Impending Revolution: The Role and Influence of the Torpedo on American Naval Strategy, 1868-1914

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INTRODUCTION

In 1868, a group of American naval officers traveled to Fiume to view a new naval weapon that had stunned Austrian naval officers during earlier tests. The news of the successful test of Robert Whitehead’s “fish torpedo” had spread throughout Europe and across the Atlantic to the United States. According to The Times of London, the Americans were very interested in this new weapon and entertained a “serious idea of making them the base, so to speak, of naval warfare, not only for defense but for attack.”\(^1\) Although this weapon was still experimental in 1868, it would become a great menace to shipping on the Atlantic almost 50 years later during the First World War. Also over this fifty-year period, in 1868 the US Navy went from being a small, obsolete, littoral force, to a large, modern, blue water fleet. Although this appeared to be a step forward in the modernization of the US Navy, the Navy was actually in the middle of a period of obsolescence, shrinkage, and disrepair. The number of vessels in commission went from nearly 700 at the end of the Civil War, to 48 by 1880. The Navy was so weak that Admiral David D. Porter likened this much smaller and weaker navy to ancient Chinese forts that had dragons painted on them in order to scare enemies away. \(^2\)

As the US Navy shrank, foreign navies were rapidly integrating new technology, such as breech-loading rifled guns, steel armor, screw propellers, and compound engines into their fleets. In contrast, the US Navy still operated wooden ships, which could not resist powerful breech-loading guns, and wind-powered ships, which did not have the freedom of mobility of steam powered ships. Resistance to adopting these new innovations came from two major sources, the public and line officers of the Navy. The public was tired of war and wanted to concentrate the nation’s resources on rebuilding a country that had been devastated by civil war. The US had no

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overseas territories and did not face the threat of war from a major foreign power. Congress did not see any good reasons to allocate funds to maintain a Navy like that of the Civil War era. Line officers resisted modernizing the Navy due to concerns about what would happen to the naval profession if these new innovations were allowed to replace wind-powered sailing ships. These officers feared that the implementation of steam power in the Navy would lead to a navy that would be controlled by engineers, rather than naval officers.  

However, these were not the only voices that were speaking in the Navy. The deplorable state of the Navy became clear during the *Virginius* affair, which started in October 1873. The Spanish Navy captured a Cuban vessel containing revolutionaries that was illegally flying the American flag. Fifty-three passengers and crew, some of whom were American, were court-martialed and shot. The American response was painstakingly slow as a ragged group of old monitors and frigate cruised off the Florida coast at a 4.5-knot crawl. Although the American public cried for war against Spain, naval officers such as Commodore Foxhall Parker and Lt. Robley D. Evans knew that the outdated American fleet could not contest the Spanish fleet, one of the weaker European navies.  

Soon after the affair, figures such as Stephen Luce and Alfred Thayer Mahan who were eager to modernize the Navy began to gain a stronger voice. The US Naval Institute, an organization founded by officers who worked to advance professional and scientific knowledge at the Naval Academy, began publishing a periodical called *Proceedings* starting in 1875. This periodical featured papers on technical subjects and strategy and helped transform the Institute into an organization that acted as a sounding board for ideas and proposals that could improve the navy.  

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Proceedings, so did foreign trade and concerns that commercial expansion overseas might lead to conflict with other foreign trading powers.\(^6\) Despite acknowledgement of the obsolescence of the American fleet in comparison to European navies, the calls for naval expansion and modernization coming from these naval officers finally gained strength in reaction to these concerns. Captain Robert Shufeldt captured these concerns when he declared the fleet as not only the protector but also the “pioneer of commerce.”\(^7\) Projection of national power and prestige also factored into renewed interest in rebuilding the Navy as figures ranging from naval officers to Senators believed that a great nation needed a great navy.\(^8\)

The beginnings of America’s “New Navy” started with a series of Secretaries of the Navy who were determined to expand and strengthen the Navy with the new technology that Europeans were integrating into their navies. The first of these Secretaries of the Navy was William H. Hunt, who took office in 1881. Hunt blamed the condition of the Navy on senior officers who bickered over the merits of steam and sail over technical details. Hunt created a Naval Advisory Board to present a comprehensive program of naval development to Congress. Although the Board members were rarely unified in opinion, a recommendation was eventually made that called for an ambitious building program of no less than 68 ships, including 18 steam-powered steel cruisers. Congress watered down the program on the grounds that the US had no significant commitments abroad and did not need a blue-water Navy. Instead, the Navy would be better off using fast cruisers in a hit-and-run commerce raiding strategy. On March 3, 1883, the fruit of the Board’s recommendation and Congress’s watering down came in the form of a $1.3 million appropriation for three protected cruisers, *Atlanta, Boston,* and *Chicago,* and a dispatch vessel, *Dolphin.* These ships became known as the ABCD ships and the beginnings of America’s

\(^{7}\) Love Jr., *History of the US Navy: 1775-1941,* 344.  
\(^{8}\) Miller, 148.
steel navy, also known as the “New Navy.” These were the first American ships to be completely electrified and feature watertight compartments. In addition, *Atlanta*, *Boston*, and *Chicago* were armed with powerful breech-loading rifled guns.\(^9\)

Along with the introduction of the steel ABCD ships, the US Navy showed great interest in a weapon that foreign navies were using extensively, the torpedo. This interest was demonstrated in 1869 when Secretary of the Navy Robeson established the Naval Torpedo Station for the purpose of following European achievements in developing and maintaining such weapons.\(^10\) Torpedoes had existed for quite some time, as Robert Whitehead first invented them in 1867 after being inspired by a self-propelled coast defense naval mine designed by Austrian naval officer Giovanni Luppis. European navies outfitted their fleets with large numbers of torpedoes throughout the 1870’s and 1880’s, and were continuously building new models with ever increasing speed, range and accuracy.\(^11\) Naval officers and Congressmen alike slated it to be an important tool in American coast defense, which was a potent public argument for naval expansion.\(^12\) In fact, Commodore William G. Temple “argued that any new shipbuilding program should consist of monitors, rams, and torpedo craft.”\(^13\) Coast defense was certainly an important role of the Navy, but a new approach to defending the United States from seaborne attack emerged in the late 1880’s and came to a head in 1890.

Alfred Thayer Mahan, a captain in the US Navy, began lecturing at the Naval War College in 1885. He expounded on his theories of “sea power” and the importance of controlling sea lanes during a war. His lectures were eventually combined and published as *The Influence of*

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13 Love Jr., 349.
Mahan’s ideas were shared by Secretary of the Navy Benjamin Tracy and an advisory board that Tracy created to rethink US national strategy. To Mahan and Tracy, the commerce raiding strategy favored by the US Navy would not adequately defend the nation. Instead, Mahan advocated having a strong battle fleet that could sail far out to sea in order to seek out and destroy enemies before they could come close to American shores. This strategy allowed the Navy to effectively gain control of the sea and cut off enemy commerce with impunity. In short, Mahan and Tracy favored an offensive defensive strategy. It was offensive in the sense that the battle fleet would not stay close to home waters but would steam far out to sea to engage enemies. This style of naval war gained the acceptance of the Naval War College and Secretaries of the Navy Tracy and Herbert, who reacted by advocating the construction of large seagoing battleships that would serve as the core of this offensive battle fleet. The shift in strategy led to a clear divide in ship roles, where seagoing ships played an offensive role while short-range littoral ships played a defensive role. Although Congress’s watering down of the Naval Advisory Board’s initial recommendation shows that Congress already understood that seagoing vessels were offensive in nature, Mahan’s ideas made the offensive realm of naval war more important than the defensive realm. In fact, he saw the defensive force as subordinate to the offensive force, allowing it to freely roam the sea without having to worry about home waters.

This did not mean that the torpedo, conceived as a coast defense weapon, was not important. In fact, a Mahan noted that a dedicated coast defense force was still needed to defend

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home waters while the battle fleet was out at sea. This need gave the torpedo a niche role to fill. However, we know in retrospect that the torpedo would eventually fill more than just a niche role in naval warfare. The torpedo devastated shipping on the high seas in both world wars and went on to sink more tons of shipping than any other naval weapon, except sea mines, in the twentieth century. How did the torpedo get out of the defensive niche role that it initially filled? Why did the torpedo initially fill a niche defensive role in the first place? In the midst of a growing navy, a strong naval gun culture, and an emphasis on offensive sea power, what impact did the torpedo have on naval planning and strategy? What changes did the Navy have to make due to the introduction of the torpedo into the arsenal?

Although we know that the torpedo was used to great effect in both world wars and remains an important weapon in the arsenals of modern navies, historical research on how the torpedo acquired this power and role has been relatively scant. Much of what has been written concerns itself with the technical details of the torpedo’s development and the problems that were encountered when it was used in combat. Historians have mentioned or alluded to the strategic implications of the torpedo, but do not closely examine it in a strategic context. Edwin Gray’s *Devil’s Device* is a biography of Robert Whitehead in relation to his work on torpedo development. However, Gray does not delve into the broader effects that Whitehead’s invention had on naval strategy. Robert Gannon’s *Hellions of the Deep* characterizes the torpedo as a weapon that naval officials in the 1870’s believed could virtually defend the coast by itself. However, his focus is primarily on technical problems and troubleshooting related to WWII

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torpedoes. Gary Weir’s work on American submarine development primarily focused on the relationship between private industry and the Navy after WWI. William McBride’s book, *Technological Change and the United States Navy, 1865-1945*, provides a great examination of how naval officers defended what Edward Constant described as a technological paradigm. These paradigms involved “an exemplary artifact and a cultural framework devoted to sustaining that artifact.” In the pre-WWI period, that predominant artifact that the torpedo threatened was the battleship. McBride shows how naval planners characterized the torpedo and its platforms as auxiliary weapons to battleships in Congressional hearings and Navy reports. These efforts acted to protect the battleship’s position as the primary weapon of the Navy. Norman Friedman’s work on the strategic use of sea power is intended to detail how the mobility, deterrent, and projection power of navies has been used repeatedly over the nineteenth and twentieth centuries. His characterization of US naval growth after 1883 was one of building up the capability to meet an enemy far out at sea so that an attack on the continental US would be extremely difficult. However, Friedman does not spend much time discussing the pre-WWI period or naval technological implications of that time.

