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**PIONEER INVENTORS, SEA DEVILS, AND INFERNAL MACHINES:
SUBMARINE DEVELOPMENT IN THE UNITED STATES FROM THE
AMERICAN REVOLUTION THROUGH THE AMERICAN CIVIL WAR**

A Thesis

Submitted to the Graduate Faculty of the
University of South Alabama
in partial fulfillment of the
requirements for the degree of

Master of Arts

in

History

by

Thomas Motes

B.A., Spring Hill College, 2014

May 2022

Dedicated to my late grandfather, Eural Dee “Mac” McCloud, who inspired my thirst for knowledge and helped make me who I am today. Words cannot express how much I owe to him. I will never forget you, Granddaddy.

ACKNOWLEDGEMENTS

I would like to thank my family for being so supportive of me during the process of writing this paper. A special thanks is for my mother, Cathy Motes. I would also like to thank Dr. Henry McKiven for suggesting I write this paper and Kay Johnson for all her help. I thank Ashleigh Morton, too, for her invaluable assistance and guidance, not just with this paper, but throughout the years. I could not have done this without her. Thanks also go to Shea McLean, curator at Battleship Memorial Park and my boss, for his understanding and support while I worked on this thesis. Lastly, I wish to thank Mark Ragan and Chuck Veit, whose books on early American submarines were and still are a huge source of inspiration for my research in the field of submarine history. Thank you all so much. This paper would not have been possible without your help.

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ABSTRACT

Motes, Thomas, M. A., University of South Alabama, May 2022. *Pioneer Inventors, Sea Devils, and Infernal Machines: Submarine Development in the United States from the American Revolution through the American Civil War*. Chair of Committee: Henry McKiven, Ph.D.

This thesis is a study of the history of early American submarine development, from the American Revolution through the American Civil War, with a brief discussion of what happened afterwards. Early American-made submarines are often not studied in detail with the exception of the most famous vessels like the *H. L. Hunley* and the *Turtle*. Few people realize just how many submarine projects were worked on in the eighteenth and nineteenth centuries, and many do not know anything about these submarines at all. This paper will cover the history of submarine development, the men behind them, what contemporaries thought of them, and ultimately what effect, if any, they had on American history. Because information on some of these submarines is scarce, some educated guesses and speculation will be used where necessary. The reasons for submarine development and what compelled people to develop submarines will also be discussed. In writing this paper, I hope to provide a better understanding of the long history of American submarines and encourage others to research these early submarines, perhaps making discoveries of their own.

INTRODUCTION

“There are two types of vessels in the Navy today: submarines and targets.” This quote by an anonymous retired naval officer, emphasizes the importance of submarines in modern navies. In a time when ships can be taken out with missiles from great distances without the need to get within visual range, stealth is key. Submarines allow navies to sneak up on targets and strike without being seen and carry a payload of missiles to enemy shores without detection. Their ability also makes them a vital nuclear deterrent, considering they are able to launch nuclear missiles at enemy shores should surface launch sites be destroyed. They also have a wide variety of other uses, including reconnaissance, aircraft carrier protection, and deploying covert operatives behind enemy lines. These highly versatile crafts are vital for naval dominance. Today, the United States Navy maintains a large fleet of nuclear submarines that patrol the world’s oceans.

Considering the role of submarines in the military and studying the history of submarines can help us gain a better understanding of how these vessels became so important. While the history of submarines in the twentieth century is well known, the history of submarine technology prior to that time is not. The history of the submarine goes back hundreds of years, and American submarine history dates back to the late colonial period. Like many forms of technology, times of conflict served as the greatest driving force behind the development of submersible and semi-submersible vessels.

Warring parties then, as now, were always looking for a new weapon that could give them an edge over their enemies. The submarine was one such weapon; but the limits of technology at the time meant that most efforts to use such vessels ended in failure. Usage was further limited by the perceptions of naval officers at the time, as many naval officers in the eighteenth and nineteenth century viewed the use of submarines as dishonorable.¹ Despite this, there were a number of early attempts to use submarines during the American Revolutionary War and the War of 1812. During that time, the United States found itself confronting the Royal Navy, the most powerful naval force in the world at the time. Desperation in the face of a superior force seems to have made the submarine more appealing, though the perception of the submarine as an underhanded weapon quickly returned once these conflicts ended. The potential of underwater warfare was largely ignored throughout most of the nineteenth century, though a number of civilians continued to experiment with underwater crafts. In 1861, however, events would be set in motion that would bring drastic changes to naval warfare.²

The United States was engulfed in a bloody civil war from 1861-1865. The war that began in 1861 was between the Union forces, which was made up of people from the northern states that remained loyal to the United States government, and the Confederate forces that were made up of rebels from the South that refused to accept Lincoln, a member of an anti-slavery party, as the President, as well as the abolitionist views of

1. James P. Delgado, *Silent Killers: Submarines and Underwater Warfare* (New York: Osprey Publishing, 2011), 11.

2. Mark K. Ragan, *Submarine Warfare in the Civil War* (New York: Da Capo Press, 2002), vii-viii.

most northerners. The war stretched across much of the southern United States and resulted in the loss of countless lives. A war that was supposed to end within a few months dragged on for years, with both sides attempting to employ new tactics and weapons in order to gain the advantage. This was especially apparent on the water, where the Union Navy blockaded the southern coast in the hopes of depriving the Confederacy of much needed supplies.³ The Confederate rebels worked hard to find different ways around the blockades, while the Union worked to improve them. Both sides employed the use of new and experimental weapons of war during this time. The armored ships known as ironclads were among the most famous of these weapons.⁴ The Battle of Hampton Roads marked the first time in world history that two such armored warships, the CSS *Virginia* and the USS *Monitor*, faced each other in combat. Mines, or torpedoes, as they were known during the 1860s, played a prominent role with the Confederate forces. These useful weapons, loaded with additional explosives, lined the ports of Confederate harbors to create obstacles for blockading ships.

One of the lesser-known weapons that was used in the war was the submarine. The study of submarine warfare during the Civil War has been limited in the past and has only recently received public attention with the raising of the *H. L. Hunley* in 2000. The *Hunley* was a Confederate submarine which became the first underwater vessel to sink an

3. Ragan, *Submarine Warfare*, 3.; Horatio L. Waite, "Confederate Commerce-Destroyers. The Blockade of the Confederacy," *The Century, A Popular Quarterly* 56, no. 6 (October 1898): 914-929.

4. B. Harris and W. J. Boyne, ed., *The Navy Times Book of Submarines: A Political, Social, and Military History* (New York: Berkley Publishing Company, 1997), 79.

enemy ship in combat.⁵ With films, books, documentaries, and more featuring the vessel, the *Hunley* entered the public eye, and the conservation center where it now resides has become a popular tourist attraction. What most people do not know is that the *H. L. Hunley* is not the only successful submarine or semi-submersible vessel that was used and developed during the Civil War. The truth is that there were dozens, if not more, of these experimental vessels designed during the Civil War. Some of the crafts never made it past the proposal or development stage, while others were developed, built, tested, and even used in combat. Both sides of the conflict, Union and Confederate, built and used submarines during the Civil War.⁶

Equally important to the history of submarines is the history of semi-submersibles. These are vessels which only partially dive, leaving part of the vessel above the surface. Semi-submersibles and submarines are closely linked. They were built for largely the same reasons. Although semi-submersibles have largely disappeared in modern times, they were much more common in the early days of submarine development. In the eighteenth century, sails were the primary means of propulsion for warships. These would be useless underwater, so submarines relied on hand-power. The nineteenth century would see the rise of the steam engine, which would soon become the primary means of propulsion for ships; however, these were not reliable for underwater use, either. The steam needed a means to escape—like a smokestack—which would not

5. Andrew Curry, “Time Capsule from the Sea (Cover Story),” *U.S. News and World Report* 143, no. 1 (02 July 2007): 47-50, <http://search.ebscohost.com/login.aspx?direct=true&AN=25517375&site=ehost-live>.

6. Curry, “Time Capsule,” 47-50.

work underwater. Steam engines also generate a lot of heat, which would make a small, confined space underwater uncomfortable, if not unbearable. Although attempts were made on a number of occasions to incorporate steam or other types of engines into fully submersible vessels during the nineteenth century, none of the efforts in the United States were successful. Those submarines that had working engines could only use them on the surface, switching to manual propulsion when they submerged. Thus, hand-power remained the primary means of propulsion for submarines for much of the nineteenth century. Semi-submersibles, however, could incorporate smokestacks since part of the vessel would remain on the surface. They were also safer than fully submersible vessels since it was easier to keep the crew supplied with air. Navigation and technical challenges were less of an issue as well. Semi-submersibles offered builders of the time many of the same benefits of submarines, such as stealth and protection from surface attack, albeit to a lesser extent, with less risk to the crew and the ability to use the steam engines typically used by surface craft. They were developed alongside submarines for the same reasons and worked in much the same way. This makes them important to any understanding of the development of submarine technology.

