened by Carolyn Hopkins with a bottle of custom blend Kentucky bourbon. The ship's sponsor is the wife of former Congressman Larry Hopkins. Kentucky serves as an extended family to the crew, for example, its Thoroughbred Sub Club provides liaison between the submarine and the state.

In November 2012, SECNAV Mabus chose the name Delaware to honor the long-standing relationship between the Navy and our nation's first state. The first ship named after the state was a frigate launched in 1776. The ship's sponsor for *DELAWARE* (SSN-791) is former Second Lady Jill Biden.

In April 2014, the Navy awarded a historic \$17.6 billion multi-year contract to Electric Boat to support the acquisition of 10 Block IV Virginia-class submarines. *VERMONT* (SSN-792) was named by SECNAV Mabus that September and is the lead ship in Block IV. Harvard President Drew Gilpin Faust is the ship's sponsor. The following month, SECNAV named our 20th VA-class *OREGON* (SSN-793). The ship's sponsor is Admiral John Richardson's wife Dana.

NEW JERSEY (SSN-796) was named by SECNAV Mabus in Jersey City in May 2015 to meld the submarine's fighting spirit with the state's pride in its awesome heritage. John Philip Holland, the Irish engineer, designed and built the Navy's first submarines in Elizabeth, New Jersey, the very first commissioned submarine being USS *HOLLAND* (SS-1).

SECNAV Mabus named *IDAHO* (SSN-799) in August 2015 at the Western Idaho Fair in Boise. The state is known for its Farragut Naval Training Station that operated during WWII as the second largest recruit training center. Idaho has taken great pride in serving as the home of the Naval Reactors Facility located within the Idaho National Laboratory, and the fact that nearly 40,000 Navy personnel have been trained in surface and submarine nuclear power plant operations. On the same naming road trip, in Ames, Iowa, SECNAV named our 24th VA-class *IOWA* (SSN-797) to honor the history its namesake state has with the Navy. Iowa is home to former Naval Air Station Ottumwa.

On another road trip in September 2015, SECNAV Mabus hosted a double naming ceremony. He named *MONTANA* (SSN-794) and littoral combat ship *BILLINGS* as "enduring reminders of the service and sacrifice made by generations of Montanans who have always been first in



line to volunteer for service.” The Navy tried to honor Montana twice before but, as they say, third time’s a charm: battleship *MONTANA*’s keel was laid in 1918, but the post-WWI Washington Naval Treaty limited the size of America’s fleet and construction on BB-51 was canceled; then in 1940 the Navy authorized the Montana-class battleships, with a flagship designated BB-67. Those plans were also scrapped. Submarine *MONTANA*’s ship’s sponsor is Senator Jon Tester’s wife Sharla.

MASSACHUSETTS (SSN-798) was named by SECNAV Mabus in November 2015 and Facebook’s chief operating officer, Sheryl Sandberg, was designated the ship’s sponsor. Next came *ARKANSAS* (SSN-800), named in January 2016. Mabus served aboard the now-decommissioned cruiser named for Arkansas’s capital city.

Also in January 2016, SECNAV Ray Mabus named his 16th VA-class *UTAH* (SSN-801), thus completing the naming of all Block IV submarines. It happens that area code 801 covers much of the area along the Wasatch Range including Salt Lake City. Mabus designated his youngest daughter, Kate, as *UTAH*’s ship’s sponsor.

The Honorable Ray Mabus was the longest-running Navy Secretary since WWI. His naming 16 VA-class submarines, six in Block III and 10 in Block IV, is quite impressive, and all but one were named after states. SECNAV Mabus honored the Father of Our Nuclear Navy by designating one of the Block IV submarines *HYMAN G. RICKOVER* (SSN-795). The announcement came on the 60th anniversary of *NAUTILUS* (SSN-571) which radioed on January 17, 1955 “Underway on nuclear power”. A decommissioned LA-class submarine, hull SSN-709, had also been named in honor of the venerable Admiral Rickover.

Starting in 2019, the Virginia-class boats will be stretch versions to accommodate a Virginia Payload Module, an added hull section, 85 feet or so long, to provide additional Tomahawk missile capacity. Block V boats will house four additional launch tubes, each carrying seven Tomahawks, replacing the payloads of our four aging SSGNs — and just in time. The plan is to offset losses in our Tomahawk arsenal that are inherent to the phased retirement of our current SSGNs. With two six-shooters in the bow and four VPMs aft of the sail, the cruise missile payload for Block V boats becomes 40. There is the added possibility for carrying larger weapons in the future and even undersea vehicles.

In summary, as of this writing, 44 states have namesake submarines (17 boomers and 27 attack boats). The six remaining states are Arizona, Kansas, New York, Oklahoma, South Carolina and Wisconsin, all of which at one time were honored with namesake battleships.