It is clear that historical work on the torpedo does not go into detail on its strategic effects. This thesis will examine the strategic impact of the torpedo and how that impact manifested itself in tactics, training, shipbuilding, and fleet composition. Discussions within the Navy on how the torpedo would be integrated into the fleet occurred during a time of naval expansion, and a time of change to an offensive-defensive naval strategy, highlighted by

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24 Friedman, *Seapower as Strategy: Navies and National Interests*, 4
Mahan’s ideas on sea power. This new strategy, supported by Mahan, Benjamin Tracy, and the General Board of the Navy, placed great importance on the offensive high seas battle space. While naval expansion meant that torpedoes were able to find a role to fill in the growing Navy, the new offensive strategy delineated two distinct classes of roles, offensive roles and defensive roles. This work will show how technical and tactical limitations that affected the torpedo and its platforms initially limited them to defensive roles. However, once these limitations were overcome, the torpedo could enter the more important offensive role and effect significant changes in naval strategy. This division of roles is key to this thesis because the eventual ability of the torpedo to reach out into the offensive role signifies its entrance into what Mahan, Tracy, and other naval planners, considered to be the battle space where all decisive naval action would take place. The fact that naval planners had to consider the presence and use of torpedoes in high seas fleet action signifies a change in how the Navy believed opposing navies would engage each other, from conceiving a battleship and gun dominated battle to conceiving a battle dictated by the range of torpedoes.

Much of the research for this thesis comes from Congressional documents, Annual Reports of the Navy Department, and the Proceedings of the United States Naval Institute, which serve as a good representation of what naval planners were thinking at the time. While the writings of Mahan were certainly important, naval strategy was built through the recommendations and decisions of many officers and entities including the General Board of the Navy, Congress, and even foreign navies. By adding perspective that emphasizes naval planning and the strategic ideas of contemporary naval officers of the time to the standard histories of torpedoes, the technology’s effects on naval strategy that came about before its widespread usage in the world wars will be better understood. By focusing on the time period 1868-1914, which
begins at the first American viewing of the Whitehead torpedo, readers will be able to get a sense of how naval planners conceived the role of torpedo before it saw its most active and notable action during the rest of the twentieth century.
"Strategy," and more specifically "naval strategy," is an abstract concept not easily defined because it consists of many different parts. Antoine Henri Baron de Jomini, one of the most influential military strategists of the nineteenth century, described strategy as "the art of making war upon the map." He perceived strategy to be the part of warfare that "decides where to act." This view was generally retained for the rest of the nineteenth century. Captain Alfred Thayer Mahan, who is considered to be one of the foremost naval strategists of his time, believed in 1900 that strategy was concerned with the distribution, positioning, and movements of forces over a battle space. This concern with forces existed in order to gain control over what a strategist determined to be a key position in the battlefield. Mahan's view corresponds with the "war upon the map" conception of strategy. Mahan, who was greatly inspired by Jomini, also believed that a sound strategy was the foundation of any military campaign. To him, the skill of the generals, bravery of the soldiers, or significance of a victory would have no effect if there was no strategy behind them. Mahan believed strategy "precedes the operations of the campaign, the clash of arms on the field. It is done in the cabinet, it is the work of the students with his dividers in his hand and his information lying beside him." Strategy originates "in a mental process, but it does not end there." This view corresponds with Jomini's view of strategy as a process that entails a decision-maker determining how to use his forces.

However, the above description of strategy may make strategy appear to simply be a mental exercise. John Hattendorf points out that strategy is comprehensive: “For those who

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practiced it, naval strategy involved an understanding of the capabilities and limitations of men and the machines with which they worked and lived."28 A proper examination of strategy must have practical considerations as well, including technology, fleet composition, and training. Strategy is not just confined to the realm of theory but "is a practical issue and has to do with the comprehensive direction of ships and weapons to achieve specific practical ends through forceful control."29 One must be careful when examining naval strategy to avoid regarding strategy as simply an amalgamation of concepts or plans. Hattendorf warns historians not to "let their appreciation for successful books and good ideas lead them into assuming that abstract ideas drive navies."30 While ideas are important, they are only one of many factors behind the practical decisions a navy makes.

Commonly associated with strategy is another aspect of warfare, known as tactics. Tactics can be described as the various procedures, movements, and techniques that would be used in an engagement to ultimately come out of the battle victorious. These concepts would take effect once two opposing forces were "brought into contact."31 Captain William McCarty Little, an intellectual leader at the Naval War College who is most well known for developing the naval war game, used an analogy to describe tactics and strategy involving the relationship between an architect and builder, or the relationship between a playwright and an actor. The strategist would correlate with the architect or playwright while the tactician would correlate with the builder or actor. A strategist has an objective that he needs to achieve and must determine the necessary steps that need to be taken in order to achieve that goal. The tactician, being aware of the

31 Mahan, The Interest of America in Sea Power, Present and Future, 8.
strategic goal and the steps that are being taken to reach that, is concerned with the best way to execute those steps.\textsuperscript{32} However, the lines between strategy and tactics are not well defined, and there is overlap between these two areas. American military strategist Bernard Brodie even went so far as to say the line between strategy and tactics was arbitrary.\textsuperscript{33} Although Little still saw tactics as subordinate to strategy, “no tactical problem had meaning without a strategic setting, and no strategy could develop auspiciously without reference to tactics.”\textsuperscript{34} It is clear that the realm of tactics is the battlefield where opposing forces are engaged in battle, while strategy involves the preparation leading up to the engagement and also involves the overall objectives of each force. It is in the objectives of a battle or campaign where strategy and tactics overlap.\textsuperscript{35} For instance, a force whose objective is defense of a narrow chokepoint will adjust their tactics such that they will stick close to the chokepoint and not venture very far out to sea to meet the enemy. If a fleet intends to gain control over a large area of ocean, it must employ tactics that will prevent losses, lest there be little to no fleet left after the battle to control the ocean. Tactics can be adjusted based on strategic objectives, which supports Little's ideal of the subordination of tactics to strategic considerations.

As navies around the world integrated new technology into their navies, such as breech loading guns, steel armor, steam power, and torpedoes, naval strategy had to adapt to the new capabilities and requirements that came from new technology. Strategy became a necessary art, not only in war, but also in "preparedness and peace," thanks to the new capabilities that new

\textsuperscript{32} Hattendorf, *Naval History and Maritime Strategy: Collected Essays*, 4.
\textsuperscript{35} Alfred Thayer Mahan, “Naval Warfare,” Alfred Thayer Mahan Papers, Box 5, Reel 3-4, page 23, Library of Congress.
technology gave.\textsuperscript{36} Commander C.H. Stockton pointed out in 1893 that because nations could now rapidly build ships that had high speed and long endurance, naval operations were given "given such possibility of quickness and vigor in execution and increased length of reach, that the time permitted for preparation for defense [was] correspondingly shortened."\textsuperscript{37} A navy could not react to an aggressor or to a conflict by strengthening itself, whether that meant increasing ship production, personnel or ordnance, after a conflict began. The only way to be ready to fight another power was to be prepared for battle before war even began.

In addition to a perceived need to be prepared for war even during peacetime, the influx of these new technologies made having extensive technical knowledge a necessity in order to keep the many systems on a ship operational. The growing importance of technical knowledge was exemplified in the Naval Personnel Act of 1899, which "amalgamated the engineers with the line in an attempt to make every line officer an engineer, and also every engineer a line officer."\textsuperscript{38} Hattendorf’s previous statement on how naval strategy involved understanding the “capabilities and limitations of men and the machines” effectively illustrates that an understanding of what a new system on a ship could do and how crew members had to adapt to its use became an integral part of naval strategy. Simply put, the strategist had to understand the machines that the sailors would be living in and interacting with during peace and war.

Technical knowledge and training became increasingly important as the navy integrated new technology onto their ships. Skilled engineers and technicians were required to maintain and operate complex steam engines and torpedoes. As a result, a synergy had to be formed between

\textsuperscript{36} Hattendorf, Technology and Strategy: A Study in the Professional Thought of the U.S. Navy, 1900-1916.
developing technology and strategic considerations. In fact, a broad strategic outlook needed to take technical considerations into account if it was to be successful.\textsuperscript{39} Professor Hugo Mustenberg of the Naval War College summed up this idea: "The knowledge of the ships and the armament becomes a living power only if it is embedded in the understanding of strategies and grand tactics, and they would be empty if the psyche of man were not acknowledged as their center."\textsuperscript{40} But concerns were voiced, especially by Mahan, that rather than synergy, an overemphasis on technology was overwhelming attention to strategy.\textsuperscript{41} Although an influx of new technology into the navy made technical knowledge and training more important, the Navy made sure that technical expertise was understood in a strategic context. Technical knowledge would not be of much use if it were obtained for the sake of simply knowing how to operate a piece of machinery. Just as tactics had objectives that were dictated by strategy, the capabilities brought about by new innovations needed to have a place in naval strategy.