CHAPTER I

EARLY SUBMARINE DEVELOPMENT

During the late 1800s, submarine technology was still in its infancy, so submarines and semi-submersibles were found to be just as dangerous to the crew as they were to the enemy. Both sides lost many lives in submarine experiments, especially the Confederacy. Despite the danger, many men came forward to be the crew members of the submarines in order to provide service to their countries. Sadly, their stories are poorly documented, and the events surrounding many of these incredible crafts are shrouded in mystery.⁷

1.1 The Beginnings of Submarines

The concept for submarines can be traced back to England in 1578, where an innkeeper named William Borne devised the concept for a boat that would be able to submerge into the water without detection by decreasing its volume. Then around 1620, Cornelis Drebbel, a Dutch inventor living in England, brought Borne's concept to life with the first-ever working submarine. The experimental submarine is known by some today as the "Drebbel" although it was never given an official name itself.⁸

7. Ragan, *Submarine Warfare*, ix-xi.

8. Harris and Boyne, *Navy Times Book of Submarines*, 5-8.

The use of submarines by Americans as a weapon of war can be traced all the way back to the American Revolutionary War. The earliest attempt to create a submarine in the United States was first referenced in a proposal by Joseph Belton to the Pennsylvania Committee of Safety during the American Revolutionary War. His purpose was to build a submarine for the colonies' protection. Belton envisioned the design in 1774 and proposed to use it to help the cause of the patriots during the conflict. However, Belton's design was never built.⁹

In November of 1775, letters between Dr. Benjamin Gale and Silas Dean mentioned a submarine being developed for use against the British fleet. The one-man submarine came to be known as the *Turtle*, and was designed by Yale graduate and inventor, David Bushnell. Bushnell's invention saw action against the British fleet in the New York Harbor during its service with the Continental Army under George Washington's command. The one-man submarine was the first watercraft to make use of a hand-cranked propeller, or screw, for power. This vessel was meant to descend under an enemy ship, where an exterior drill could be used to attach an explosive to the hull, or bottom of the ship. Once the explosive was attached, it was then detonated by the submarine's operator. This process was mentioned in both the journal of James Thacher and also in a post-war letter written by Ezra Lee, the submarine's operator. It was said that the *Turtle* made an attack on the HMS *Eagle* on the night of September 6, 1776. Lee stated that he maneuvered the *Turtle* into position and attempted to attach the explosive.

9. Richard Keith Wills, "The Louisiana State Museum Vessel: A Historical and Archeological Analysis of an American Civil War Era Submersible Boat," Master's thesis (Texas A&M University, 2000), 4, <http://www.nautarch.tamu.edu/Theses/pdf-files/Wills-MA2000.pdf>.

The plan failed when the drill hit an iron bolt or brace and could not penetrate it. He tried to move the submarine into a different position to attack from a different point on the hull. Unfortunately, his inexperience with the craft, combined with likely exhaustion from fighting the current, led to him getting off course and losing the warship. He eventually surfaced in an attempt to get his bearings, only to realize that the sun was rising. He abandoned the attempt and was barely able to escape the British pursuers after being spotted while detaching and detonating the explosive in order to escape. Lee made another attempt on an unknown frigate, but he was once again spotted. He dove too deep after misreading the depth measuring device in the vessel, and lost sight of the target. Other attempts were made, as described by Thacher in his journal, but all attempts ended in failure.¹⁰

Bushnell and the Continental Army waited for another opportunity to attack using a submersible. Unfortunately, on October 6, 1776, the boat carrying the *Turtle* was sunk, taking the submarine with it to the bottom. The *Turtle* was recovered, but Bushnell was in bad health by that point. He felt that he would not be able to get enough support for

10. Harris and Boyne, *Navy Times Book of Submarines*, 27-33.; Dr. Benjamin Gale to Silas Deane, February 1, 1776. Found in *Correspondence of Silas Deane Delegate to the Congress at Philadelphia, 1774-1776* (Hartford, CT: Collections of the Connecticut Historical Society, 1860), 358-359. Found in digital archives, The Submarine *Turtle*: Naval Documents of the Revolutionary War, Naval History and Heritage Command. <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/submarine-turtle-naval-documents.html#item12>.; Ezra Lee to David Humphreys, February 20, 1815, Yale University Library. A slightly modified version of the letter was published in *The Magazine of American History* 29 (New York, NY: A. S. Barnes Company, January-June 1893). Found in digital archives, The Submarine *Turtle*: Naval Documents of the Revolutionary War, Naval History and Heritage Command. <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/submarine-turtle-naval-documents.html#item12>.

another attempt at using the submersible for an attack. He believed that Lee needed more training in the use of the submarine. Thus, as Bushnell wrote after the war, “I therefore gave over the pursuit, for that time, and waited for a more favorable opportunity, which never arrived.” The *Turtle* was never used again, and its fate is unknown. It is possible that it may have been destroyed in order to prevent it from being captured when the American forces abandoned New York.¹¹

Despite the submarine’s failure, contemporary writers praised the *Turtle* as an innovative machine. Thacher firmly believed that the failure of the submarine was not due to “any defect in the principles of this wonderful machine.” Thomas Jefferson, while serving as ambassador to France, showed great interest in the submarine, and contacted George Washington to find out more about the vessel. Washington told him that he believed the vessel “an effort of genius,” blaming the failure on the difficulty one man would have operating such a complex craft.¹²

11. Harris and Boyne, *Navy Times Book of Submarines*, 33-34.; David Bushnell to Thomas Jefferson, October 17, 1787, Papers of Thomas Jefferson, vol. 13, Library of Congress, Washington, DC. Printed in Thomas Jefferson, ed. by Julian Boyd, et al., *The Papers of Thomas Jefferson* 34 vols (Princeton: Princeton University Press, 1950), 555-57. Additional enclosures found in *The Magazine of American History* 29 (January-June 1893). Found in digital archives, The Submarine *Turtle*: Naval Documents of the Revolutionary War, Naval History and Heritage Command, <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/submarine-turtle-naval-documents.html#item12>.

12. George Washington to Thomas Jefferson, September 26, 1785, Papers of Thomas Jefferson, vol. 13, Library of Congress, Washington, DC. Printed in Thomas Jefferson, ed. by Julian Boyd, et al., *The Papers of Thomas Jefferson* 34 vols (Princeton: Princeton University Press, 1950), 555-57. Found in digital archives, The Submarine *Turtle*: Naval Documents of the Revolutionary War, Naval History and Heritage Command, <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/submarine-turtle-naval-documents.html#item12>.; Military Journal of —Footnote continued on next page.

Another early notable American submarine pioneer was Robert Fulton. Born in Pennsylvania, Fulton initially learned how to be a gunsmith before becoming a painter. In 1786, with the encouragement of Benjamin Franklin, he moved to England where he worked under Benjamin West. Rather than remaining a painter, Fulton saw far more potential for profit in civil engineering. Tinkering with building projects from an early age, Fulton was a self-taught engineer. He became noticed for his work when he began working on the canal projects in Britain. Many saw the canal projects as the key to the future prosperity of Britain. He began designing canal digging devices, as well as providing designs for the canals themselves. In 1796 he wrote a book on canals. The following year, he travelled to France where he sought out a patent for his system of canals and funding for further work. There he met and took up residence with another American, Joel Barlow, and began experimenting with devices for naval warfare. Barlow actually knew Bushnell, so it is possible that through him Fulton became familiar with Bushnell's work, as he later admitted to familiarity with it. Bushnell was also suspected of being in Paris around that time, though the reason is unknown. Perhaps he was trying to garner interest in his submarine design, though if so, he did so without success. It is also possible that he may have contacted Fulton there through their mutual acquaintance Joel Barlow. Did Bushnell briefly cooperate with Fulton on a submarine design? We may never know. Fulton attempted to create a self-propelled underwater explosive, but the

James Thacher, February 10, 1778, found in James Thacher *Military Journal of the American Revolution* (Hartford: American Subscription Publishing House, 1862), 62-63. Found in digital archives, The Submarine *Turtle*: Naval Documents of the Revolutionary War, Naval History and Heritage Command, <https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/submarine-turtle-naval-documents.html#item12>.

experiment ended in failure and nearly claimed their lives. Despite the failure, later experiments with naval weapons became the origin of the term “torpedo” for underwater explosives, which Fulton named after a genus of electric ray.¹³

Undeterred, toward the end of 1797 Fulton proposed to the French government that he could build them another invention, a submarine, to help them in their war with Britain. He built his “Mechanical Nautilus,” as he called it, and operated it at his own expense. In return for operating the machine himself, he asked to receive payment in prize money for each ship and the right to claim whatever he captured as his personal property. He also called for reimbursement should the craft not see action before the war ended, and a naval commission for both himself and his crew. This was due to the fact that as private citizens, he and his men were to be engaged in what was considered at the time to be an underhanded form of warfare and would be put to death if captured.¹⁴

By that point, Fulton views were that “national navies represented an economic evil because they interfered with the practice of free trade, and therefore the world should rid itself of them.” His submarine was to be the instrument by which the world’s navies would be destroyed and rendered obsolete. He claimed that a fleet of his craft would be able to protect France from any warship. The British fleet, the most powerful force on the seas, and in Fulton’s mind the greatest threat to free trade, could be destroyed.¹⁵

13. Delgado, *Silent Killers*, 27-28.; Harris and Boyne, *Navy Times Book of Submarines*, 52-54.; Knox, *Life of Robert Fulton and a History of Steam Navigation* (New York: Putnam Publication, 1886), 47-48.