Dick Brown is a member of USSVI's Holland Club, a life member of the Navy League and former chairman of the USS New Mexico (SSN-779) Commissioning Committee. As a long-time member of the Naval Submarine League, he is a frequent contributor to The Submarine Review.



**INTERVIEW WITH LIEUTENANT COMMANDER
DIMITRIOS PAPAGRIGORAKIS, HELLENIC NAVY
COMMANDING OFFICER HS MATROZOS (S 122)**

Conducted by Capt. Edward Lundquist, USN, Ret.

Hellenic Navy Lieutenant Commander Dimitrios Papagrigorakis is the commanding officer of the Type 214HN diesel electric attack submarine HS MATROZOS (S 122), which was commissioned in March of 2016, and is the newest of the 11 submarines of the Hellenic Navy.

Lundquist: Tell me about your ship, and how she is intended to operate.

Papagrigorakis: This submarine is designed for both littoral and open sea operations. She is a diesel-electric submarine, fitted with a fuel cell capability which increases our capacity to stay submerged for a long period of time. Her state of the art sensors allow for stand-off targeting while remaining undetected. The installed sophisticated equipment (I-band radar, bow and flank array sonar, TIMNEX II ESM system) are integrated with the ISUS 90 weapon control system, thus providing enhanced operational and fighting capabilities. Moreover, our state of the art communications system in conjunction with our sensors (periscopes, optronic mast) has increased our capability to acquire an improved tactical maritime picture in extensive areas of operations in the Aegean Sea and beyond.

Lundquist: When you're operating and detect a potential threat, do you go into a stealth mode, hide on the bottom, or find someplace and wait? Or do you prosecute the attack and try to move in?

Papagrigorakis: It is well known that the main advantage of a submarine, by default, is the ability to avoid detection while operating. Therefore, depending on the nature of our mission (anti-ship, anti-submarine) we

conduct a variety of tactics with the main purpose to surprise our opponent, while exploiting the environmental factor (weather, sea bed condition, sound propagation, geography etc).

Lundquist: I would imagine that the Aegean being your home waters, you have done a lot of hydrographic studies of the bottom.

Papagrigorakis: It is true, we are highly familiarised with the environment and its particularities.

Lundquist: And hopefully you know more than anyone else, so that becomes an advantage you can exploit.

Papagrigorakis: I couldn't agree more.

Lundquist: Have you operated outside the Aegean?

Papagrigorakis: Yes, of course. The Hellenic Navy submarines operate seamlessly within NATO and the EU, thus continuously supporting the wider effort of Maritime Security in our region. In this context, we participate in NATO and EU Operations, such as Operation Sea Guardian (ex – Active Endeavour), and European Union Operation EUNAVFORMED – SOPHIA. Our units operate in Aegean Sea as well as in Mediterranean Sea and wherever is necessary in order to support our national interests.

Lundquist: This is a new submarine with improved capabilities. Is this an opportunity to develop some new tactics?

Papagrigorakis: Indeed, we are in the process of such a development. Improved capabilities of type 214 submarines provide us the opportunity to explore new tactics including cooperation with Special Operation Forces (SOF) and Intelligence, Surveillance and Reconnaissance (ISR) operations. and covert mine-laying operations.

Lundquist: Have you worked with unmanned vehicles?



Papagrigorakis: We are considering this option as a future project.

Lundquist: Do you train with other navies?

Papagrigorakis: We participate in a considerable number of national, multinational and NATO exercises. Hellenic Navy Submarines participate in respective major NATO submarine exercises, such as MANTA type. Additionally, we conduct exercises in bilateral and multilateral level with allies and partners such as the exercises “NOBLE DINA” with USN and Israel Navy and “MEDOUSA” with Egyptian Navy.

Lundquist: Do you have the ability to communicate while submerged?

Papagrigorakis: Yes, as most conventional submarines.

Lundquist: How do you approach the mine threat?

Papagrigorakis: We employ numerous tactics in order to reduce the risk but always we consider that we operate in a multi-threat environment, including mine danger. We also take advantage of any known national and allied information concerning SDAs and other intelligent information from our respective Mine Warfare Data Center.

Lundquist: Would you be determining the presence of mine-like objects and avoid them, or try to counter or neutralize them?

Papagrigorakis: As a submarine, we don't neutralize mines, we just avoid them.

Lundquist: How often do you get to conduct live-fire exercises?

Papagrigorakis: We conduct such exercises on a regular basis, according to Hellenic Fleet operational training schedule. These live firing exercises include firings of torpedoes at a surface target.

Lundquist: You have commanded both a Type 209 submarine and now

a 214. What's the biggest difference?

Papagrigorakis: Allow me to highlight that the Type 214 is a whole new generation submarine, notwithstanding that both types have a similar design philosophy. The biggest differences are the acoustic and the optical sensors; our ability to detect an enemy at greater distances; our ability to remain submerged without breaking the surface for any reason for longer periods of time; and our improved communications, which are very important for the modern operations. I think these three attributes are the most important.