But according to Mahan, there was no coherent naval strategy in the US Navy for many years after the end of the Civil War. In fact, ships were independent units that did not interact with each other often. Any groupings of vessels were small and the groups of ships would be thousands of miles apart. Combined maneuvers or naval exercises were a rarity in the Navy. While periodic exercises and maneuvers were finally mandated by the Navy Department until 1894, this mandate to help coordination between ships did not include "long term vision of coordinated activities or strategy."\textsuperscript{42} There were also serious perceived deficiencies and misplaced attention in how Navy personnel were trained that office of like Luce, Mahan, and Little pointed out. Luce and Mahan particularly lamented the weak state of education in naval

\textsuperscript{40} Hattendorf, \textit{Naval history and Maritime strategy: collected essays}, 25.
\textsuperscript{41} Hattendorf, \textit{Naval history and Maritime strategy: collected essays}, 63.
\textsuperscript{42} Douglass, "Technological Innovation and Organizational Change: The Navy's Adoption of Radio, 1899-1919," 123.
history, strategy, and tactics. History, strategy, and tactics, were seen as "impractical," thus not worth teaching to sailors and officers. As late as 1893, Mahan claimed that most of the training that sailors and officers received involved practice in passing orders and incessant drilling.\textsuperscript{43}

During this time period, there was no single decision-maker or decision-making body that determined what US naval policy would be. Although there were certain officers that were held in high regard, such as Admiral George Dewey, Captain Mahan, and Admiral William Sims, the Navy Department actually “operated with only professional opinion from separate bureau chiefs and special boards which were convened occasionally and only for specific purposes.”\textsuperscript{44} Naval administration was essentially a body of many people working to further their own sector of the Navy, rather than the Navy as a whole. Mahan pointed out that while each bureau was effective at managing its own part of the navy, they were “jealously independent and responsible only to the Secretary of the Navy.”\textsuperscript{45} Thus, any strategy that the Navy employed came as a result of the combination of actions that individual bureaus took and legislation that passed Congress regarding naval affairs. However, the efforts of figures such as Alfred Thayer Mahan and Stephen Bleecker Luce, laid the foundations for a body that could develop naval strategy and teaching it to future Navy leaders.

The Naval War College became that body. The College was established in 1884 and was designed to teach sailors and officers strategy and history, which were areas that were seen as lacking in the Navy. Mahan and Luce both characterized the Naval War College as the only place where naval strategy, tactics, and history were studied. Commander C.H. Stockton, when speaking of the importance of the College and its unique academic foci, posited that the

\textsuperscript{45} Knisley, 8
College's "favor of the Government and Congress [depended] upon the importance of the subjects with which it alone among the organizations of the Navy [undertook] to deal."  

The next development in the creation of strategy came in 1900 with the creation of the General Board of the United States Navy, or the General Board for short. The General Board was a group of highly respected naval officers who met regularly to discuss many subjects including naval strategy, policy, construction, and foreign navy developments. Despite its good reputation, the General Board was not a very powerful organization. It could not give orders, could not tell the bureau chiefs what decisions to make, and could not make direct recommendations to Congress. However, because of their reputation, their opinions were usually well regarded. Instead, the Board advised the Secretary of the Navy in matters of naval and foreign policy. In turn, the Secretary of the Navy advised the President and made decisions concerning issues such as expanding the navy, base acquisition, and war planning based on the advice of the General Board.  

Although the General Board did not write much about their intimate discussions during this time period, the members wrote in periodicals and technical journals in order to express their views. If anyone informed on naval matters wanted to get a sense of what plans and recommendations the General Board was making, they knew they could rely upon those articles written by Board members and upon the Secretary of the Navy's reports to ascertain the Board's thinking.  

Before the establishment of the College and the Board, the Navy was primarily a coast defense force. As American trade expanded overseas, the Navy had to find a way to defend American sea-based trade routes. Many characterized the US Navy as a defensive force.  

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47 Knisley, 5.  
48 Knisley, 40.
Benjamin Franklin Tracy drew from an address given in 1800 by President John Adams and recommended that the US build a “Navy adapted to a defensive war…for the safety of our shores, and for the protection of our property committed to the ocean.”49 The Navy was not meant to be a force for conquest. However due to its small size relative to other navies and relative to the length of coastline that it needed to defend, the Navy could not adequately perform its role as a defensive force, let alone attempt conquest or defend distant trade routes.50 As a result, concerns about a possible attack on the continental United States in the event of a war with a major naval power existed even as late as 1899, well after the American victory over Spain that showcased America's new naval strength.51

Interestingly, the obtaining of Spanish possessions in 1898 did not figure significantly into discussions regarding the torpedo and its related weapons platforms. The more pressing concern for the Navy was the need to repair and upgrade shipyards and docks in these possessions in order to support a sea-going battle fleet far from home waters. The battle fleet was the main arm of defense for these far flung possessions, which marginalized the place of the torpedo in this battle space.

Having a defensive navy that could also defend distant commercial interests led to the question of what kind of strategy could protect the US and its interests at the same time. Alfred Thayer Mahan, provided an answer to this question that ended up being a crucial part of US naval strategy, which was the idea of an offensive defensive. In other words, the US Navy needed to have the ability to meet its enemies out in the open sea or even at hostile shores, which

51 Senate Committee on Naval Affairs, Submarine Torpedo Boat Holland, 56th Congress, 1st session, 1899, S. doc. 14.
would indirectly keep American waters safe. While Mahan was not the only naval thinker of the time, he was certainly someone who illustrated the importance of history and strategy in naval affairs in a very powerful way. Mahan understood how important sea commerce was to a nation waging a war, and he characterized commerce and sea trade routes as the lifeblood of a war campaign. Controlling the sea in order to neutralize enemy commerce was the ultimate goal of Mahan's strategy. His book, *The Influence of Sea Power Upon History: 1660-1783*, contained numerous historical accounts of wars and naval engagements, which Mahan used to put forward what he believed to be the best way to gain control of the sea. His method involved the use of a concentrated battle fleet that would seek out enemy forces and eliminate them. This strategy stood in contrast to commerce raiding, also known as *guerre du course*, which was a very popular form of warfare before this book was published. But rather than directly attacking shipping, Mahan advocated eliminating enemy forces first, so that nothing could stop friendly forces from denying shipping to the enemy. Once an enemy’s naval forces were destroyed and control of the sea achieved, a blockade could be established in order to starve the enemy into submission. This offensive defense strategy that Mahan favored was based on Mahan’s view of what made the Navy special. Mahan saw the Navy as a "military body of which the distinguishing characteristic is extreme mobility." This mobility made an offensive defense strategy possible, as a navy could fight on the coasts, or far away in open seas. To Mahan, a strong offense was the best defense.

The offensive defense strategy rested on a fleet having the ability to cruise out into the open sea in order to meet and engage the enemy. This was the “offensive” part of the offensive

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54 Notes on Elements of Naval Strategy. Alfred Thayer Mahan, Alfred Thayer Mahan Papers, Box 7, Reel 4-5, Alfred Thayer Mahan Papers, Library of Congress.
defense strategy. Thus, the sea-keeping characteristics of ships that allowed a vessel to weather high seas conditions were associated with offensive operations. A long operational range was also associated with offensive operations. Vessels that lacked these qualities were confined to littoral or coastal operations and were associated with defensive operations. However, one must be careful when interpreting the words “offense” and “defense” and their derivatives. The term “offense” and its derivatives were also used to describe certain types of littoral operations, usually in countering blockades of harbors. This type of offensive operation was still considered to be littoral combat, thus placing it within the broader category of defense operations. In other words, within the realm of defensive operations that took place in littoral waters, there were offensive operations. This was in contrast to “purely” offensive operations that included engaging an enemy fleet in the open sea, blockading enemy ports, and conducting any operations in enemy waters or along the enemy coastline. The separation of offensive open sea operations, and defensive littoral operations was very important. The offensive operation in the open sea was seen as the site of all significant tactical and strategic shifts, while defensive operations were subordinate to offensive ones. Furthermore, changes in the role of vessels were put in the context of this separation of offensive and defensive operations; a vessel that was once primarily used in a defensive manner could develop in such a way that it could then be used in offensive operations in the open sea.

The ability to operate along coasts and harbors to defend these areas had to be balanced with the ability to sail far out to sea. Although Mahan recommended that the Navy take up an offensive defensive strategy where enemy forces would be engaged and destroyed in waters far away from the coast, defense of the coast was still considered to be more important than blue
water endurance.\textsuperscript{55} The retained importance of coast defense can be observed in the designs of the \textit{Indiana}, \textit{Massachusetts}, and \textit{Oregon}, the first battleships of the US Navy. These battleships were primarily designed for coastline defense, and did not “emphasize the feature of coal-endurance,” as characterized by the Secretary of the Navy in his annual report of 1890.\textsuperscript{56} However, the Secretary also stated that the ability to cruise far out to sea was not lost on these ships, as their operating radius was about 5000 miles.\textsuperscript{57} But if the place of the battleship was the high seas, fighting in large engagements, the coasts would still be undefended. There was still a need for a force dedicated to coast defense. This was where the torpedo and torpedo boat made their entrance into the US Navy.


\textsuperscript{56} Tracy, Benjamin F. “Report of the Secretary of the Navy.” \textit{Annual Reports of the Navy Department} (Washington, DC: Government Printing Office, 1890), 13.

\textsuperscript{57} Tracy, Benjamin F. “Report of the Secretary of the Navy.” \textit{Annual Reports of the Navy Department} (Washington, DC: Government Printing Office, 1890, 13.
CHAPTER 2 - The Torpedo and Torpedo Boat, 1866-1900

The torpedo boat represented the first major torpedo weapon platform that the Navy considered for torpedo service. Although this weapon platform was popular with European navies throughout the 1880's, the torpedo boat faced several limitations that limited its range of operation to defensive roles. In essence, the torpedo boat was a glass cannon that had a powerful weapon but a delicate platform. Furthermore, Mahanbian strategy deemed defense roles as subordinate to offensives ones, marginalizing what effects the torpedo and torpedo boat had on naval strategy.