14. Harris and Boyne, *Navy Times Book of Submarines*, 40-41.

15. T. Parrish, *The Submarine: A History* (London: Penguin Books, 2005), 14.

The French considered Fulton's offer but declined to accept it under the current proposed conditions. The following year, they offered an alternative to Fulton in which they offered half the money Fulton had originally wanted. Compensation for the end of the war was only offered if his invention terrified the British so much that they surrendered before he could attack their ships, and no commissions were offered due to the nature of their form of warfare, as well as fears of English reprisals. This modified agreement was offered on February 4, 1798. Fulton refused to sign the contract. Fulton occupied himself with other projects while continuing to promote the usefulness of his proposed submarine. In July of that year, a new Minister of the Navy entered office, and Fulton again approached the French Navy with his plans. The new Minister was intrigued, and a committee was formed to evaluate Fulton's plans. Their report was favorable, and the committee encouraged the government to fund the construction of a prototype. Fulton even stated that if the government would pay him half a million for the first ship he sunk, he would use the money to construct an entire fleet of submarines.¹⁶

Despite the favorable report, the government did nothing. Fulton continued to work on other inventions until 1799, when another Minister of the Navy took office. Once again, he submitted his proposal, and once again the intrigued Minister appointed a commission to investigate the feasibility of the project. Just as before, the committee submitted a favorable report, but no action was taken. At this point, Fulton tried to offer his plans to Dutch officials, again with no results. A third attempt to offer his submarine design to the French Navy was interrupted by a coup in November when Napoleon seized

16. Harris and Boyne, *Navy Times Book of Submarines*, 41-42.

power. Again, a new Minister of the Navy, Pierre-Alexandre-Laurent Forfait assumed office. Forfait, who had been part of the commission which had examined Fulton's idea in 1798 and had also developed plans for a submarine of his own a few years earlier (though he likely never built it), finally approved Fulton's design. Fulton began work on his submarine, named the *Nautilus*, which was completed by the summer of 1800. The trials using the submarine began on July 29, 1800. The trials were a complete success, with the submarine diving to twenty-five feet in the Seine River in Paris before returning to the surface.¹⁷

At twenty-one feet, the copper submarine was larger than Bushnell's *Turtle*. It was designed for a crew of three or four. On the surface, a sail provided the means of propulsion, which allowed it to move or be pushed forward. To be able to dive, it used one ballast tank. The ballast tank was a tank that was either filled or emptied of water in order to allow the submarine to dive or surface by adjusting the vessel's buoyancy. This tank was located on the keel or at the bottom of the ship. In order to dive, the vessel's sail folded flat onto the deck, the ballast tank was filled, and a propeller, powered by hand-cranked turned by two men, served to propel the craft under the surface. The vessel was steered by using both a horizontal and vertical rudder, operated by another crew member using levers beneath the propeller. The vertical rudder was the predecessor of the diving planes that appeared on future vessels.¹⁸

17. Harris and Boyne, *Navy Times Book of Submarines*, 41-45.

18. Harris and Boyne, *Navy Times Book of Submarines*, 42.; Parrish, *The Submarine*, 15.

The submarine's armament was similar to the *Turtle*. The submarine had a "horn" or spike-like drill which was driven into the hull of another ship. Attached to this was a rope on a spindle, at the other end of which was a "torpedo," or mine which was towed behind the vessel. Once the spike was driven into the ship that was being attacked, the submarine moved underneath the target and dragged the explosive into the detached spike which triggered the bomb. To provide the crew with directionality, they carried a compass for navigation. Tests showed this worked well both on and beneath the surface. If the crew wished to extend their dive time, an optional leather tube leading to the surface could be attached to the submarine to act as a sort of snorkel.¹⁹

The day after his first successful test, Fulton took the *Nautilus* to the coast for further testing. These tests were also successful. At one point Fulton and his crew were able to stay underwater for six hours using the snorkel. In another test, the submarine was able to travel 192 yards in four minutes, beating the speed of a boat that was rowed on the surface. The tethered explosive system also worked without posing any danger to the submarine. These tests concluded in August of 1800.²⁰

With this new series of tests concluded, Fulton was confident that his *Nautilus* was ready to make an attack on the British fleet. He would not do so, however, without receiving a commission in the French Navy. He requested commissions for himself and his crew from the Minister of the Navy. However, his request was denied due to the fact

19. Harris and Boyne, *Navy Times Book of Submarines*, 42.; Knox, *Life of Robert Fulton*, 38-44.

20. Harris and Boyne, *Navy Times Book of Submarines*, 45.; Parrish, *The Submarine*, 15.

that the submarine was not yet in use, and it broke the laws of war. Undeterred, Fulton wrote to Barlow in Paris, requesting that he ask in person on Fulton's behalf. This time the request was granted. Fulton was commissioned as a rear admiral, while his crew were commissioned as lieutenants.²¹

In September of 1800, Fulton attacked the British ships stationed off the French coast in the English Channel with the submarine. Initial attempts were hampered by harsh weather, which did not create ideal conditions for an attack. Fulton eventually attacked anyway despite the weather. It was at that point that another problem presented itself: the British, unbeknownst to Fulton, knew about his plan. The captains of the ships had been warned to be on the lookout for Fulton's submarine. When he made his attack, the targeted ship simply set sail and got away from the submarine. While the *Nautilus* was faster than a rowboat, it was far slower than a British warship. A second attempt produced the same result. Following the second attempt, the ships simply anchored where the submarine could not reach them. Fulton tried to wait for another opportunity, but winter set in preventing further attacks.²²

Fulton returned to Paris, confident as ever. He told the Minister of the Navy that he had proven submarine navigation practical and possible. Citing the submarine's ability to scare off British warships, he requested funding to build a bigger *Nautilus*. This one would be armed with twenty explosives, and the French government would cover the cost of trials. A commission was appointed to investigate the feasibility of these plans by

21. Harris and Boyne, *Navy Times Book of Submarines*, 41-45.

22. Harris and Boyne, *Navy Times Book of Submarines*, 46.

Pierre-Alexandre-Laurent Forfait, who was the Minister of the French Navy. Just like all the previous commissions, their report was favorable. A test was recommended to try out Fulton's new plans. An old hulk would be set up as a target to test the explosives. Fulton was also granted an audience with Napoleon himself, though there is no record of what transpired during the meeting. At that point, Fulton began to propose new ideas for underwater weapons. He believed there were simpler means of deploying his torpedoes against ships than that which was employed by the *Nautilus*. He felt that his previous attacks had shown that the submarine's speed made it almost impossible to attack the faster British warships. Fulton surmised that a new method was needed to deliver the explosives to the target.²³

Minister Forfait was skeptical of this new plan. It would be expensive to tow an old hulk into position, and it would cost more money to clear its sunken remains from the water. He believed that the target of the test should be an enemy ship. Forfait also felt that Fulton was wrong in his abandonment of the attack method of the *Nautilus*. Fulton's new plan relegated the submarine to a secondary role, being used merely to transport the mines into a position from which they could be deployed. Forfait did not want to see the *Nautilus* abandoned in favor of this new method. Despite his misgivings, in February 1801, Napoleon agreed to finance Fulton's new plan. He also agreed to Fulton's proposal for bounties for sunken ships, which would range from 60,000 to 400,000 francs depending on the size of the ship that was destroyed. Napoleon, like Forfait, was still interested in the *Nautilus*. Therefore, work on the experimental craft was ordered to

23. Harris and Boyne, *Navy Times Book of Submarines*, 45-47.

continue. However, Fulton largely abandoned the use of the craft in favor of new ideas. He constructed a small boat propelled by a hand cranked propeller. He recruited two dozen sailors from the French Navy and began testing the craft—making adjustments to the pitch depth, cranking ratio and propeller size. French officials were skeptical of this new craft, believing that it would be easier to simply use a canoe with paddles. Better yet, the French believed that the method employed by the *Nautilus* could be used, since this was what the government had paid him to use. It did not help matters that the new craft could only travel four knots, far slower than the twelve knots Fulton had hoped it would achieve. He was sure that this new method was better than his original plans with the *Nautilus*.²⁴