Lundquist: How big is your crew?

Papagrigorakis: My crew consists of 5-6 officers and about 40 petty officers and warrant officers.

Lundquist: Does the Hellenic Navy have conscription?

Papagrigorakis: Yes. Conscripts serve for 12 months.

Lundquist: How would you describe your crew?

Papagrigorakis: My crew is my second family. Taking into consideration that life in a submarine, especially during deployment, is anything but normal and everyone relies entirely on each other, we consider ourselves as a "brotherhood", members of an exclusive club. The bonds between my crew are very tight, and during our common service we have made lifelong friendships here. Mutual support and helping each other in a day to day routine is a matter of course in my crew. Moreover, my crew consists of well trained and qualified naval personnel, dedicated to the profession, devoted, with deep knowledge of their assigned duties, and make me feel comfortable and proud to be part of this crew.

Lundquist: What kind of job can you expect to get after this command assignment?



Papagrigorakis: I think that after this submarine's command assignment; I will probably be assigned as a staff officer, ashore. Although I believe that being Commanding Officer of a submarine is one of the most honorable assignments in the Navy, I consider this as an opportunity to use the knowledge have acquired all these years in order to serve navy from a different post, on a higher level.

HS MATROZOS (S-122)

Displacement: 1,690 t surfaced / 1,860 t submerged

Length: 213 feet 3 inches (65 m)

Beam: 20 feet 8 inches (6.3 m)

Draft: 19 feet 8 inches (6 m)

Weapons: 8 x 533 mm torpedo tubes, 4 sub-launched Harpoon-capable

Diesel engines: 2 x MTU 16V-396 (3.96 MW)

Mission endurance: 12 weeks

Submerged endurance without snorkelling: 3 weeks

Operating depth: Greater than 250 meters

THE USS *DALLAS*: WHERE SCIENCE AND TECHNOLOGY COUNT

Mr. Lester Paldy

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There are places where proficiency in science and technology is an immediate life or death matter. The USS *Dallas*, SSN 700, a fast attack submarine based in New London, Connecticut, is one of them. I had the privilege of touring the submarine at its home port recently to get a better understanding of its working environment and learn about career opportunities in the submarine service for university students of science and engineering.

Naval Submarine Base New London is on the Thames River, just a short drive north from U.S. 95 along the east coast of Connecticut. During our visit, several of the Navy's Atlantic fleet of fast attack submarines were at the base for repairs and refitting after completing patrols that may keep them underwater for months at a time. Adjacent to the base is the Submarine Force Museum and the Historic Ship *Nautilus*, the first submarine to transit the North Pole. Both of these immaculately maintained facilities are open to the public and free. The base, of course, is closed to the public with layers of security protecting the piers where the submarines dock. Visitors get an immediate impression that that this is a no-nonsense, zero-tolerance for error, environment.

On the day of our visit, our hosts drove us to the pier to board the *Dallas* where we met the submarine's senior enlisted man, better known as "Chief of the Boat." (Unlike sailors in the surface Navy, submariners call their vessels "boats.") The Master Chief bears a large part of the responsibility for coordinating the work of the *Dallas's* 130 enlisted crewmen. Women officers now serve on both fast attack submarines and the larger ballistic missile submarines, and the Navy has begun to train



enlisted women for submarine duty. The *Dallas* is an older boat but newer Virginia-class attack submarines will accommodate mixed-gender crews more readily.

Our pier-side conversation with the Master Chief gave us the impression that he would rise to senior management in any civilian organization. He was proud of the diversity in race, ethnicity, and backgrounds of his crew and extolled their ability to work as a team. It was obvious to us that he was deeply dedicated to his boat's mission, and we left knowing that we had met a remarkable leader.

The interior of the *Dallas* is tight, utilizing every space. The array of technology required to operate it is remarkable. Its nuclear reactor powers the submarine's propulsion system, provides the electric power required to distill fresh water and produce oxygen, and operate its myriad systems. (Naval reactors use highly enriched uranium but there are efforts underway to design naval reactors using low-enriched uranium to prepare for the possibility that nations may someday agree to ban the production of highly enriched uranium that can also be used for nuclear weapons.) With nuclear power, the length of time the *Dallas* can remain submerged is limited only by the amount of food it can carry.

On the day of our visit *Dallas* crew were reviewing training manuals and checking equipment. They clustered around the control systems used to maintain course and depth, monitor the boat's interior and exterior environment, and power its weapons and defensive systems. Fire prevention and control is high priority requiring frequent drills. Our guide showed us a wall-mounted bracket holding two valve wrenches required to operate a seawater fire extinguishing system and said that if one wrench is out of place, the crew would be alerted and take immediate action. There is no allowance for error or tolerance for deficiencies in a submarine environment. Few university science laboratories achieve that standard in their safety practices.