Although the continental United States was not in close proximity to any major naval powers, the postbellum Navy still felt the need to strengthen the coast defense capabilities of the Navy. The small size of the Navy and the very long coastline that needed to be defended made the development of the torpedo service of “paramount importance,” according to Secretary of the Navy R.W. Thompson in 1877. Coast defense continued to be an important issue even in 1898 when one of the most telling events regarding coast and harbor defense took place during the Spanish-American War. In a statement before the House Committee on Naval Affairs, Admiral Philip Hichborn told of how “people along the New England coast raided the Navy Department from morning till night for old monitors that had been condemned more than thirty years.” These citizens were afraid that the Spanish fleet would suddenly appear and start bombarding the New England coast. To quell the panic that had arisen, the Navy put these outmoded monitors into harbor waters, which calmed people's nerves. Even though these New Englanders were calmed by old monitors, the Navy knew that it needed to strengthen its coast defenses. In 1882,

60 Ibid.
Commodore George Boutwell argued before Congress that any program to strengthen coast defense had to include torpedoes.\textsuperscript{61}

The torpedo has a long history that actually spans different classes of weapons. The word \textit{torpedo} today describes a naval weapon that operates primarily underwater, strikes its target underwater, and has some way to propel itself towards its target. In the nineteenth century, the world \textit{torpedo} could be used to describe several different weapons. This term first came into use after David Bushnell used it to describe what we would call today naval mines. These old “torpedoes” were essentially large containers of explosives that could be anchored to a certain point underwater or left floating on the surface to drift. Two other notable classes of torpedoes were the towed torpedo and the spar torpedo. The towed torpedo would be towed by a vessel so that it would cross the path of the target vessel. The spar torpedo was a container of explosive mounted on the end of a long stake or spar that pointed towards the front of the attacking ship. The attacker would use the spar to attach the explosive to the target ship’s hull, then detonate the explosive. Spar torpedoes saw some success in the American Civil War, most notably on the Confederate submarine Hunley.\textsuperscript{62} In 1866, Robert Whitehead invented the self-propelled torpedo, which can be thought of as the weapon that eventually led to today’s modern torpedoes. This class of weapons went under other names as well, automobile torpedo, locomotive torpedo, or moveable torpedo. The torpedo that will be referred to from now on, is the self-propelled torpedo, or the class of weapons that was first invented by Robert Whitehead.

When Rear Admiral Charles Stedman observed a demonstration of the Whitehead torpedo in Austria, he reported back to his superiors by characterizing the torpedo as a weapon


that was likely to “change the character of naval warfare.” The explosion in variety of torpedoes that were developed soon after the invention of the Whitehead reveals that the belief that the torpedo was a revolutionary weapon was widespread. Some of these torpedoes included the Lay, Barber, and Howell torpedo. These three torpedoes represent radically different approaches to torpedo design. The Lay torpedo, first tested by the Navy in 1873, was a dirigible torpedo that had a submerged warhead that was suspended from surface floats. The Barber torpedo, built in 1873, was a rocket propelled torpedo that was fired from submerged tubes. The Howell torpedo, first tested also in 1873 was a long cylindrical tube that was propelled by a flywheel instead of high pressure gas like many other torpedoes. The Navy also tried its hand at making its own torpedo through the Naval Torpedo Station from 1869 to 1871. Although the torpedoes varied widely in terms of design and efficacy, the torpedo had gained a notorious position in naval warfare. David D. Porter, the Admiral of the Navy, wrote in 1885 that all foreign navies were giving the torpedo a lot of attention as the one weapon that could threaten what was believed to be an otherwise invincible ironclad.

One of the biggest drivers of construction of torpedoes and torpedo boats was their cost effectiveness. One torpedo could do a lot more damage than one shell from a large naval gun. Congressman Benjamin W. Harris, a member of the House Committee on Naval Affairs, pointed out in an 1878 report that $250,000 for the purchase of and experimentation with torpedoes was "not a large sum when we consider when we consider how powerful the torpedo has proven to be...and how great is the cost of a single vessel of war.

63 Love, History of the US Navy: 1775-1941, 374
65 Wildenberg, 17-18.
of the cost effectiveness of the torpedo appeared as the 1892 prize essay of “Proceedings of the United States Naval Institute.” Although this essay appeared well after the US Navy and other private American firms began developing torpedoes, it provided a startling picture of just how cost effective a weapon this was. William Laird Clowes, the British historian who wrote the essay, cited war games that took place in England in 1890 that pitted battleships against defending torpedo boats. The results of the war games appeared to confirm how great a threat torpedoes posed to surface vessels. Nine torpedo boats, valued at a $900,000 and crewed by 163 sailors, managed to knock four large surface vessels out of actions. The four vessels were valued at $12,200,000 and were crewed by 2,302 sailors.68 The Navy recommended that the US establish an organized torpedo-boat coast defense, similar to the torpedo boat coast defenses of Europe. Secretary of the Navy Benjamin Franklin Tracy even characterized the American coast as being “admirably adapted for this kind of warfare.”69

When it came to the role of the torpedo boat, most agreed that it was confined to coastal defense. Again, the US Navy looked abroad for guidance on the use of torpedo boats. In his report of 1888, the Secretary of the Navy made mention of “naval maneuvers” abroad that demonstrated that “torpedo boats must still be regarded as most useful for coast and harbor defense.”70 Like European navies, torpedo boats were seen as composing the middle layer of a three layered coast defense system. Monitors and other surface vessels formed the outer layer, while mines and land based forts formed the inner layer. Of these three layers, the middle layer was deemed the most important by Rear Admiral E. Simpson, president of a naval advisory

board that made recommendations on the composition of shipbuilding programs.\textsuperscript{71} Although the reason for this layer being the most important one of the three was not explained, the effects that the torpedo boat had on tactics were clear. If an enemy fleet were to attack the coasts, it would most likely do so with a battleship based fleet. Torpedo boats would limit the area of operations of battleships and "become dangerous in narrow waters and near the coast, in darkness or thick weather."\textsuperscript{72} While the torpedo was effective in its niche coast defense role, it was largely confined to that role. Even in that role, it had to share space with monitors, mines, and rams, all of which denied operating space to an attacking fleet. This weapon system was merely another tool that the Navy had in their coast defense "toolbox."

The torpedo would be largely confined to a coast defense role due to technological limitations, tactical limitations, and geographical limitations that the weapon system faced. The technological limitations were primarily related to the ability of the torpedo boat to cruise out to sea. Tests of the French Navy showed that torpedo boats had a hard time keeping up with larger surface combatants in high seas conditions. The smaller and slower torpedo boats attempting to follow a battle fleet of large ships out to sea would lag behind and hold up the entire fleet. In fact, battleships ended up towing the torpedo boats several times, further reducing the overall speed of the fleet.\textsuperscript{73} Even "first class" torpedo boats, which were designed to better weather high seas conditions, could not handle such long cruises and suffered from engine problems.

Three of the major tactical obstacles to the operation of torpedo boats in the high seas were there possibility of friendly fire, its weakness against rapid fire guns, and the strain on torpedo boat crewmen. Clowes referred to tests in the Royal Navy where torpedo boats fired


\textsuperscript{73} Clowes, “Torpedo Boats: Their Organization and Conduct,” 182.
their torpedoes towards their targets, only to have them miss and hit friendly ships. Torpedoes were seen “wandering about after almost every attack.” The next two tactical obstacles were closely related. Destroyers were developed mainly to destroy torpedo boats and mounted many light guns and machine guns that could fire rapidly. Due to the effectiveness of these guns against torpedo boats, the torpedo was limited to action under cover of darkness. Adding to the difficulty of operating torpedo was the addition of powerful searchlights, that made even night fighting of doubtful worth. On top of these shortcomings of the torpedo, there were also shortcomings in terms of what conditions humans could withstand. William Laird Clowes said of torpedo boat crewmen: “They cannot, in bad weather, keep up with the-knot battleships; they are perpetually in distress, and their crews get worn out and incapable of energetic action.” Even “first class” torpedo boats, were still inhabitable for the crew. In fact, crew endurance, not coal supply or feed water supply, was considered to be the most significant factor that limited that operational range of the torpedo boat.

The geographic obstacles facing high seas use of the torpedo were not general, but special to the United States. Lieutenant L.H. Chandler pointed out that due to the vast distances between the US and Europe, destroyers would have a difficult time crossing the Atlantic and still be in a good fighting condition at the end of the voyage. It is easy to then deduce that if a larger, more seaworthy destroyer would have a hard time making that journey, then it would be virtually impossible for a smaller torpedo boat. Due to the relatively short distances between European ports, using torpedo boats or destroyers to raid enemy ports was conceivable.

On top of the limitations regarding where and when the torpedo boat could operate, the torpedo had to face doubts about its efficacy. Even as the torpedo was receiving praise, figures in Congress and the Navy rose to assert that the torpedo was not the wonder weapon that it was touted to be. In 1877, Secretary of the Navy Richard W. Thompson described the torpedo as a weapon of "forlorn hope, and with little chance of success against a watchful enemy." Seven years later, the SECNAV Chandler testified before the Senate Committee on Naval Affairs that he believed that the Whitehead torpedo, the fastest torpedo available at the time, was too slow and easily stopped by netting.

The imperfections of the torpedo/torpedo boat weapon system were highlighted by poor performance in actual combat. For instance, in September of 1894 during the Battle of the Yalu of the Sino-Japanese War, torpedoes were not presented with targets because most had already been destroyed by gunfire. In fact, the torpedoes became more of a danger to the ships carrying them than to the ships they were supposed to attack. Having charged torpedoes in deck torpedo tubes meant that the torpedo could explode inside the tube if hit by a shell. The Chinese were even reported as throwing their torpedoes overboard when they were retreating from the Japanese fleet. While the Chinese did launch some torpedoes, they were in fact too close to their targets due to the large initial dive of the deck launched torpedo. During this time, if a torpedo did manage to hit a target, it was seen as an “incident” rather than the “main object” of the torpedo.