Later that month Napoleon requested to be shown the *Nautilus*, wanting to see this “plunging boat” in person, only to be informed by Fulton that he had disposed of it. Napoleon then asked the inventor to submit copies of his drawings to a Committee of Engineers. Fulton refused for two reasons. He feared that the plans would fall into the hands of the enemy, and he considered the plans to be his private property, with which he could do with as he saw fit. He did assure Napoleon that his plans had been given to a friend, whom he would not name, for safekeeping. This no doubt infuriated the first consul and future emperor. The final nail in the coffin of Fulton’s efforts in France was to be the replacement of Forfait with a new Minister of the Navy in October 1801, roughly around the same time that Britain was entering peace negotiations with France. The new minister was an admiral who firmly believed in following what were considered the rules

24. Harris and Boyne, *Navy Times Book of Submarines*, 45-47.

of war. The submarine, in his view, was a despicable violation of the rules of war, fit only for the use of pirates. He ended the Navy's association with Fulton. Fulton continued to attempt to garner interest in his idea up until 1802, but without results.²⁵

By that point, the British became interested in getting Fulton to return to England, possibly in hopes of removing any possibility of the future use of Fulton's inventions. Earl Stanhope made a speech to the House of Lords in May of 1802, stating that an inventor had perfected submarine navigation in the French Republic, which could ensure the destruction of any targeted ships. Further warnings were issued to officers to be on the lookout for the submarine. The British were apparently unaware that Fulton had disposed of his submarine and was no longer working on undersea navigation. It appears that the British had no interest of pursuing submarines at the time, as when Fulton's friend Barlow visited London in July 1802. Fulton was told by the Secretary of the Royal Society that no "civilized" nation would ever use such a despicable weapon.²⁶

Fulton, meanwhile, had turned his attention to work on steamboats. He was working with the American Minister to France, Robert Livingston, another steamboat pioneer, on steam powered vessels which Fulton hoped to sell to the French for an invasion of Britain. He demonstrated a steamboat for French officials on August 9, 1803. However, Fulton would only sell if he could have another meeting with Napoleon to discuss his ideas, including political viewpoints. Napoleon refused. By October of that same year, the British entered into secret negotiations with the inventor in an attempt

25. Harris and Boyne, *Navy Times Book of Submarines*, 49-50.

26. Harris and Boyne, *Navy Times Book of Submarines*, 51-52.

convince him to return to Britain. Thanks to the fact that Fulton had always been motivated by profit, not loyalty, they succeeded, and Fulton left Paris on April 29, 1804. The following month, Britain and France were once again at war, and Fulton saw a new opportunity for profit. Fulton wrote a letter to British Prime Minister William Pitt offering to use his inventions against the French, though it is unknown if the letter was actually sent. In it, he talks about how the submarine could end naval warfare entirely. Fulton believed that submarines could only attack surface ships, not each other, and would prevent the navies of the world from attacking each other, creating a “principle of equality among nations.” This idea was remarkably similar to the twentieth century concept of preventing war for fear of mutual assured destruction. He also laid out plans for a larger submarine, also named the *Nautilus*, thirty-six feet in length, which would have a crew of six. It was to be armed with thirty of his torpedoes. It would act as a mine layer, approaching the enemy fleet submerged, then surfacing to release the torpedoes, then submerging again to escape. One notable feature of this craft was a vertical propeller, like the one used on Bushnell’s *Turtle*, which replaced the vertical rudder used on the *Nautilus*. He also proposed a new anchored mine to be used in minefields, which Fulton warned should be adopted by the British before the French used the same concept. Fulton also designed a smaller, nine-foot-long submarine, designed to be operated by one man, which he called the *Messenger*.²⁷

Pitt was amazed by the potential of the submarine but was reluctant to agree to fund such a project. Fulton also offered an alternative proposal to stop work on

27. Delgado, *Silent Killers*, 27-28.; Harris and Boyne, *Navy Times Book of Submarines*, 52-54.; Knox, *Life of Robert Fulton*, 47-48.

submarines and mines entirely, taking himself out of the military market, in exchange for one hundred thousand pounds. He was basically asking the British government to bribe him not to sell his inventions to other countries. In the end, the British decided to purchase his services, but they were only interested in his explosives, not his submarine. Neither the second *Nautilus* nor the *Messenger* ever made it past the planning stage. Fulton later wrote that it was probably because Britain already controlled the sea. In Fulton's view, the submarine was a weapon in which a weaker naval force would have greater interest. Such a weapon would allow them to pose a serious threat to an otherwise superior navy. This idea would be shared by many Confederate inventors in the Civil War nearly half a century later, as well as many other future submarine designers. Indeed, this was one of the prime motivating factors behind submarine development throughout history.²⁸

Soon after his return to the United States, Fulton's friend Barlow arranged a meeting between Fulton, the Secretary of State James Madison, and the Secretary of the Navy William Jones. Trying to gain support for his designs and submarines, Fulton arranged a demonstration of his weapons for the U.S. Navy. The demonstration was on July 20, 1807, in the harbor in New York City. A target ship was provided for Fulton to sink. This time, however, his results were far from impressive, as it took three attempts to sink the vessel. Despite that happening, Fulton considered his demonstration a complete success, and wrote to the governor of New York about the capabilities of his weapons and their guarantee of security at sea. Soon after the tests, President Jefferson became

28. Harris and Boyne, *Navy Times Book of Submarines*, 51-52.; Knox, *Life of Robert Fulton*, 46-52.

interested in Fulton's work. Jefferson, who had also been fascinated by Bushnell's work on the *Turtle*, asked Fulton not only about his torpedoes, but about his submarine experiments as well. The President clearly wished for Fulton's work on submarines to continue. While Fulton was more than happy for any chance to make torpedoes, he had no interest in continuing his work on submarines. Around the same time, Fulton was working on the steamboats for which he had become famous, and for the next few years he abandoned his dreams of torpedoes and other submarine weapons in order to focus on the development of steam powered, surface going vessels.²⁹

Fulton returned to his work on underwater warfare in 1810 with the publication of the pamphlet, *Torpedo War and Submarine Explosions*, which he sent to the President and Congress. Though the pamphlet makes no mention of submarines, it does feature the predecessor of the spar torpedo, which would be used by both sides of the American Civil War over fifty years later. Another test was arranged. The test was a failure. Commodore John Rogers, the man in charge of the test, set up a defense of booms and nets around the target ship, the *Argus*, possibly without alerting Fulton beforehand. This was the same method of basic defense the British felt could protect their ships from Fulton's bombs, and a naval officer in the Union Navy would suggest a similar method to serve as an anti-submarine defense during the Civil War. None of Fulton's little crafts were able to deploy their torpedoes against the target, and the *Argus* remained afloat. Still, Fulton told anyone who would listen that the test was a success, due to the fact that it would force any attacker that tried to attack American ports to use the same defensive measure of nets

29. Delgado, *Silent Killers*, 29.; Harris and Boyne, *Navy Times Book of Submarines*, 51-52.

and boom used to defend *Argus*, limiting their actions. The commission concluded that Fulton had not provided convincing evidence that the government should rely on his torpedoes for national defense. All work on Fulton's torpedoes was abandoned, and the inventor returned to working on steamboats.³⁰

1.2 Early Nineteenth Century Submarine Development

Interest in submarine warfare continued into the nineteenth century. David Bushnell's ideas and creations inspired at least two similar vessels to be built during the War of 1812. One of these vessels, a semi-submersible torpedo boat, was used to drag floating mines towards enemy ships. It became stranded on a sand bar in Long Island Sound and was destroyed in 1814 before it could be recovered. The other vessel was a one-man submarine which was operated in a remarkably similar manner to the *Turtle*.³¹ Not much is known of this submarine except that it had been invented by Silas Clowden Halsey. One such submarine is mentioned in Mark Ragan's book. He states that a Connecticut newspaper, during the summer of 1813, reported that "a gentleman from Norwhich had invented a diving boat." This boat had made three different runs under the bottom of the *Ramillies*, which was a 74-gun British warship captained by Commodore Hardy. This was likely the same submersible created by Halsey. The captain of the British ship, Commodore Sir Thomas Hardy, was so angered after hearing the news that a

30. James P. Delgado, *Misadventures of a Civil War Submarine: Iron, Guns, and Pearls*. (College Station, TX: Texas A&M University Press, 2012), 28.; Harris and Boyne, *Navy Times Book of Submarines*, 60-63.

31. Harris and Boyne, *Navy Times Book of Submarines*, 64,74.; Knox, *Life of Robert Fulton*, 148, 155-157.

submersible had tried to attack his ship, he brought American prisoners of war aboard to deter any future attempts. He also threatened harsh punishment to anyone caught attempting to use underwater weapons. He stated that he would retaliate against any further attempts by sinking every American ship he could find, be it civilian owned or a ship of war. The U.S. Navy denounced these threats and disavowed any association with submarine and torpedo warfare. Crowley would later make another attack on the *Ramillies* or another ship of the same size, assuming he was the same unnamed inventor that attacked it in 1813, only to lose his submarine and probably his life in 1814. Robert Fulton also attempted to contribute to the war effort. In addition to a new steam powered warship, there is evidence that in 1815 he began work on a new submarine called the *Mute*, which would be propelled by a sail on the surface and a paddle wheel propelled by hand underwater. It would have been armed with mines and cannon. On February 24, 1815, however, Fulton unexpectedly died of pneumonia, having been exposed to the cold and freezing water while inspecting the work on his warship. The new submarine project died with him. The attitude of the Navy towards submarines and underwater explosives did not change for many years following the war. Many politicians shared this view.