The submarine's formidable technology would impress any observer but the attitudes and seriousness displayed by crewmen as they pursued their assigned work activities were just as impressive. We left the *Dallas* feeling humbled and proud of the submariners who serve on it, and proud of a democratic nation with men and women volunteering to serve in such a spartan and dangerous environment.

Would it be possible to develop an introductory university science class that generated a similar intensity of purpose and esprit? Perhaps one could try to develop a course on “submarine science and technology” designed around the technologies on display in the *Dallas* with students assigned as “crew” tasked to understand and operate the *Dallas*’ systems. The content is built in: physics, chemistry, biology, computer science, oceanography, and engineering.

Students who wanted to do more could explore the psychology of crew selection, training, and morale maintenance in close quarters. They could study the role of the submarine force in the nation’s deterrent and power projection capabilities. Grades may not motivate as much as the need to work in an unforgiving environment but students might get a better sense of the value of technical competence, discipline, and dedication to mission in the world beyond the confines of the university.

HAMMERHEAD

Author: CAPT John Eldridge, USN, Ret.

Once upon a midwatch dreary, while I nodded bleak and bleary
Over many a midwatch that had passed for me before
Suddenly there came a banging, little more than common clanging,
nonetheless a new haranguing
Haranguing me at ten to four
Only that to break the bore

This new sound that came to flaunt me, probably harass and haunt me
Grew in size and magnitude nearing that of a dull roar
Now I noticed a vibration, quite unlike a known sensation, causing me some
great frustration
Here on watch at five to four
Drowsiness I had no more

As I looked at my surroundings searching for this noise astounding
I noticed that the port TG had come apart both aft and fore
As I watched the rotor turning, everything near by was churning,
Maneuvering was now just learning
From my report they knew the score
"The port TG was lost at four."

It carved a path of great destruction, slowing down for no obstruction
It now was moving forward.... the bromide was to be no more
There was a sound not far from thunder, 6SB was ripped asunder
approaching nearer would be a blunder
I kept my distance at Maneuvering's back door
My eyes were fixed on the scene before

The bromide stood its ground quite firmly, swaying little and holding sternly
The port TG had taken on a foe that it could not ignore
In the glances I could snatch, the bromide stood without a scratch, the port TG
had met its match
It coasted down and settled to the floor
I checked the time: ten past four.
In the state of near confusion, I knew that it was no illusion
The port TG had shown that it was rotten to the core
There it lay, beyond repair, the rotor out and stripped quite bare, knowing that
we had no spare
I noted in the logs at four
Just a drill and nothing more.

SUBMARINE NEWS FROM AROUND THE WORLD

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From the October 2017 Naval Market Forecast Newsletter:

UNITED STATES: General Dynamics Awarded IPPD Contract for Columbia Class SSBN

On 21 September 2017, the United States Navy (USN) awarded a US\$5.1B contract to General Dynamics - Electric Boat (GD-EB) for Integrated Product and Process Development (IPPD) for the Columbia Class Nuclear Powered Ballistic Missile Submarine (SSBN).

This follows information on 04 January 2017 that the Columbia (SSBN) program passed its Milestone B decision review and was moving into the detail design phase (engineering manufacture and development). GD-EB was selected as the prime contractor for the program and submitted its bid to the US Naval Sea Systems Command (USNAVSEA) on 20 May 2016.

The IPPD contract is for the design, completion, component and technology development and prototyping for the new SSBN. The work also includes unique efforts for the Common Missile Compartment (CMC) that will be found on the 12 hulls of the US Columbia class SSBN and the four hulls of the Royal Navy's (RN) Dreadnought (successor) class SSBN.

The completion of IPPD will lead to the start of the construction phase in Fiscal Year (FY) 2021 of the first hull, USS Columbia (SSBN 826). The first patrol of SSBN 826 is scheduled for FY 2031. A work-share agreement for the construction phase of the twelve hulls has already been submitted to the Navy with Huntington Ingalls Industries (HII) Newport News Shipbuilding being the other builder. Both yards also share construction of the Virginia class Nuclear Powered Attack Submarines (SSNs) as GD-EB and HII Newport News are the only two submarine builders left in the United States.



The latest estimates are that the entire program will cost US\$115B with an additional US\$12B in R&D, or an average of US\$10.5B per hull. The average cost per hull without equipment is estimated at around US\$8B per hull. For the USS Columbia that will begin in FY2021, US\$883M was already committed in FY2015 and US\$971M in FY2016. The 30 year shipbuilding budget (FY2017 - FY2021) calls for US\$773M in FY2017 (plus US\$1.091B in R&D), US\$787M in FY2018, US\$2.7B in FY2019, US\$1.3B in FY2020 and US\$3.6B in FY2021 when the construction phase begins.