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Despite the many doubts surrounding the efficacy of the torpedo, the widespread foreign usage of the torpedo and its psychological effect drove further development of torpedo forces.\(^\text{82}\) Lieutenant Commander J.S. Newell believed that the “greatest power possessed by the torpedo is the fear that attends its use. It is doubtful whether any crew can stand the strain for a long time without impairing their efficiency.”\(^\text{83}\) But the torpedo needed to have a platform to be launched from, or else it would be useless. In 1885, the US had no torpedo boats in service, which was a glaring deficiency in the eyes of the Admiral of the Navy, David D. Porter. Porter reiterated Newell’s position by describing torpedo warfare as the most difficult type of warfare for attackers to deal with. Both Porter and Newell advocated swarm tactics in narrow choke points for torpedo boats in order to take full advantage of the psychological effect of the torpedo-torpedo boat combination.\(^\text{84}\) This type of tactic had a deterrent effect as it left very little maneuvering room for an attacking fleet, compelling them to stay away from chokepoints and keep their distance from the coast. The torpedo and torpedo boat’s ability to act as a deterrent, merely by its presence on the battlefield, allowed this weapon system to perform its duty of defending the coast and harbors. A torpedo boat could potentially fulfill its role without ever leaving harbor as long as “the fact that torpedo boats are in a certain place prevents battleships from going past or near it for fear of what may happen.”\(^\text{85}\) This deterring ability was demonstrated, also during the Battle

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\(^\text{82}\) After 1883, torpedo development was mainly focused on the Howell torpedo. After several tests from 1884 to 1886, the Howell torpedo was the only weapon that was fast and accurate enough to meet Navy requirements. Other torpedoes, such as the Lay and Weeks torpedoes, were either too inaccurate or unwieldy to use.


of the Yalu, when Chinese torpedo boats were able to deter Japanese attacks up the Yalu River for some time, merely by their presence.\footnote{Ibid 16.}

The other major reason for continued development of torpedo forces was the growth of torpedo forces in foreign navies. In 1884, Lieutenant Nathan Sargent accused the US of having an “ostrich” policy, partly due to his observation that even the most “insignificant navies” were obtaining English built torpedo boats, while the US still did not have a single one.\footnote{Charles E. Munroe, “Notes on the Literature of Explosives,” \textit{Proceedings} 10 (February 1884): 238.} The following year, Admiral Porter illustrated America's weakness in torpedo boats by describing the existing steam launch based defense system as something that would make foreign officers "smile when witnessing the vain efforts of these six knot launches to blow up a barrel which is intended to represent an ironclad armed with a sufficient number of machine guns to cripple an ordinary ship of war in ten minutes."\footnote{David D. Porter, “Report of the Admiral of the Navy,” \textit{Annual Reports of the Navy Department} (Washington, DC: Government Printing Office, 1885), 275.} Secretary of the Navy B.F. Tracy highlighted America’s lack of torpedo boats by contrasting them with foreign fleets that had many of these types of craft. In his 1889 annual report, Tracy pointed out that the US only had one torpedo boat under construction at the time. At the same time, the largest European navies had over 100 torpedo boats each. Even smaller European navies had many torpedo boats including Denmark with 22 and Greece with 51. Tracy considered these small craft “essential constituents of a naval force,” and asserted that from the desire for battleships, the most marked defect of the US Navy was its lack of torpedo boats.\footnote{B.F. Tracy, “Report of the Secretary of the Navy,” \textit{Annual Reports of the Navy Department} (Washington, DC: Government Printing Office, 1889),13.} Lieutenant W.H. Jaques pointed out, by citing Lieutenant-Commander F.M. Barber, that America's geographically isolated position partially explained its lack of torpedoes. However, he later referred to Congressman Anson G. McCook's description of
America’s coast defense force, which McCook believed to be so weak that it was as if it did not exist.90

The most significant strategic effect the torpedo boat had lay in its cost effective coast defense capabilities. The swarm tactics developed for torpedo boats made harbor defense much more effective than the previous defense system that was based on slow steam launches, mines, and land fortifications. But this did not mean that the torpedo boat eliminated all other forms of coast defense. Rather, the torpedo boat was simply another part of the coast defense system. Torpedo boats relieved battleships and other large surface vessels from coast defense duty, allowing them to form the battle fleet that formed the core of Mahanian strategy. However, this is the only major strategic effect of the torpedo boat based torpedo. Because the new Mahanian strategy placed more importance on the offensive sea-going battle fleet, and the open sea was identified as the location of decisive sea battles. The torpedo boat’s limitations confined it to the coast, barring it from participating in fleet action. Other strategic changes brought about by the torpedo boat based torpedo can be seen in fleet composition, ship equipment and weaponry, and fleet distribution. A new class of ship, the destroyer, was developed in response to torpedo boats. Other surface vessels were equipped with torpedo nets, searchlights, and more rapid firing guns. Nets tangled up slow torpedoes before they hit the ship hull, and searchlights and rapid firing guns made quick work of targeting and destroying the lightly armored torpedo boats. These new vessels and equipment required engagement with torpedo boats in order to be utilized. But if enemies were being engaged far from the coast by the battle fleet, the torpedo boat would have no opportunity to take part in the fight.

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Throughout the 1880's and 1890's, the torpedo and torpedo boat represented an imperfect solution to American coast defense. While the torpedo was cost effective, powerful, and frightening, its weapon platform lacked protection and endurance. Its lack of protection made it too susceptible to rapid gun fire. Its lack of endurance limited its field of action, which meant that the torpedo boat could not serve offensive roles in the open seas. As a result, it was confined to a coast defense role. Furthermore, it could only fulfill this role at night, alongside other weapon systems. While the US Navy did end up commissioning 18 torpedo boats by the end of the nineteenth century, a better platform for torpedo attack was needed for this powerful weapon. Secretary of the Navy Whitney summed this idea up in his annual report of 1887 nicely by saying that “The abandonment of the unprotected [torpedo] boat does not involve the abandonment of the torpedo.” At the same time, the requirements for a successful torpedo attack became clear as well, with the ability to strike with the element of surprise being most important. Assistant Naval Constructor R.B. Dashiell saw the need for invisibility or low observability and took this to mean that a small boat was necessary in order to conduct a successful torpedo attack. Whitney also realized that torpedo boats could only be effective if they were invisible and saw a potential solution to the problem as early as 1887: “In what way, then, shall the high explosive projectiles be carried so as to certainly reach the object of attack in spite of machine and rapid-fire guns? One method possibly now taking practical shape is that of the submarine boat.”

CHAPTER 3 - The Torpedo and Submarine, 1900-1903

The submarine was an experimental platform that had not been used extensively in the US Navy. Like the torpedo boat, the submarine was met with a mixture of optimism and pessimism regarding its usefulness in combat. Early Navy submarines also faced the problem of limitations that confined it to defensive roles near the coast. However, the submarines proved to be a platform that had the potential to have its speed and range increased in the future, warranting investment in the platform. Although the submarine in this stage could not influence naval strategy in the crucial offensive sphere, it laid the foundation for future impact in this sphere.

The idea of a vessel that could submerge and attack from underwater was not a new idea in 1887, when Secretary of the Navy Whitney pointed to the submarine as a platform that could reliably get through the defenses of a surface vessel and bring it within striking distance. Some notable examples of earlier submarines include the Turtle, which was used during the American Revolution, and the Hunley, which successfully sank a Union ship during the Civil War.\footnote{Love, *History of the US Navy: 1775-1941*, 12, 316.}

Thanks to the advent of electric batteries and the invention of coal fired engines, submarines could rely on a propulsion system that did not directly involve human power. John Philip Holland, an Irish immigrant to the United States who for a long time dreamed of building a practical submarine, was one of the earliest figures to develop submarines with steam and electric propulsion.\footnote{Wildenberg, *Ship Killer: A History of the American Torpedo*, 37.}

In contrast to the torpedo boat, the submarine appeared to be the perfect weapon platform for the torpedo primarily thanks to its invisibility and potential to go far out to sea. As pointed out earlier, a successful torpedo attack needed to have the element of surprise in order to have the
best chance of success. The ability to submerge and approach the enemy “seeing but unseen” made the submarine the “ideal torpedo boat.” 96 Charles Domville-Fife even went so far as to say that the “hour of the torpedo came with the perfection of the submarine,” implying that the torpedo boat faced too many problems in trying to bring its weapon close to its target. Of these problems, the biggest was susceptibility to rapid fire guns. The conditions needed in order to launch a successful torpedo attack from a torpedo boat, such as fog or cover of darkness, further restricted use of the torpedo boat based torpedo. The submarine was the ideal torpedo boat because it rectified these problems, as Domville-Fife detailed:

“All the conditions of an ideal torpedo-boat were fulfilled - invisibility rendering daylight attacks possible; almost perfect immunity from gun-fire enabling the torpedo to be discharged at a closer range; submerged discharge removing the likelihood of the weapon being exploded by accurate gun-fire before being discharged; speed on the surface enabling the "carrying" vessel to maneuver for position; moderate speed when submerged enabling an attack under all reasonably tactical conditions.” 97

The submarine-torpedo combination was powerful, not only from the torpedo’s perspective but also from the submarine’s perspective. The Bureau of Construction and Repair, the part of the Navy responsible for ship design, procurement, construction, and repair, noted that the submarine had great offensive power thanks to its all-torpedo armament. The Bureau referred to an offensive capability within the role of coast defense. Rather than sitting in a torpedo boat and waiting for enemy ships to enter a chokepoint, submarines could stealthily and safely approach enemy ships while they were still quite a distance from the harbor. The submarine, with its unique ability to strike from underwater, found a complementary underwater weapon in the torpedo.