During the period from 1815 to 1820, a mysterious individual by the name of Thomas Johnstone appeared to have worked on submarines. He may have been the anonymous inventor mentioned to be working for the British in 1814, and his work on behalf of the British appeared to have continued through 1815. While most sources describe him as British, some sources claim he was an American. It is said that he worked with Robert Fulton during the latter's work in France and/or Britain, which may have been the source of inspiration for his own submarine projects. Johnstone may also have

attracted the attention of unknown American agents in Britain, who showed interest and may have helped with his work. Soon after Napoleon's final defeat and exile to St. Helena in 1815, Johnstone appeared to have been interested in a reward of 40,000 pounds offered by Napoleon's supporters to anyone who could rescue Napoleon from his island prison. Johnstone, having already built a small, twenty-seven-foot-long, two-man submarine at Chelsea Meadows in Britain, began work on a larger one-hundred-foot vessel. He planned to use one or both of the submarines to rescue the exiled emperor. The larger one was supposedly under construction by 1820, but Napoleon died the following year ending the project. British authorities seized the unfinished larger boat and halted construction. The smaller vessel was seized in the water near London Bridge, then taken to Blackwall and destroyed.³²

During the 1840s, tensions with Britain and the disputes over the U.S.–Canadian border led to a major shipbuilding program. It began in order to strengthen the United States Navy. In 1841, two brothers, Robert L. and Edwin Augustus Stevens of New Jersey, who were inventors and shipbuilders, proposed a revolutionary new vessel that could serve as the ideal defense of America's harbors. It was a semisubmersible, steam powered, screw driven ironclad floating battery with armor that could withstand the fire from the most powerful guns of the time. The vessel was planned to be two hundred-fifty feet long, with an armament of six cannons. Other innovations included a forced air ventilation system and a nine hundred horsepower engine. The Stevens brothers also toyed around with the idea of adding a naval ram. The vessel was an improved version of

32. Harris and Boyne, *Navy Times Book of Submarines*, 51-52.; Ragan, *Submarine Warfare*, 2.

an idea of their late father, John Stevens. In 1812, John Stevens had proposed the creation of a saucer shaped, ironclad surface vessel driven by propellers. The government rejected the idea and all subsequent ideas of Stevens for armor plated vessels. His sons had more luck. A board of officers from the Army and Navy observed Edwin's experiments, which showed that the brothers' armor could hold up against cannon fire. The House Committee on Naval Affairs ruled in favor of construction of the craft for the defense of New York City's harbor, and in 1842, Congress authorized construction of what came to be known as the "Stevens Battery" with \$250,000 provided by the government. Any further funding would have to be provided by the brothers themselves, with the vessel to be completed in two years.³³

By 1843, funds and supplies had been allocated, and work had begun on the craft. Work was slow, and the vessel was not finished within the two-year timeframe. Fortunately, in December of 1844, Robert Stevens was able to get a second contract for construction, with the completion date set for November 1846, with a total cost of \$586,717.48. The work was met with serious problems, however. A Swedish inventor named John Ericsson had moved to the United States and had introduced a powerful twelve-inch gun called the "Oregon" that could smash through 4.5-inch armor, the same

33. Nathan Miller, *The U.S. Navy: An Illustrated History* (New York: American Heritage Publishing Co., 1977), 123-124.; William H. Roberts *Civil War Ironclads: The U.S. Navy and Industrial Mobilization* (Baltimore, Maryland: The Johns Hopkins University Press, 2007), 121.; Spencer C. Tucker, "The Stevens Ironclad Battery," *The American Neptune* 51, no. 1 (Winter 1991): 12-21, <https://babel.hathitrust.org/cgi/pt?id=ien.35556020718029&view=1up&seq=376&q1=Stevens%20Battery.>; William H. Thiesen, "Revenue Cutter Service Gunboat *E. A. Stevens*: The Stevens Family's Civil War Experiment in Modern Naval Technology," *Nautical Research Journal* 54, no. 3 (Fall 2009): 141-154, <https://media.defense.gov/2017/Jul/02/2001772317/-1/-1/0/THIESENRCSGUNBOATEASTEVENNS.PDF>.

thickness as the iron armor on the Stevens Battery. Even with the ability to partially submerge, the parts of the craft still exposed above the surface could no longer withstand fire from this new cannon. The armor that had been state of the art at the start of construction was already obsolete. The armor could be thickened but that would require significant lengthening of the hull to accommodate the added weight. They had to develop an innovative design before they were able to continue with the project.³⁴

1.3 Antebellum Submarine Development

In 1845, the man who would become one of the most successful and noteworthy pre-Civil War American designers of submarines, built his first submarine when he was only twenty years old. Shoemaker turned inventor Lodner D. Phillips of Michigan City, Indiana, created a submarine made of copper sheets attached to a wooden frame. The vessel contained an iron ballast and sank using a simple plunger device to fill a cylinder in the interior with water, which was emptied via the same method to raise her. It was propelled by a pole that ran through a watertight gasket to the exterior of the submarine, allowing it to be pushed along the bottom in a manner similar to the way a gondolier propels his boat. After testing it on Lake Michigan, Phillips quickly abandoned this craft after sinking it in ten feet of water. He then moved on to constructing a larger, forty-foot-long submarine. The craft was conical in shape with tapered ends at the bow and stern and sank using compressed air and multiple ballast tanks. Phillips had yet to design a

34. Roberts, *Civil War Ironclads*, 121.; E. A. Stevens, "The Stevens Battery," *Scientific American* 7, no. 5 (August 2, 1862): 67. <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796679&view=1up&seq=71&skin=2021>.

more efficient propulsion system, so it was likely propelled by one or multiple poles protruding from watertight gaskets. Not much is known about this submarine, which Phillips worked on between 1845 and 1850. However, when it was tested in the Chicago River, it proved a failure and sank. It possibly remained there until 1915, when a mysterious submarine was discovered by diver William Deneau in the river. Raised in 1916, it became a side-show attraction, with people paying ten cents to view it. It soon disappeared from history, its fate unknown. Dubbed the “Foolkiller,” it is widely believed that this was Philips’ second submarine. Undeterred, Phillips began constructing a third submarine in 1850.³⁵

As Lodner Phillips worked on his first submarine on the Great Lakes, the Navy was losing interest in the Stevens Battery. So far, the vessel had cost \$31, 043.66, and the Secretary of the Navy, George Bancroft was not satisfied with the results. In December 1845, he called for work on the project to end. It could resume once detailed plans for the vessel were submitted to the Navy. Robert Stevens argued that he had submitted plans twice, a general plan in 1843 and a detailed plan in 1844. What Steven considered plans, however, appear to be little more than descriptions of the vessel in the contracts, which was not satisfactory to Bancroft. During this time period, Robert Stevens fell ill—the sickness likely worsened by the stress of the project. Stevens travelled to Europe to recover on the advice of his doctor. In the meantime, John Mason replaced Bancroft as Secretary of the Navy in September 1846. Mason had also been Secretary when the second contract had originally been awarded to Stevens. Mason was far more interested

35. Delgado, *Silent Killers*, 38-39.

in the project than Bancroft. With Mason back in office, Stevens was hopeful that his work could resume. In January 1847, he wrote to the new Secretary of the Navy asking for additional time to finish the Stevens Battery.³⁶

While Phillips was experimenting with a second craft in Chicago, Mason gave Robert Stevens what he wanted. On September 9, 1848, the contract for the Stevens Battery was renewed with a four-year extension. Robert Stevens happily returned to Europe to purchase materials, leaving his brother Edwin in charge of construction. The two inventors' fortunes once again changed, however, when Mason retired in 1849. His replacement, William B. Preston, halted payment for construction in August of that year, once again citing the fact that no detailed plans for the semi-submersible gunboat had been submitted to the Navy. Robert Stevens had no choice but to return home. When Stephens arrived, he discovered that Preston planned to declare the contract void and sell the Stevens Battery (or at least what little had been built) and all related materials for scrap. Desperate to keep the project going, Robert Stevens began the process of trying to get Congress to appeal the decision.³⁷

By 1851, Phillips' third submarine, which he named the *Marine Cigar*, was nearly sixty feet long and built of wood. It was designed for salvage work. It was one of the most advanced submarines yet designed. The vessel had four external keels composed of wooden beams to provide stability. It used ballast tanks connected to compressed air tanks. As water filled the tanks, the air was pumped into the crew space through pipes,