The second unit will begin construction in FY2024 and the third unit in FY2030. The 12th hull is expected to begin in 2035 and commission in 2041.

Additional information on this project can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Future Nuclear-Powered Ballistic Missile Submarine (SSBN) Project Report at: <http://www.amiinter.com/wnpr/projects/project.php?newcontID=664&countryID=68>.

SOUTH KOREA: Son Won-II Class Submarine (KSS-2):

On 07 September 2017, the Republic of Korea Navy (ROKN) launched its ninth and final Son Won-II (Type 214) class submarine *Shin Dol-Seok* (SS 082) from Hyundai Heavy Industries (HHI) Ulsan Yard. It will be commissioned into the ROKN in 2019 completing the class.

INDIA: Kalvari (Scorpene) Class Submarine:

Kalvari (Scorpene) Class Submarine: On 21 September 2017, the Indian Navy's (IN) first Kalvari (Scorpene) class submarine, INS Kalvari (S 50), was commissioned into the sea service. The second unit, INS Khanderi (S 51), is undergoing sea trials with an expected commissioning date of March 2018.

Unit three, INS Vela (S 52), is scheduled for launch in October 2017 and commissioning in 2018. The final three units of the class are expected to enter service by 2020.

Sources indicate that the IN may procure up to three additional units of the class. Negotiations began in late 2016. A deal for hulls seven through nine could be in place by 2018.

Additional information on the Asia Region can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or visiting AMI International's website at: <http://www.amiinter.com>.

Unmanned Maritime Systems

A. Rolls-Royce Plans for Autonomous Naval Vessel:

Rolls-Royce has announced its plans for an autonomous, single-role naval vessel with a range of 2,500nm capable of operating for over 100 days.

The 60m (196.9ft) concept vessel will displace around 700 tons and will have a top speed of 25 knots. It is to be designed to perform a range of single role missions such as patrol and surveillance, mine countermeasures (MCM), or fleet screening.

The single-role unmanned surface vessel (SRUSV), in its current design, is powered by an integrated full electric propulsion (IFEP) system that requires fewer auxiliary systems and provides better reliability and less maintenance than mechanical systems. It consists of two Rolls-Royce MTU 4000 diesel generator sets, producing a total of 4MW of electrical power. The 1.5MW propulsion drive system consists of two permanent magnet azimuth thruster and a tunnel thruster in the bow for added maneuverability. Additionally, it will have photovoltaic solar panels and a 3,000kWh battery bank for low-speed loiter operations.

Multiple sensor systems and artificial intelligence will be installed on the vessel depending on the single-role that will be assigned to the vessel. Systems can be operated remotely or simply programmed to do their mission. Also, a health monitoring system will be on the vessel to ensure the operation of the onboard equipment from engines to sensors.

While still in the concept stage, many things will need to be worked out before such a vessel will be able to operate on its own, including safety of navigation and communication with commercial vessels in order to mitigate the risk of collisions.

B. Liquid Robotics Wave Glider:

At the 2017 Defence and Security Equipment International (DSEI) exhibition held in London, UK from 12-15 September 2017, Liquid



Robotics' latest iteration of their Wave Glider unmanned surface vessel (USV).

This latest version of Wave Glider is now able to survive in the more demanding environments of the northern passages near Canada up to sea state six and greater and has been tested in sea state eight with waves of 0 meters (32.8ft).

Additional changes include an expanded sensor payload and greater energy storage capacity. Additionally, since Liquid Robotics is a Boeing company, work has been accelerated with Insitu to link the Wave Glider with the Scan Eagle unmanned aerial vehicle (UAV). While testing is complete, there has not been a client for this USV/UAV pairing. While continuing to develop Wave Glider for military applications, development continues on the civilian application side, including oil and gas exploration as well as meteorological tasks.

From the October 2017 Modernization & Ship Transfer Newsletter:

INDONESIA – Cakra Class Submarine:

In mid-September 2017, the Indonesian Navy (Tentara Nasional Indonesia Angkatan Laut (TNI-AL)) signed a US\$26M contract with South Korea's Daewoo Shipbuilding and Marine Engineering (DSME) for the overhaul of the Cakra (Type 209/1300) class submarine, KRI Cakra (401). The overhaul will be conducted at Indonesia's PAL Shipbuilding

and will begin in 2018. The work package will include the following:

- Main machinery overhaul (engines, shaft, generators, batteries).
- Hull work.
- Upgrade of the periscope mast.
- Fitted with a new combat management system (CMS).

The replacement CMS may be South Korea's newly developed LIG Nex 1 CMS that is being used on the Republic of Korea Navy's (ROKN) Jangbogo III (KSS-3) class submarine or the Kongsberg MSI-90U Mk2 CMS that is on the TNI-AL's new construction Nagapasa (Improved Chang Bogo Type 209) class submarines that are being built in Indonesia's PAL and South Korea's DSME.