97 Domville-Fife, Submarines, Mines, and Torpedoes in the War, 24.
There were several potential roles that the submarine could fit, according to Holland and other observers. Rear Admiral Mordecai T. Endicott believed that the “perfect Holland boat” would be able to “blow battle ships to the bottom, to enter harbors and blow up mines and fortifications. It will, by clearing a harbor of mines, let in its allied fleet to destroy a fleet which had felt itself secure behind the network of harbor defenses.” An inspection board for the submarine Protector listed scouting, picketing, underwater cable cutting and repair, minesweeping, and attacks within harbors as more potential roles for this type of vessel. But like the torpedo boat, the most important role that the submarine would fill would be that of coast defense.

Several naval officers praised the coast and harbor defense capabilities of the submarines, shortly after initial tests of the Holland submarine. Lieutenant William Wilt Kimball audaciously declared that if he was given six Holland submarines with crews of his own choosing, he could "stand off the entire British squadron ten miles of Sandy Hook without any aid from our fleet." One of the most famous figures who showed his support for the new vessel was Admiral Dewey, who was known for his victory at Manila Bay. Dewey believed that if the Spanish had a couple of Holland submarines, he would not even be able to enter the bay. While these were bold statements, Rear Admiral James E. Jouett noted that "perspective was maintained by the testimony of Captain Alfred T. Mahan," who "glumly observed, 'In our present unprotected condition, the risk of losing the money by reason of the boat's being a failure is more than counterbalanced by the great protection the boat would be if a substantial success.'" While Mahan's statement implies that a large amount of money would need to be invested in order to

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100 Harris, *The Navy Times Book of Submarines: A Political, Social, and Military History*, 120.
101 Ibid.
develop and implement the submarine, the submarine was in fact a relatively inexpensive vessel that could be constructed rather quickly. Battleships took years and millions of dollars to construct, while several submarines could be built in under a year for the same cost. Lieutenant Lewis Nixon, who designed the battleships *Indiana* and *Massachusetts*, recommended that in order "for defense to be obtained quickly and at a comparatively slight expense I should recommend a number of submarine boats embodying the Holland patents." Echoing this recommendation was the claim of Elihu Frost of the Holland Torpedo Boat Company, who claimed that twenty Holland boats could be purchased for the cost of one battleship and constructed in one fourth of the time.

Like the torpedo boat, the submarine's primary role was considered to be coast and harbor defense. The blockades that had been used in the past and that Mahan had recommended were thought to have declined in effectiveness because of the introduction of the submarine. The submarine extended the range of coast defense forces and permitted a "vigorous local offensive." First with the introduction of the torpedo boat, and then the submarine, it was subsequently "held by naval tacticians and strategists that the days of the close blockades [were] over." The type of blockade where both sides of the conflict could watch each other closely appeared to be impossible to hold. Despite the great potential that the submarine appeared to hold, it shared its coast defense role with torpedo boats and mines. In fact, the submarine was

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102 Lewis Nixon, Memorandum, Record Group 233: Records of the US House of Representatives at the National Archives, 1789-1989: Records of the US House of Representatives at the National Archives, 1789-1989, Box HR56A, Folder F26.7, National Archives, Archives I.

103 Letter, Elihu Frost to Adm. George Dewey, April 12, 1900, Record Group 233: Records of the US House of Representatives at the National Archives, 1789-1989, Box HR 56A, folder F26.7, National Archives, Archives I.

104 The General Board of the Navy. "The Sphere and Scope of the Submarine in Coast Defense," Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, 1798-1947, Box 420.15, National Archives, Archives I.

considered a "daytime torpedo boat" while the unprotected torpedo boat was considered a "nighttime torpedo boat." In addition, sea mines were still considered to be of great use. The General Board of the Navy believed that "it would not be advisable to substitute them (submarines) for mine fields except possibly in certain individual cases."

Although remarks, such as those of Rear Admiral Endicott and the Protector inspection board, suggested that the submarine could be used in offensive action against enemy coasts and harbors, use of the submarine in such fashion had to face the same tactical limitations that torpedo boats had. Their small size meant a lack of quarters for crewmen, limiting the amount of sailing that a crew could endure. Frank L. Pinney, the commander of the USS Adder, which was one of the earliest submarines in US Navy service, believed that "many in the service do not understand the capabilities of our boats, and the limitation of their scope of usefulness. The entire absence of quarters, alone ties them to a base; either ashore or afloat." He limited the operational range of his submarine to about twenty-five miles, effectively limiting the submarine's role to coast defense. There was also the problem of limited air inside of the submarine, which limited the number of hours that the submarine could operate submerged. Furthermore, the submarine did not have very good longitudinal stability, another problem that limited its range of operations to the coast.

These limitations were not the only factor that hindered the submarine from use beyond coast defense. Just as there was ardent enthusiasm for the submarine, there was also doubt and

106 "The Sphere and Scope of the Submarine in Coast Defense," Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, 1798-1947, Box 420.15, National Archives, Archives I.
107 Ibid
108 Letter, Frank L. Pinney to William Henry Moody, February 23, 1904, Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, Box 420.15, National Archives, Archives I.
hesitancy regarding the usefulness of this class of vessel. For instance, the General Board and the Board of Construction pointed out in 1901 that the submarine had only been tested in favorable conditions that would not be present in an actual war.\textsuperscript{110} Therefore, these tests did not demonstrate the military value of the vessel. One of the more well known tests of the Holland submarine was a 1901 war game in which a Holland submarine sank the battleship \textit{Kearsarge}. According to the report, the \textit{Kearsarge} had already been hit by surface torpedo boats, which relaxed watches on the battleships, which allowed the \textit{Holland} to get in range to fire on the \textit{Kearsarge}. The conclusion was that the Holland had not done anything that a surface torpedo boat could not do.\textsuperscript{111} The submarine, despite the potential that many officers saw in it, was seen by others as not living up to the capabilities that it supposedly had. Admiral Melville summed up this sentiment well by calling the \textit{Adder} class submarine either valuable or completely worthless.

After appropriations for battleships were eliminated from naval appropriations in 1901 in favor of submarines, Admiral Melville reacted by saying that "It is, therefore, high time that those who believe in the efficiency of the submarine should be compelled to make good a few of their promises."\textsuperscript{112}

Despite questions about the submarine's actual utility in battle, development of the vessel continued as a result of foreign development of submarines and the psychological effect of the submarine on enemy forces. The United States was not the only country that was interested in submarine development. As such, some drive behind submarine development came from concerns regarding other navies' efforts at improving the submarine. Chief Engineer Lowe believed that development of the submarine to be an urgent matter and compared French

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\textsuperscript{110} Frank T. Cable, John Philip Holland, William Wilt Kimball, \textit{The Birth and Development of the American Submarine} (New York: Harper & Bros, 1924), 170. \\
\textsuperscript{111} Senate Committee on Naval Affairs, Reports and Newspaper Articles on the Holland Submarine Boat, 56th Congress, 1st session, 1901, S. doc. 14. \\
\textsuperscript{112} Cable, \textit{The Birth and Development of the American Submarine}, 171. 
\end{flushright}
spending on submarines to American spending on the same. In 1899, France was spending well over $1.4 million on submarines while the US, in Lowe's words, "has not spent one cent, nor has it bestowed anything more than scant encouragement upon the private company which has spent large amounts of money."\textsuperscript{113} The Bureau of Construction and Repair believed that the US had a good weapon platform in the Holland, but realized that as more submarines were built, modifications made on newer models would have to be retrofitted onto existing submarines. The nation to first obtain these newer models would not only accrue the advantages of the newer models, but would also gain an advantage over other navies in cost savings resulting from an earlier understanding of newer submarine types. The Bureau recognized an opportunity to pull ahead of foreign navies in terms of knowledge of this powerful naval arm. This opportunity resulted from the Bureau’s perception of a weapon that was going to undergo extensive modification but was not yet in widespread use in foreign navies.\textsuperscript{114} The fear factor that the torpedo had applied to the submarine as well. Fear of an attack from an unknown source could cripple the morale of a crew on a surface ship.\textsuperscript{115} Lewis Nixon, a naval architect who helped build the Holland submarine, argued before the House Committee on Naval Affairs in 1901, that he would recommend the construction of submarines because of its ability to influence crew morale in such a way.\textsuperscript{116}

A very common sentiment that naval officers expressed about the submarine was that its effectiveness in combat could not be judged because it was such a new weapon. Like the Bureau of Construction and Repair forecasted, the submarine would be modified greatly in the future.

\textsuperscript{113} Senate Committee on Naval Affairs, Reports and Newspaper Articles on the Holland Submarine Boat, 56th Congress, 1st session, 1901, S. doc. 14.
\textsuperscript{114} Department of the Navy, \textit{Annual Reports of the Navy Department} (Washington, DC: Government Printing Office, 1900), 664.
\textsuperscript{115} Brayton Harris and Walter J. Boyne, \textit{The Navy Times Book of Submarines: A Political, Social, and Military History} (New York: Berkley Books, 1997), 120.
\textsuperscript{116} Lewis Nixon to House Committee on Naval Affairs, January 13, 1901, \textit{Papers on Military Value of Holland Submarine Boat}, 56th Congress, 2nd Session, 1901, Document no. 115
because it was such a new weapon. Mahan expressed in 1907 that the true capabilities and effectiveness of the submarine had yet to be seen. In an article in Colliers, Mahan speculated on the role of the submarine in fleet action and in supporting blockades of enemy ports. He understood that the submarine’s ability to submerge and move within torpedo range of a battleship through porpoising posed a large threat to the battleship.\footnote{Porpoising is the action of a submarine when it surfaces for a short amount of time to get its bearings, and then quickly re-submerges. Submarines would do this several times when on an attack approach.} He also understood that an awash submarine could serve as a powerful scout in support of blockades against enemy ports, keeping track of enemy ship movements. However, Mahan pointed out that the submarine had yet to be tested in actual battle, and that newer submarines were being built. He refrained from speculating too much on the abilities of future submarines, but held the notion that the Navy was “probably at the opening of another progression, such as the surface-torpedo boat underwent: second class boats, first class boats, torpedo boat destroyers.” This idea implied that submarines, although still seen as being confined to coast defense, could later reach further out to sea like torpedo boat destroyers.\footnote{Captain A.T. Mahan, “The Submarine and its Enemies,” Colliers, April 6, 1907, 20-21.}