36. Tucker, "The Stevens Ironclad Battery," 16-17.

37. Tucker, "The Stevens Ironclad Battery," 17.

supplying fresh oxygen. This gave the submarine an air purification system to extend dive time, which was also supplemented by a system which forced air through the water in the tanks to remove carbon dioxide. The central ballast tank served to set the depth for the vessel, while a self-regulating mechanism of some sort set the amount of air and water in the tanks to maintain the trim at depth. The vessel also had a retractable conning tower, a retractable snorkel, as well as a bow and stern anchor. It was propelled by a hand-cranked propeller operated by two men, which reached speeds of up to four and a half knots. For salvage work, the submarine had a false bow that was attached to a hinge, behind which was a ball and socket joint. A sleeve extended from this which allowed the crew to use tools such as saws and chisels to work on wrecks. A sort of underwater cannon could also be operated through the joint, designed for demolition work on sunken ships. Phillips saw military potential in his submarine, and as early as 1851 was in contact with the Navy.³⁸

In 1851, as Phillips continued to work on his third submarine, another submarine was being built in New York City. In late 1851, the French diver turned inventor Lambert Alexandre, unveiled his *Submarine Explorer*, also known as the *New York Submarine Boat*. It was designed to do underwater work such as placing or repairing telegraph lines or removing obstructions. The boat was hailed as a triumph of technology. It was egg shaped, thirty feet long and ten feet in diameter, and was designed to be manned by a crew of three to seven people. Pumps inside were used to fill and empty the ballast tanks and fill the main working chamber with compressed air from storage tanks. External

38. Delgado, *Silent Killers*, 39-40.

hinges held cast-iron ballast, which could be released for quick ascents. The air from the tanks kept the chamber pressurized so that a hatch on the floor could be opened for divers to work. Propulsion was made possible by a hand cranked propeller. Air was received by an air hose connected to a copper float on the surface, and the craft featured an internal air purification system which operated by spraying water through caustic lye to produce oxygen. The hose and air purification system allowed the crew to remain submerged for up to seven hours. The submarine was basically a mobile diving bell, combining the pressurized diving chamber of the diving bell with the mobility of the submarine. One issue of *Scientific American* in 1851 noted the potential for military use, stating that America's harbors could be protected by such craft from enemy ships. However, Alexandre does not appear to have tried to sell his craft to the military. One reason Alexandre did not offer to sell his design to the military or anyone else may be that it was not his design to sell. His submarine was actually a copy of a design patented by his former colleague in France, Doctor Antoine-Prosper Payerne, who had built multiple submarines of that design in his native country. Alexandre tested the invention not only in the waters off Brooklyn but also in a demonstration on behalf of the American Institute of New York at their annual fair at New York Battery. Among those who likely witnessed this was Julius H. Kroehl, a German inventor who had immigrated to the United States less than a decade before. Kroehl went on to design his own submarine during the Civil War. By March 1852, *The New York Times* was calling it the "most perfect submarine boat" they had ever seen.³⁹

39. Delgado, *Silent Killers*, 55-56.; "Submarine Explorer," *Scientific American* 7, —Footnote continued on next page.

The following April, as New Yorkers remained in awe of Alexandre's craft, Phillips offered to sell his submarine design to the U.S. Navy. He claimed that his *Marine Cigar* would be able to dive to a hundred feet below the surface and maintain speeds of up to four or even five miles an hour. He even mentioned Alexandre and his submarine in New York by stating that his craft was superior. He based this on the fact that while Alexandre's boat had cost \$9,000 to build, his boat only cost \$800. Within two weeks Phillips received a response from William H. Graham of the Navy Department. He told Phillips that "No authority is known to this Bureau to purchase a submarine boat. The boats used by the United States Navy go on and not under the water." As for Alexandre, the Navy Department had not even heard of him. Despite this negative response, Philips continued his submarine work, receiving a patent on November 9, 1852, for a means to steer submarine vessels solely with a propeller. Apparently finding simple rudders to be difficult to operate underwater, Philips proposed that a propeller could be mounted on a universal joint to steer the craft. The propeller itself could be turned to steer the submarine. It is possible that some form of this idea was present on the *Marine Cigar*, though the submarine also had a double rudder configuration, with one rudder above and one below the propeller.⁴⁰

As the *Marine Cigar* operated on the Great Lakes and Lambert Alexander operated his own submarine in New York City, a senate committee heard the Stevens brothers' case. Senator Stockton of New Jersey submitted a report to the Senate

no. 11 (November 19, 1851): 81, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796729&view=1up&seq=85&skin=2021&q1=Submarine%20explorer>.

40. Wills, "Louisiana State Museum Vessel," 14.; Harris and Boyne, *Navy Times Book of Submarines*, 66-68.

Committee on Naval Affairs on March 11, 1852, arguing in favor of the construction of the semi-submersible. The proposal was discussed by the committee on May 11, 1852. Stockton argued that Preston had “ungenerously” treated Stevens, and that there was urgent need of a vessel to defend New York’s harbor. The Stevens Battery was needed because there was a serious threat of war breaking out in Europe, and the United States could be dragged into such a conflict.

The harbor of New York is not now any better than it was during the War of 1812, and fleets now approached the United States uninterrupted by winds or tides. With speeds 20 miles per hour, a steamer could pass beyond the range of a fort in five minutes. To obviate the attack of a foreign fleet, it was necessary that there should be a construction for harbor defense, combining the qualities of stone with the power of motion. This vessel being shot and bomb proof, could do more to resist the progress of hostile fleets than 20 forts.⁴¹

The matter attracted the attention of the writers of *Scientific American*, who wrote about it in their May 22, 1852, issue. The article discusses both the Stevens Battery and another proposal for “an ocean craft...which can neither be burst nor sunk.” The writers favored the latter proposal over the Stevens Battery, stating that

“Mr. Stevens will no doubt accomplish anything he undertakes in the steamboat line, but a harbor floating fort would be a most useless appendage. Let us have a good steam fleet: let our sea defense be upon the mountain wave. In an

41. “New War Steamers,” *Scientific American* 7, no. 6 (May 22, 1862), 285. <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796729&view=1up&seq=289&skin=2021&q1=Stevens%20Battery>; Tucker, “The Stevens Ironclad Battery,” 16-17.

emergency, and bank barricades can be thrown up for the defense of our harbors, and these, with heavy guns and brave hearts, need fear no foreign floating batteries.”⁴²

On August 14, 1852, it was reported in *Scientific American* that a W. O. Stone of Charleston, South Carolina, had developed “what he calls a submarine rocket, or an infernal machine, for blowing up vessels of war.” It was apparently similar to an aerial rocket, only adapted for the ocean. Although there is no evidence that anything ever came of this invention, this marks an early attempt to develop the modern torpedo.⁴³

Further north, things were looking up for Robert Stevens. The Senate committee did not share the views of *Scientific American*. On August 31, 1852, Congress put a clause in the Naval Appropriation Act which called for the Secretary of the Navy to have the Stevens Battery completed as soon as possible using the balance of the surplus fund authorized in the Act. Work soon resumed, and the Stevens brothers quickly began a complete redesign of the craft.⁴⁴

Sometime in early 1853, Alexandre abandoned his submarine and never used it again. It remained where he left it for well over a year, beyond which its fate is unknown. Philips, on the other hand, continued to operate the *Marine Cigar*. He even managed to wow spectators and attract some publicity. The submarine was mentioned in the newspapers. In October 1853, Philips shipped the submarine to Lake Erie. There he

42. “New War Steamers,” 285.

43. “A Submarine Rocket,” *Scientific American* 7, no. 48 (August 16, 1852): 380, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796729&view=1up&seq=289&skin=2021&q1=Stevens%20Battery>.

44. Tucker, “The Stevens Ironclad Battery,” 16-17.

hoped to do salvage work on the wreck of the *Atlantic*, a steamer that sank off Long Point, Ontario after colliding with another vessel. At some point during the time from 1853 through 1855, Phillips ran into problems as he attempted to dive on that wreck, 165 feet below the surface. At one hundred feet, before he even reached the wreck, the *Marine Cigar* began to leak. Phillips returned to the surface for repairs. Once he was finished, he filled the submarine's ballast and sent the vessel down, unmanned, to test the safety of the craft. It was attached to the surface with ropes. When the craft reached the wreck, the ropes or the submarine got caught on the rigging of the *Atlantic*'s wreckage. As Phillips struggled to get the submarine loose, the water pressure opened the submarine up. It quickly filled with water. The ropes were no longer able to hold the weight of the flooded submarine and gave way. The *Marine Cigar* settled on the bottom somewhere near the *Atlantic*, where it apparently remains to this day.⁴⁵

By 1854, as Alexandre's submarine lay abandoned in New York, the Stevens brothers had finished redesigning their semi-submersible, and the floor timbers had been laid. The armor had been increased from 4.5 inches to 6.75 inches of iron plating to withstand the heaviest guns at the time. To accommodate the added weight, the ship had been almost doubled in length, from two hundred-fifty feet to four hundred-twenty feet. The beam had been increased from forty to fifty-three feet. The number of engines had also been doubled to ten, with the number of propellers increased from one to two. The semi-submersible's engines had an impressive output of 8,624 horsepower. The new design was able to reach a speed of twenty knots. The armament consisted of seven guns