The overhaul will be completed by 2020. The second unit, KRI

Nanggala (402), will probably receive the same upgrade beginning in 2020 through 2022.

Additional information on Indonesian Navy (Tentara Nasional Indonesia Angkatan Laut (TNI-AL)) modernization activities can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Modernization Report at: <http://amiinter.com/wnpr/country/viewcountry.php?country-ID=27>.

From the November 2017 Naval Market Forecast Newsletter:

INDIA: Four Project 75I Bidders Left, Foreign Partner to be Chosen in 2018

On 20 October 2017, AMI received information that two of six prospective suppliers for the Project 75I Submarine program did not respond to the Request for Information (RfI) that closed on 16 October 2017. The RfI was released on 19 July to the six original companies that had shown interest in the estimated US\$9.65B program.

The two companies that failed to meet the deadline are Japan's Mitsubishi Heavy Industries/Kawasaki Heavy Industries and Navantia. The Original Equipment Manufacturers (OEM) were expected to show their qualifications to build the six submarines with a partner shipyard in India. Each company must have independently designed and constructed a modern submarine that is either currently in use or on sea trials.

ISRAEL: German Government Approves Israel Submarine Deal

On 19 October 2017, German Chancellor Angela Merkel approved the Memorandum of Understanding (MoU) to sell three new Dolphin II diesel electric submarines to Israel. The approval was probably political in nature as the Chancellor needed to gain approval while her coalition was still in power. The MoU is for a US\$1.7B deal between Israel and ThyssenKrupp Marine for the three submarines, of which Germany is expected to pay for one third of the cost (around US\$617M).

The MoU signature follows recent reporting in June and July 2017 that direct negotiations were conducted by Germany's Chancellor An-



gela Merkel and Israel's Prime Minister Benjamin Netanyahu and their direct representatives through a fast track process. Sources indicated at the time that the deal in its current form had very little chance (postponed as of 20 July 2017) of being completed as questions continue to be raised concerning the validity of the fast track process.

Israeli press reporting also indicated that up to four investigations were underway in Israel on how the deal was negotiated (and those involved). However, sources now indicate that the deal will be approved (German Parliament) as long as there are no improprieties concerning the procurement decision itself (none found to date).

With an MoU now signed (as of 19 October 2017), it appears that the program will move forward for the three Dolphin II submarines. In late October 2016, AMI first received information that the Israeli Defense Force (IDF) Navy (Heil Hayam Ha Yisraeli - HHHY) was interested in the procurement of three additional Dolphin II submarines in to replace the original three Dolphin I class that were commissioned in 1999 and 2000. Source indicated that the Israeli Government had already entered into negotiations for the three hulls under a deal worth an estimated US\$1.7B although the Memorandum of Understanding (MoU) had not been signed at the time.

Assuming that the MoU remains in force and no improprieties are discovered through the ongoing investigations; the first of three units could begin construction as early as 2019. The third unit (Dakar) of the original three Dolphin IIs will be delivered in 2018.

Additional information on this project can be obtained by contacting Pat Bright at AMI International (Tel: + 1 757 963 7719 or E-mail: pbright@amiinter.com) or by visiting the Dolphin II Class Submarine Project Report at: <http://www.amiinter.com/wnpr/projects/project.php?newcontID=468&countryID=30>.

EGYPT: S-41 (Type 209) Class Submarine:

On 08 August 2017, the Egyptian Navy (EN) took delivery of its second of four Type 209 class submarines from Germany, S-42 (864).

S-42 arrived at Egypt's Ras al-Tin Naval Base on 18 October 2017. The submarines were built at Germany's ThyssenKrupp Industrial Solu-

tions (TKIS) HDW Shipyard. Two additional units (S-43 and S-44) are currently construction at TKIS and will be delivered to the EN by 2020.

Unmanned Maritime Systems:

A. OCIUS Technology's Bluebottle USV:

At Pacific 2017 held in Sydney, Australia from 3-5 October 2017, Australia's OCIUS Technology showcased its Bluebottle ocean drone, Unmanned Surface Vessel (USV).

The Bluebottle is named after an Australian jellyfish that uses its body like a sail; much like the USV uses a solar sail for gathering energy for its CNIM L-CAT Design OCIUS Bluebottle USV propulsion motor. This unique arrangement of collecting both wind and solar power allows the Bluebottle to remain at sea almost indefinitely. It has a unique flipper and rudder appendage underwater that steers and drives it forward against the waves; meaning it has speed of advance no matter the conditions.

Specifically designed to carry a relatively large payload of between 200-300kg (440-661 lbs), it is capable of providing constant monitoring of the ocean for border security, oil and gas exploration, bottom mapping, or weather observation.