The potential capabilities that were touted for the submarine would take time to develop as private submarine builders built larger and more endurable submarines. Even as late as 1912, the notion that the submarine still had room to further enhance its capabilities still existed. Chester Nimitz asserted that submarines were equal to, if not better than surface craft in terms of mobility, communication, invulnerability, and offensive strength. Thanks to its ability to submerge, it could immensely reduce its visibility and use radio communication safely and protect itself from surface attack. But there was still room for improvement. For instance, he believed that although battleships of the time could operate in more areas than the submarine, the mobility of submarines would increase faster than that of surface vessels. This mobility entailed...
the submarine’s surface speed. Nimitz held that given the time, future submarines would be able to increase their surface speed and have an easier time keeping up with the larger surface ships of the battle fleet. Although he initially used the term "offensive strength" in a coast defense context, referring to an offensive type of defensive that engaged blockading ships while they were still outside of the harbor, he later spoke of how "the steady development of the torpedo together with the gradual improvement in the size, motive power, and speed of submarine craft of the near future will result in a most dangerous offensive weapon, and one which will have a large part in deciding fleet actions." Nimitz, like Mahan, characterized the submarine as a weapon that had ample room for advancement. In Nimitz’s view, such development meant better sea-keeping qualities, simpler engines, and better fuel efficiency, in addition to greater surface speed.

In order for the torpedo to have an influence in fleet actions, it had to be able to reach out into the high seas. Although the submarine's limitations appeared to confine it to the realm of coast defense, the Navy demonstrated its desire to turn this defensive weapon into an offensive one. One of the less practical ideas was to have battleships carry submarines and lower them into the water before an engagement began. Although this was considered technically impractical, the fact that such a plan was considered just so that submarines could be brought out to sea along with the battle fleet demonstrates the Navy's interest in using submarines in fleet action. A more efficient solution to this problem was the use of submarine tenders. The most promising method of bringing submarines out to sea came in the form of a completely new design for submarines, called the submersible. Instead of having a single hulled cylindrical shape, the submersible

121 Herbert C. Fyfe and Sir Edward J. Reed, Submarine Warfare Past, Present, and Future (London: Grant Richards, 1902), 19.
design featured a double hull that was shaped more like a surface ship. This design gave it more internal space and better seaworthiness, both of which were lacking in the previous designs. This ship-shaped hull design had better surface speed, "high enough to enable it to accompany a sea-keeping fleet of battleships," as Nimitz noted.\footnote{Nimitz, “Value and Tactics of Modern Submarines,” 1198.}

The strategic effects of the submarine based torpedo can be seen mainly in naval planning, or the part of strategy that Mahan said “precedes the operations of the campaign.”\footnote{Captain Alfred Thayer Mahan, “The Practical Character of the Naval War College,” Proceedings of the United States Naval Institute 19 (1893): 163.} Much of the discussion that took place regarding the submarine was projection. Unlike the torpedo boat, the submarine had more roles that it could potentially fill. In addition, the opinions of the naval officers cited suggest that a sense of novelty surrounded the submarine, compelling naval officers to forecast how submarines could be used for torpedo attack, reconnaissance, mine clearing and many other roles.
CHAPTER 4 - Breaking Out into the High Seas, 1903-1914

The torpedo and submarine, both weapons that were initially largely confined to roles in coast and harbor defense, began to break out of this defensive role in the first decade of the twentieth century. Their entrance into the open sea and offensive roles in warfare can be attributed to advances in technology that finally convinced naval planners that torpedoes and submarines had to be accounted for in high seas operations with a cruising battle fleet. In fact, torpedoes began to reach a parity with naval guns, the predominant naval weapon of the time, in effective range. With these advances, the torpedo began to influence naval strategy in the pivotal offensive battle space.

The breakthrough for the torpedo was actually more of a gradual advance in range and accuracy. For the submarine, the submersible design and diesel engine gave it the ability to perform operations far out to sea. A critical point was reached when torpedoes began to boast effective ranges of 3000 yards or more. This range was important because beyond this distance, unavoidable errors in gun fire due the difficulty of range-finding at such ranges and the rolling action of the ship itself would lead to a decrease in accuracy and a lower percentage of hits. In 1903, the Bureau of Navigation believed that the hit percentage for naval guns at this range would be low enough that decisive action could not be obtained through gunfire alone at these ranges. The Bureau also noted that at this range, the hit percentage of naval guns and that of torpedoes were roughly the same. The Bureau subsequently believed that "the present evidence of the accuracy and destructiveness of the torpedo as a weapon [was] too strong to be disregarded; that torpedoes in battleships have an important value tactically as a weapon of

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124 Report, Bureau of Navigation, October 7, 1903, Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, Subject File 407, National Archives, NARA.
offense and defense."\textsuperscript{125} As a result, the Bureau recommended that every armored vessel carry two or more submerged torpedo tubes. In addition, the Bureau pointed out that the "opinion for such action [was] confirmed by the universal practice abroad."\textsuperscript{126}

The General Board of the Navy concurred with the Bureau of Navigation's opinion, echoing the notion that "gunfire, in order to result in a decisive action, must be delivered at a range not greatly exceeding 3000 yards." Furthermore, the General Board took this view a step further and believed that it "follows that the tactics of fleet actions will hereafter be influenced by the presence or absence of torpedoes."\textsuperscript{127} The Naval War College supported the conclusion that torpedoes would play a crucial role in fleet tactics after conducting war games involving nearly equal fleets. The two fleets were equal except that one had torpedoes and the other did not. The results of the war games were decisive:

"Tactical war games played at the naval war college between fleets with and fleets without torpedoes have been won by the former whenever the result of the game has been decisive; in all cases, the fleet armed with torpedoes holds the command of the situation in tactical maneuvers, and, on the other hand the fleet without them finds itself very much hampered in all its efforts."\textsuperscript{128}

Previous concerns that submerged torpedo tubes would require design changes to surface ships that were not worth the extra cost gave way to support for arming surface vessels with these torpedo tubes. A scenario that demonstrated the advantage of equipping surface vessels with torpedoes was illustrated by Assistant Naval Constructor T. G. Roberts, also in 1903. Roberts imagined what would happen if an American battle fleet faced an enemy fleet that was led by a commander who conducted battle like the British Admiral Horatio Nelson. This Nelson-like

\textsuperscript{125} Ibid
\textsuperscript{126} Report, Bureau of Navigation, October 7, 1903, Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, Subject File 407, National Archives, Archives I.
\textsuperscript{127} Report, General Board of the US Navy, September 26, 1903, Record Group 80: General Records of the Department of the Navy: General Records of the Department of the Navy, Subject File 407, National Archives, Archives I.
\textsuperscript{128} Ibid
captain would be bent on closing the distance between the two fleets as quickly as possible in order to force a close-range engagement. Roberts believed that it would take about fifteen minutes for the fleets to close after opening gunfire at a distance of five knots. This would leave twelve minutes before torpedoes of that time could effectively engage the opposing fleet. If the enemy fleet could not be destroyed within those twelve minutes, then torpedoes would be unleashed. At these close ranges, an American crew would be much more comfortable and would be in a better fighting spirit if they knew that their ship had torpedoes. If not, then the American ship would be at the mercy of enemy torpedoes, which would certainly demoralize the crew with the knowledge that a single hit could disable or even sink the entire ship.129 Lieutenant commander Frank H. Schofield decided to take the concept of a torpedo armed large surface vessel one step further when he wrote a letter to the General Board “suggesting it carefully consider a capital ship armed with torpedo tubes alone.”130 Although the General Board considered such a design ridiculous, it exemplified the rising importance of the torpedo relative to naval guns.

The "command of the situation" that General Board referred to not only manifested itself in the torpedo’s usefulness in close range battle, but also in the ability of this weapon to dictate the range at which two fleets could engage each other in battle. In 1907, Commander Bradley A. Fiske, a naval inventor and later member of the General Board, believed that he would be able to safely declare that "the auto-torpedo will soon make us do our gun fighting beyond 4000 yards."131 The general principle was that in regards to battle range, "the least range than can be used is that a little in excess of the range of the enemy's torpedoes; the maximum range of the

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enemy's type of torpedo is therefore the minimum battle range to be sued in a fleet action."\textsuperscript{132}

Command of fleet tactics also manifested themselves in how torpedoes could induce adjustments in fleet positioning. The enemy fleet could conceivably be forced to move their ships into such a position that they would not be able to train all of their guns onto the other fleet. This would come as a result of the enemy fleet maneuvering to stay out of torpedo range.\textsuperscript{133}

While the ability to induce maneuvers in an enemy fleet through surface vessel launched torpedoes was great, this ability was amplified when the weapon platform was a submarine. Sea-keeping submarines were to be used as a means to set up danger zones that an enemy would have to avoid if he saw them. Nimitz posited that "the appearance of several groups of submarines within or very close to his formation just before a general gun action would undoubtedly case the enemy to so alter his plans and formation that he would be at a temporary disadvantage, and at the mercy of our fleet."\textsuperscript{134} Torpedoes would not even have to hit their target in order to have an effect, as Nimitz believed the mere effect on enemy morale of torpedoes nearly missing their ships would be enough to give a friendly fleet a small advantage. The General Board faced the reality that "the submarine has developed to a point where it must be reckoned with and relied upon in high sea fleet actions."\textsuperscript{135}