45. Delgado, *Silent Killers*, 56.; Harris and Boyne, *Navy Times Book of Submarines*, 67-69.

in two batteries with three in the front and four in the back, although some sources say each battery was to have four guns. The foremost and rearmost guns were 10-inch guns, while the remainder were rifled 15-inch cannons. The guns could be rotated so they could fire to either side of the craft by a turn table turned by men below deck. As in the previous design, the gun's crew was protected by armored casemates. When the gun needed to be reloaded, the muzzle would be pointed at a hole in the casemate so that the crew could reload it. The only crewman not protected from fire by armor was the one who aimed and fired the gun, and he was protected by the gun and carriage itself. The vessel was able to sink in order to increase its draft from sixteen to twenty-one feet, and in smooth water could dive deeper to submerge itself up to its gun deck. Once finished, the vessel was going to be an impressive warship many years ahead of its time.⁴⁶

Work on the Stevens Battery increased at a rapid pace. By October 1854, the number of men working on the craft had increased to five hundred. On December 30, *Scientific American* claimed that the floating ironclad batteries being built for use in the Crimean War “are of American origin” because the Stevens brothers had introduced the idea first. According to the article, the Stevens Battery was “with the exception of a few ribs, completely in frame, and about one-third planked up with heavy iron plates.” It also noted however, that by December of that year the number of workers on the project had been reduced to four hundred-seventy, and around December 16 one hundred-forty more

46. Tucker, “The Stevens Ironclad Battery,” 16-17.

workers had to be laid off due to “the difficulty of procuring funds during the severe pressure in the money market.”⁴⁷

In 1855, sometime after the loss of the *Marine Cigar*, another American inventor, William H. Felt, traveled to France in an attempt to sell his own idea for a submarine to the French Navy. Not much is known of this endeavor, other than that the proposed vessel would have been armed with eight guns and was rejected by the French. Later that same year, German inventor Wilhelm Bauer attempted to sell his submarine designs to the U.S. Navy. Bauer was already an experienced submarine engineer, having built his first submarine the *Brandtaucher* or “Fire Diver” for the German military in 1850 during the First Schleswig War. Propelled by a treadwheel powered propeller and designed to break the Danish blockade, the submarine sank during a trial on February 1, 1851. Bauer and his crew escaped, becoming the first crew to escape a submarine accident in the process. The Germans however, refused to fund his plans for an improved second submarine. Bauer then turned elsewhere to find support for his ideas. By 1855, he had already been turned down by the Austrian Hapsburgs, the French, and the British. Like Phillips before him, his proposal was rejected by the U.S. Navy. Bauer eventually succeeded in getting a contract with the Russian Government soon afterward.⁴⁸

Meanwhile, attempts to get funding for the Stevens Battery were bearing fruits. On March 3, 1855, Congress authorized \$250,000 more for the Stevens Battery from

47. Tucker, “The Stevens Ironclad Battery,” 16-17.

48. Wills, “Louisiana State Museum Vessel,” 25.; Harris and Boyne, *Navy Times Book of Submarines*, 69-70.; Delgado, *Silent Killers*, 36-38.; Parrish, *The Submarine*, 17-19, 36-38.; Paul E. Fontenoy, *Submarines: An Illustrated History of Their Impact* (Santa Barbara, CA: ABC-CLIO, 2007), 1-11.

naval appropriations of the year, which ended on June 30, 1856. However, around the same time Lodner Philips lost the *Marine Cigar* in the Great Lakes, problems continued to plague the construction of the Stevens Battery. By the end of the year, the \$250,000 dollars authorized for construction in March had been spent. In February of 1856, a board was appointed to determine the money necessary for completion of the ship.⁴⁹

On March 1, 1856, it was reported in *Scientific American* that a Peter Cooper of New York City had developed “a nautical torpedo” powered by a steam driven propeller that was guided by two rudders, which were controlled from wires that connected it to the shore. The editors of the article concluded that the method of steam generation was one of the slowest possible, and they had no faith in the design.⁵⁰

On March 7 of that year, the board finished its assessment of the cost of the Stevens Battery. In their report, they estimated that even with half a million dollars already spent on the vessel, it would take an additional \$812,033.68 to finish it. Then, on April 20, 1856, Robert Stevens died. *Scientific American* mourned the death of “a man distinguished for his genius” in their May 3, 1856 issue. They mentioned his semi-submersible in the article, stating that another \$250,000 application was “pending before Congress.” The publication claimed that a million dollars had already been spent on the unfinished craft. They also described the Stevens Battery within the article, though based on the description it appears that they were relying on hearsay and rumor. They describe

49. Tucker, “The Stevens Ironclad Battery,” 17-18.

50. “Cooper’s Torpedo,” *Scientific American* 11, no. 15 (March 1, 1856): 198, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787611&view=1up&seq=202&skin=2021&q1=Cooper's%20Torpedo>.

the vessel as being seven hundred feet long and seventy feet wide. They claimed it was armed with thirty guns on each side and “on deck, four Paixhan guns.” They also described it as built so “that its ends may be driven into an ordinary ship and cut it in two.” Though the armament and the size were clearly a ridiculous exaggeration, the ram may not be. The Stevens brothers considered ramming as a viable tactic for their craft, and surviving illustrations show a sharply pointed bow.⁵¹

More funding was approved for the craft, which Edwin was determined to finish, on August 16, 1856. However, it was only \$86,817.84 instead of the \$250,000 that had been requested. That was not enough, and, by the end of the year, all work on the semi-submersible ground to a halt. On December 20, 1856, *Scientific American* wrote a scathing article on the slow progress of the project stating that “this infernal steam battery appears to be a disgrace to the spirit of our people.” They also wrote that “it has been a great number of years in the course of construction, has cost thousands of dollars, and only a miserable abortion has been the result of all this money and time. The best thing that can be done with it, is to blow it up and commence anew.” Edwin desperately wrote to Congress asking for more money on December 22 of that year. He told Congress that delays had been necessary to redesign the craft in order to keep up with the technology of the times. The original design had been rendered obsolete by newer, more powerful guns, which resulted in the 1854 redesign. Though he admitted that part of the fault lay with design changes made by his late brother, he said that the primary reason for further delays

51. “Death of a Distinguished Inventor,” *Scientific American* 11, no. 34 (May 3, 1856): 266, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787611&view=1up&seq=270&skin=2021>.; Tucker, “The Stevens Ironclad Battery,” 17-19.

was the government's ordered halts in construction. He and his late brother had already spent \$173,570.11 on the vessel, and he did not want it to go to waste. Unfortunately, his efforts were in vain, and the craft remained unfinished on the Stevens Estate in Hoboken, New Jersey.⁵²

That same year Phillips was once again working on submarine technology. Following the loss of the *Marine Cigar*, Phillips found himself in financial trouble, and fled to Chicago to escape his creditors. Once he had evaded them, he resumed his work. In 1856 he received a patent for a suit of atmospheric diving armor that he developed based on his experience with universal joints. The diving armor was successfully tested in the Chicago River. Soon afterwards, he developed an innovative design for a diving bell. Though he had lost his submarine, Phillips was determined to continue his work on diving technology.⁵³

Things did not improve over the next few years for Edwin Stevens. *Scientific American* wrote another critical article on the Stevens Battery on December 19, 1857, stating "that there never was a greater or more outrageous take in, perpetrated upon any people or government, than that of the incipient grampus battery lying at Hoboken, opposite our venerable Gotham." Ridiculing the unfinished craft that some had claimed could "sink all the fleets in Christendom," the article stated that since "it is now fifteen years since this lazy tong's affair was begun, and as science and art relating to marine

52. Tucker, "The Stevens Ironclad Battery," 17-19.; "The Steam Battery," *Scientific American* 12, no. 15 (December 20, 1856): 115, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787660&view=1up&seq=119&skin=2021>.