The USV can operate at full functionality in conditions up to Sea State 5 (SS-5) and has limited function with full survivability up to SS-7. They are road transportable on a trailer or two can be shipped in a standard 20ft TEU container.

B. Knifefish UUV Completes Contractor Trials:

In late October 2017, General Dynamics Mission Systems successfully completed contractor trials for the US Navy's (USN) Knifefish mine countermeasures (MCM) unmanned underwater vessel (UUV) program. The Knifefish UUV operated in multiple mine test target fields at-sea using buried, bottom and volume type mine-test targets. The Knifefish system successfully demonstrated its ability to detect, classify and identify potential mines, at a variety of depths, each of which would pose a unique threat to naval vessels operating in a mission area.

Contractor trials, managed by General Dynamics Mission Systems,



took place off the coast of Boston using submerged Navy mine-test targets. These trials differed from previous evaluations of the Knifefish UUV by demonstrating end-to-end performance of the Knifefish system in realistic at-sea mission scenarios over the course of hundreds of hours of at-sea operation and more than a hundred simulated missions.

Knifefish is a medium-class mine countermeasure UUV intended for deployment from the Navy's Littoral Combat Ship (LCS) and other Navy vessels. Knifefish will reduce risk to personnel by operating in the minefield as an offboard sensor while the host ship stays outside the minefield boundaries.

Additional information on these articles can be obtained by contacting Rick Dorn at AMI International (Tel: + 1 360 674 6494 or E-mail: rdorn@amiinter.com).

TRIBUTES**ADMIRAL CARTER TRIBUTE***CAPT Sam Ward, USN, Ret.*

As the Commanding Officer of USS *Hammerhead* (SSN-663), Powell Carter was a terrific leader, teacher, and mentor, and he accomplished this by bold example. He set very high standards in all areas, which he expected would encourage his men to emulate. One of his prime methods for inducing this performance was his sagacious use of delegation. He knew his people, and recognized their strengths, as well as their limitations. When there was a tough task ahead, he could articulate the results he expected and then stand back and let the crew accomplish it. Only on rare occasions did he intervene – his confidence in his mentoring and understanding of people produced outstanding results. This turned hard work into fun, because those to whom the task had been delegated got the joy of figuring out how to do it themselves, rather than simply by following orders.

One example of his ability to empower and inspire high performance occurred during *Hammerhead's* Arctic deployment in Fall 1970. Among the many missions assigned, the ship was to conduct an accurate bottom navigational survey of an important Arctic area. The ship was fitted with the Navy's newest Ship's Inertial Navigation System (SINS), as well as a satellite navigation system tied to the SINS computer. However, there were no spares for these systems available in the Supply system. As fate would have it, eighteen days after sailing, the SINS computer failed, disabling the SINS and the most accurate means for navigating, the satellite navigation system. Without these aids, it would have been considered impractical to conduct the survey.

However, as a backup measure, the ship had also fixed the ship's position celestially 2-3 times daily, using the periscope sextant and manual nautical almanac calculations to generate lines of position. These positions correlated very well with the corresponding satellite fixes. After



the ship informed headquarters of the SINS failure and was notified that SINS spares were still not available, Powell reviewed this alternative navigation data and elected to proceed to the survey using celestial fix data, telling his navigation team to keep doing what they were doing. This method was used for the remaining 44 days of the voyage, and established the ship at 0.9 miles from the North Pole in early November. The survey was evaluated as a complete success, and was accomplished without the Captain intervening – a testament to his confidence in his ability to inspire high level performance in others.

A LOWLY LIEUTENANT COMMANDER REMEMBERS VICE ADMIRAL RON THUNMAN

By Captain Dave Miller, USN, Ret.

As the Navy Submarine League Honors Vice Admiral Nils Thunman, I thought that I might provide a perspective from a non-admiral.

My association with the good Admiral was when I was assigned my post-engineer tour as the Assistant for Training and Readiness at Submarine Squadron FIFTEEN in Guam. At the time Admiral Thunman was COMSUBPAC. This was a new billet for a post-engineer that Admiral Thunman wanted in Guam, the home of the oldest SSBNs and a frequent stopping point for the Skate class submarines. My Commodore, Stan Severance's introduction laid out the guidelines that Admiral Thunman and he had established, but in words that only Commodore Severance could express: "So you're Miller huh! You go tell Cheaure (That was then Commander Al Cheaure, the Deputy) I don't want any ____ ____ deficiencies in my Engineering Departments. Now get out of here." A real results focused goal.

As I rode the ships in our Squadron, Admiral Thunman visited often. Knowing my bosses' concerns, I watched him tactfully interact with the officers and crew, quickly understanding the issues these young men and their Commanding Officers were dealing with. He had a way of breaking down the obvious Admiral-to-sailor barriers and getting them to open up. They would tell him things that allowed him to confirm/recognize underlying problems. That Thunman style and technique is something I took away with me and used the rest of my life.