Another sign of this rising importance can be seen in the remarks of George A. Converse on torpedo training. According to Converse in 1903, only thirteen percent of the torpedo practice needed to fulfill general order requirements was being fulfilled on ships. But the more surprising revelation were “the reasons given in the report of ships for not having practice [which] were

\textsuperscript{132} Translated from German, "Gun Distribution Aboard Modern Battleships." \textit{Proceedings} 33 (March 1907): 223.
\textsuperscript{133} Fiske, "The Naval Profession," 535.
\textsuperscript{134} Nimitz, "Value and Tactics of Modern Submarines," 1198.
\textsuperscript{135} "The Submarine Situation in 1912", memorandum, General Board of the US Navy, April 22, 1912, Record Group 80: General Records of the Department of the Navy; General Records of the Department of the Navy, Subject File 407, National Archives, Archives I.
generally embraced in the simple statement ‘no opportunity for practice.’” In contrast, practice with gunnery was not lacking. Torpedo training was not only lacking on ships, but also in naval education establishments. The course in the use of torpedoes at the Naval Torpedo Station was only three months long. The course was only held in the winter when there was little opportunity for practical instruction. Even the ordnance officer in charge of torpedoes on ships was “selected because of his special knowledge of guns, and the duties required in connection with the proper care and handling of the guns leave him little time to be devoted to the torpedoes.” Converse urged that changes be made to the training regimen in order to allow for more practical instruction and more time for instruction. Fortunately for those urging for an increase in torpedo training and practice, the Naval Torpedo Station reported in 1912 that torpedo repair work was increasing due to increased torpedo practice. The Station’s facilities could not keep up with the increased repair work, and asked for resources to expand and modernize its facilities to manufacture and repair torpedoes.136

The desire for long range submarines did not just represent the submarine’s breakout into the open seas but also allowed for a change in the way that the US Navy performed coast defense. Initial plans for coast defense submarines called for submarines to be stationed at certain harbors because they could not travel very far. This type of coast defense strategy would require a large number of submarines and infrastructure to support it. With long range submarines, the General Board recommended that a group of submarines that could roam up and down the coast be utilized for coast defense. This would be a much cheaper solution to coast defense in the long run. The General Board stated that “they must be regarded as seagoing craft,

and are not efficient unless they have this characteristic.” Although this was a coastal defense use of a submarine capable of fleet action, it demonstrated the effects of having submarines with such capabilities.

The entrance of submarines into the high seas can be clearly seen in the desired characteristics for submarines. Thanks to the submersible design, ranges in the thousands of miles could be achieved without placing too much strain on the battle fleet as a whole. In 1910, the Bureau of Construction sent a request to the American Laurenti Company, asking for the cost and specifications of a “high speed submersible torpedo boat.” The submarine, while capable of ranges up to 6000 miles, was reported to cost $1 million, which turned out to be half of the entire budget allocated to submarine construction. In 1911, the General Board recommended in a study called "Characteristics of New Submarines" to have submarines that had operating radii between 3000 and 5000 miles. Cost initially proved to be a roadblock to the construction of sea-going submarines. Nevertheless, this request for information indicates the growing acknowledgement of the submarine’s future in offensive action on the high seas.

The US was not alone in its interest for long range sea keeping submarines. In fact, it was concerned about foreign development outpacing American development, similar to American concerns about foreign development of torpedoes and torpedo boats. Naval planners and officers realized that the US Navy needed to play a game of catch-up in fleet submarine development. As early as 1901, it was known that Germany was not developing submarines for coast defense and was wholly committed to building fleet submarines for operations on the high seas. The

137 "The Submarine Situation in 1912," memorandum, General Board of the US Navy, April 22, 1912, Record Group 80: General Records of the Department of the Navy, subject File 420.15, National Archives, Archives I.
138 Request, Bureau of Construction, October 20, 1910, Record Group 80: General Records of the Department of the Navy, Subject File 420.15, National Archives, Archives I.
139 Report, General Board of the US Navy, April 26, 1911, Record Group 80: General Records of the Department of the Navy, Subject File 420.15, National Archives, Archives I.
commander of the 2nd submarine division, John T.G. Stapler, later pointed out in 1912 the lagging position of the US in submarine construction relative to other navies. Great Britain, France, Russia, and Japan were all building fleet submarines of over 900 tons. These heavier submarines gave the submarine better sea keeping qualities and better habitability for the crew. Stapler noted that the US Navy, on the other hand, “[had] hardly past the 400 ton mark of submerged displacement. During the past few years, designs have practically been duplicated while other countries have been reaching out and drawing ahead.”

The strategic effects of the long range submarine and torpedo on naval strategy are immense. Changes can be seen in planning, tactics, ship weaponry, fleet composition, and training. The use of the battleship and naval gun, which were the core of the offensive battle fleet, were now determined by torpedo ranges and submarine danger zones. The fleet that officers wanted to arm solely with guns, now had to be equipped with torpedoes, lest their opponents force an engagement at torpedo range. Fleet submarines were projected to play a greater role in fleet action, thanks to their ability to safely close the distance between two opposing fleets by submerging. Submarines, simply by making the enemy suspect its presence, could force enemies into disadvantageous position in battle. Projected increases in the participation of submarines in fleet action and foreign development of fleet submarines translated into a greater demand for fleet submarines by the US Navy. Because the US Navy did not fight any wars between 1903 and 1914, there was no way to test these theories in combat. But these theories still represent shifts in strategy as they fall within Mahan's view that strategy originated in a mental process. In short, the decisive destruction of an enemy fleet in order to gain sea

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140 Letter, John T.G. Stapler to George von Lengerke Meyer, Record Group 80: General Records of the Department of the Navy, Subject File 407, National Archives, Archives I.
control began to rest less with how the gun was used and more with how torpedoes and submarines were used.
CONCLUSION

The torpedo's journey from a coast defense weapon to an offensive fleet action weapon caused a number of changes in US naval strategy, even though the US Navy did not sink one enemy ship in combat between 1866 and 1914. When the Navy adopted Mahan's offensive defensive strategy, the limitations of the torpedo boat and submarine appeared to confine the torpedo to coastal action. Because the high sea was where decisive naval action took place, these two weapon platforms initially mitigated the effect of the torpedo on US naval strategy. The torpedo and its weapon platform were at the center of a debate about how effective the torpedo was and what its place in the Navy was. Thanks to foreign development of torpedo forces and the sheer psychological power of this weapon, torpedoes and their weapon platforms continued to grow in number from 1890 to 1914. Once the torpedo and the submarine reached into the high seas offensive realm, they caused considerable shifts in naval strategy. These shifts manifested themselves in naval planning, tactics, training, fleet composition, and ship weaponry and equipment. Mahan's idea of gaining control of the sea by eliminating an enemy's naval forces still held strong by the beginning of WWI, but they way by which that control was gained had changed.

Jackie Fisher, the British admiral commonly associated with the development of the Dreadnought-type battleship, was actually an ardent supporter of submarine development. A letter that he wrote in 1904 captures the obstacles that the torpedo had to overcome in order to participate in fleet action. Although the letter addresses submarines, the ideas that his letter alludes to are parallel to several ideas in this thesis, including the importance of the offensive-defensive divide:

"I have not disguised my opinion in season and out of season as to the essential, imperative, immediate, vital, pressing, urgent (I cannot think of any
more adjectives) necessity for more submarines at once - at the very least twenty-five in addition to those now ordered and building and 100 more as soon as practicable, or we shall be caught with our breeches down just as the Russians have been! And then, my dear friend, you have the astounding audacity to say to me: 'I presume you only think they (the submarines) can act on the defensive'!! Why my dear fellow, not take the offensive? Good Lord! If our Admiral is worth his salt he will tow his submarines at eighteen knot speed and put them in the hostile port (like ferrets after the rabbits) before war is officially declared...In all seriousness I don't think it is even faintly realized the immense, impending revolution which the submarine will effect as offensive weapons of war."141

Fisher recognized the divide between offensive and defensive roles and the limitations of the submarine in traveling across the ocean, which is why he urges his admiral to tow his submarines out to sea. He also recognized that the submarine, at the time, was seen only as a defensive weapon. However, Fisher dared to go against the established opinion and suggested a way to bring submarines out to the open sea. Additionally, he recognized that this new weapon would change the way that navies fought. Torpedoes overcame these barriers on its journey from being just a coast defense weapon to an offensive weapon that was vital in fleet action.

The torpedo's success in WWI serves as confirmation of the torpedo's immense effect on strategy and naval warfare. German unrestricted warfare was sinking so much shipping that by 1917, food lost to U-boat torpedoes combined with a bad harvest, brought the UK within weeks of running out of food.142 More importantly, the psychological effect of Germany's submarine campaign was astronomical. Even though fewer than 13000 lost their lives to the submarine campaign, which was not a high number compared to the number of people being killed in the trenches of the Western Front, Germany was accused of waging an immoral campaign against humanity. Interestingly, even Admiral Tirpitz admitted that the submarine campaign had only angered the British more and had made him consider whether Germany really was committing

141 Admiral John Fisher to Admiralty House, April 20, 1904, quoted in Brayton Harris, The Navy Times Book of Submarines: A Political, Social, and Military History by Brayton Harris, 152.
142 Lisle A. Rose, Power at Sea: The Age of Navalism 1890-1918 (Columbia: University of Missouri, 2006), 259-60.
crimes against humanity. This led to a pause in the submarine campaign, giving the Allies time to develop counter-tactics that would defeat the submarine campaign when it restarted in 1917.\textsuperscript{143}

Today, torpedoes are still in widespread use in modern navies. They are still very cost efficient weapons as evidenced by tests where a single torpedo can literally cut a ship in half. Although new weapons have entered naval warfare, like anti-ship missiles and aircraft dropped bombs, there are no plans in the US Navy to phase torpedoes out of service even though they have been in service for well over a century.

Selected Bibliography


United States National Archives and Records Administration. Center for Legislative Archives. Record Group 233.