In the Wardroom, he told great stories. The one I remember the best was when he was a student at Navy Nuclear Power School in 1956 at Submarine Base New London's Cromwell Hall. He took a call from Admiral Rickover and was directed to covertly move Nuclear Power School over a weekend from Submarine Base New London's Cromwell Hall to Naval Training Center Bainbridge Maryland.



His described what they did from the close of classes on a Friday to starting classes in Bainbridge the following Monday. The story was hilarious. I guess having taught Bainbridge, he put together many of the pieces that we had tried to figure out when we shutdown Bainbridge in 1976 (for us old farts think those lockers, desks, and the other primitive furniture to be lovely).

He was also insightful. I remember him talking about how the Navy needed to take the 598 George Washington Class boomers, soon to be decommissioned, and fill them full of Tomahawk missiles. SSGNs circa 1980.

But my greatest remembrance of Admiral Thunman, that personally affected me, was how he handled the very difficult transition of USS *Proteus*, Commanded by Captain Tom Fox, back to Guam in the Spring of 1980. *Proteus* had been delayed in overhaul at the Non-Nuclear Long Beach shipyard. It should have been an easy overhaul until some unexpected issues arose in the Nuclear Repair Spaces. Handling these issues took its toll on the RADCON Department. As *Proteus* went through its certification to get back on line, the lack of RADCON staffing and time to train resulted in great concern.

I was directed to take a team of USS *Hunley* RADCON team members that would be cross-decking to *Proteus* and fly to Pearl Harbor to ride the ship back to Guam. On meeting Captain Fox early in the morning, I gave him a letter from my Commodore, Stan Severance. On reading it, he was not happy. For those of you who remember Tom Fox, it was the evil eye. Here he needed real help and they sent a lowly LCDR, not even the Squadron Engineer and not certainly a Squadron Deputy.

In the *Proteus* wardroom mess six hours later, I figured out it was Admiral Thunman who had sent me. As I sleepily wandered in and got in the mess line for lunch, the voice of Niles Thunman boomed over the wardroom so all could hear. I turned and saw the Admiral with his arm around Captain Fox walking toward me. He shook my hand and gave me that Thunman- welcome and turned to Captain Fox. "Tom, this is Dave Miller from Squadron FIFTEEN. He is the best at what he does and he is going to help you."

I immediately saw a change in Captain Fox's eyes. The look of concern from that morning changed to a look of hope. Needless to say, it

was a tough slow trip to Guam (*Proteus* could crank out 12 knots with a good tail wind.) 18 hours a day of drills, evolutions and Admin review. Writing new instructions and reports necessary to meet the new and ever tougher RADCON standards. Classroom training, examinations and qualifications necessary to pick up the heavy, never-ending demand of Squadron FIFTEEN's 10 SSBNs and all SSNs deploying to the Western Pacific.

I left the *Proteus* as the RCPE boarded. She did very well. I knew in my heart that it was Admiral Thunman establishing a sense of "we're here to do whatever it takes to help you do well" that helped her Commanding Officer and crew do well on that exam and meet the difficult times ahead.

Throughout the rest of my Navy career and since, I never forgot that Thunman lesson in leadership.

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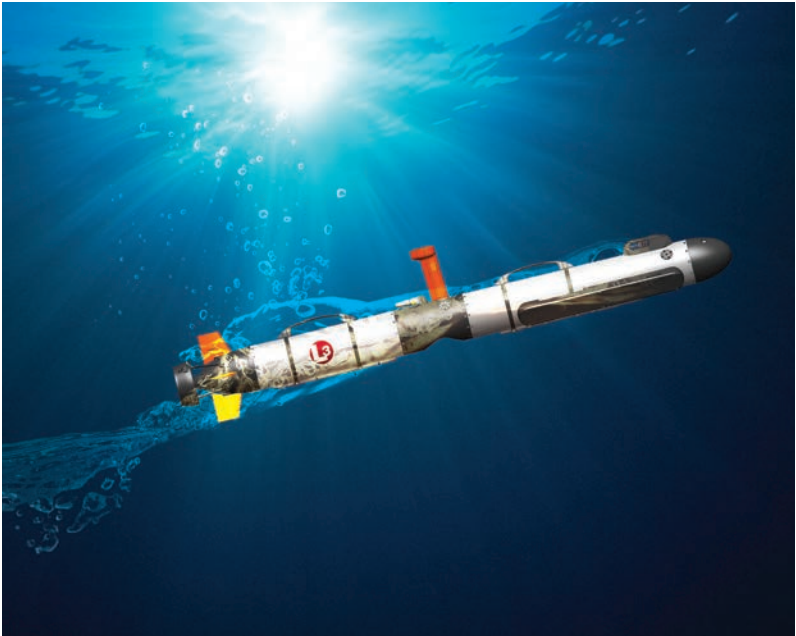
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