53. Delgado, *Silent Killers*, 41.; Harris and Boyne, *Navy Times Book of Submarines*, 58.; Wills, "Louisiana State Museum Vessel," 22.

engineering and floating batteries have undergone a complete revolution in that period, we suppose the work done on this intended floating monster is worse than useless. The best thing that could be done with it is to sell it for old iron and timber, or put it in charge of a committee of ‘unfinished business,’ and open it to visitors at the rate of three cents apiece, as a monument of patient labor under liberal appropriations made by that benevolent old gentleman *Uncle Sam*.”⁵⁴

Two other notable inventors in the period before the Civil War were Ross Winans and his son Thomas. Neither of the two inventors ever built submarines, but their work is important because it may have inspired some of the submarine designs of the Civil War. Ross Winans was best known for his work on the Baltimore and Ohio Railroad, and was a noted inventor of various machinery, including the eight wheeled car used on those tracks. A resident of Baltimore, Maryland, in the 1850s Ross Winans and his son began attempting to design a steamship which he believed would be superior to those then in use. He was particularly focused on speed, friction, and water resistance.⁵⁵

The resulting ship, built in 1858, is first mentioned in the October 16, 1858, issue of *Scientific American*. According to the article, Winans “constructed a steamer which is

54. “The Steam Floating Battery.” *Scientific American* 13, no. 15 (December 19, 1857): 114, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796703&view=1up&seq=118&skin=2021>.; Ragan, *Submarine Warfare*, 3, 25.; John Edward Seemes, *John H. B Latrobe and his Times: 1803-1891* (Baltimore, MD: Norman Remington Company, 1917): 384-386, https://books.google.com/books?id=QLJYAAAAMAAJ&pg=PA1&source=gbs_toc_r&cad=3#v=onepage&q&f=false; R.A. Fletcher, *Steam-Ships: The Story of their Development to the Present Day* (Philadelphia: Lippincott Company, 1910), 880, https://books.google.com/books?id=BC8wAAAAYAAJ&pg=PA1&source=gbs_toc_r&cad=3#v=onepage&q&f=false.

55. Fletcher, *Steam-Ships*, 880.

intended to surpass in swiftness every craft that skims the seas, because it is designed to plow through the waves, and not take the trouble of rising and falling with them.” The vessel was described as being 170 feet long and was powered by a paddle wheel in the center of the hull. The writers at *Scientific American* were not impressed, stating that “Diagonal Paddles and center wheels are not new, and unless it be in the model of this steamer, we cannot perceive from the descriptions published concerning her, anything novel, or any point on which to base conclusions for greater speed than is attained by other steamers.”⁵⁶

The subsequent issue on October 23, 1858, revealed more information on it in a short article titled “New Cigar Boat.” This time the boat’s hull is described in detail, with a corrected length of 180 feet long. It was sixteen feet in diameter. The entire vessel was made of iron, and it was powered by “four high pressure locomotive engines,” which would power the propeller in the center of the hull. This centrally located propeller occupied the space between the two halves of the hull. “Neither masts nor spars” were present, and the vessel had neither a keel nor a flat deck. The article states that the ship was to be ready for its first trip in six weeks. The writers mention that it reminds them of another “cigar ship” made by a “Mr. Burden” of Troy, New York in either 1837 or 1838. That vessel was supposed to be fast also, but on its first trip it “was stranded on some of the flats up the Hudson River.” Though the writers stated that Winans’ steamer “is undoubtedly different in principle” from Burden’s craft, its shape meant that “it must roll

56. “A Naval Steamer,” *Scientific American* 14, no. 6 (October 16, 1858): 46, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=50&skin=2021>.

awfully in a heavy sea. It is a mistake to suppose that it will sail through the waves smoothly. We think it will be perfectly unmanageable.”⁵⁷

When next we hear of this bizarre ship, it has made the front page of *Scientific American* on November 6, 1858. A woodcut drawing of the craft is visible above the article, as is a schematic drawing below it. The basic design, including its distinctive spindle, or cigar, shape was clearly visible. A tiny pilot house, located inside the bow has a small viewport which protrudes slightly above the hull. A superstructure containing a long, narrow deck runs along the top of the hull, allowing the crew to cross between the two halves of the hull. In the schematic, we see a lookout tower located between the two smokestacks, located directly above the propeller which, in turn, is covered by a protective sheath. Missing from the schematic is a second rudder located underneath the bow. The article appears to contain quotes from the builders themselves explaining the benefits and purposes of the craft which is revealed to be a testbed for ideas. “It has been with a view to obtaining greater safety, dispatch, uniformity and certainty of action, as well as economy of transportation by sea (taking shipwrecks and other casualties and risks into consideration), that we have devised and combined exhibited in the vessel in question.” They go on to explain that lessons learned from ship design over the past few decades “has shown that steam power on board sea going vessels, when used in aid of sails, insures, to a great extent, dispatch, certainty of action, and uniformity in the time of their voyages. Now, we believe that, by discarding sails entirely, and all their necessary

57. “New Cigar Boat,” *Scientific American* 14, no. 7 (October 23, 1858): 53, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=50&skin=2021>.

appendages, and building the vessel of iron, having reference to the use of steam alone, the most desirable ends may be even still more fully obtained.” The cigar ship “is for the purpose of experiment, to enable us to test the accuracy and practical value of our peculiar views.” These peculiar views included:

no keel, no cut-water, no blunt bow standing up above the water-line to receive blows from the heaving sea, no flat deck to hold, or bulwark to retain the water that a rough sea may cast upon the vessel; neither masts, spars nor rigging. The absence of sails not only renders the parts thus abandoned by us useless, but their abandonment in a vessel such as ours will, we believe, most materially promote safety, easy movement, or diminished strain of vessels in rough weather, will save dead or non-paying weight, insure simplicity and economy of construction, and will give greater speed in smooth water, less diminution of speed in rough water, as well as diminished resistance to moving power at all speeds, in all water, and result in shortening the average time of making sea voyages.⁵⁸

The builders claim that its all-iron construction removes the danger of fire, and its sturdy build would keep it safe in the event of a collision. By plowing through waves, rather than riding over them, the cigar steamer was supposed to maintain a steady speed in calm or stormy weather. The writers of *Scientific American*, however, were still not impressed. They felt “that the ‘wave line’ system is the true one on which to construct

58. Michael Crisafulli and Karen Crisafulli. “The Winans Cigar Ships,” *The Vernian Era*. Last modified October 19, 2021. <https://www.vernianera.com/CigarBoats.html>; “The Winans Steamer in Course of Construction at Baltimore,” *Scientific American* 14, no. 9 (November 6, 1858): 65-66, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=50&skin=2021>.

vessels that are to cleave the waters with safe rapidity, but this boat does not admit of these lines.” Such a narrow ship, they explained, would surely roll constantly in the water. Its iron design was “not novel,” and they felt that no success would come of this experimental design doomed to be a failure.⁵⁹

By that point, the craft had also drawn the attention of the British *Mechanics Magazine*. The November 27, 1857, issue contained the same quotes by the adventures as those used in *Scientific American*. They concluded that the father and son duo should “be careful how they experiment with a vessel of so bad a form.” They dismissed the inventors as having no “sound knowledge of the principles of ship building.” A subsequent issue on December 4, 1858, criticizes the means of propulsion, stating that the centrally located propeller would propel the vessel sideways “like that of a crab” since the propeller was only partially submerged. It suggested that three propellers could correct that problem.⁶⁰

That same day, the inventors responded to the *Scientific American*’s critique of their craft. Their harsh criticism had attracted the attention of Ross and Thomas. They wished to respond to “the many objections and no virtues...in which one-sidedness of opinion put forth to the public (so far as we are aware) you stand alone.” Apparently the

59. Crisafulli and Crisafulli, “The Winans Cigar Ships,”; “The Winans Steamer in Course of Construction at Baltimore,” 65-66.

60.”The Latest Steam-Ship Novelty,” *Mechanics Magazine* 69, no. 1842 (November 27, 1858): 519-520, <https://babel.hathitrust.org/cgi/pt?id=nyp.33433069061376&view=1up&seq=535&skin=2021&q1=steamship%20novelty.>; “The American Cigar Steamship,” *Mechanics Magazine* 69, no. 1843 (December 4, 1858): 540, [https://babel.hathitrust.org/cgi/pt?id=nyp.33433069061376&view=1up&seq=556&skin=2021&q1=american%20cigar%20steamship.](https://babel.hathitrust.org/cgi/pt?id=nyp.33433069061376&view=1up&seq=556&skin=2021&q1=american%20cigar%20steamship)

two were not familiar with *Mechanics Magazine*. Father and son proceeded to respond to each objection one by one. They argued that engine failure was not an issue, because if one engine failed there were three others. Even if all of the engines were to fail, a makeshift sail could be hung from the smokestacks. Given ship's low machinery and position in the water—sailing practically awash—any stability issues (i.e., rolling) would be prevented. Further stability issues, they believed, were solved by the ship's length and shape. As for the “wave-line system” argument, they believed that if their ship had been built along those lines, it would have been subject to greater resistance from the water, but they were quick to point out that if they had constructed it along those lines, it would have been “a much more perfect form of the ‘wave-line’ vessel than is to be found in present use.” They also argued that their use of iron was in fact original because, while ships had been built of iron in the past, they were unaware of any of them being built entirely of iron.⁶¹

This led to a response in the December 11, 1858, issue in which the editors reiterated their argument for the ship's instability. The editors also stated that regardless of the number of engines, there was still a chance of mechanical failure, and a makeshift sail hanging from the smokestacks “is surely too small a one (dependence) for the safety of human life.” Furthermore, the instability and tight space in the interior, they argued, would make any passenger uncomfortable. Additional criticism came from a December

61. Ross Winans and Thomas Winans, “Winans’ New Steamer—Interesting Statement of the Builders,” *Scientific American* 14, no. 13 (December 4, 1858): 102, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=105&skin=2021&size=125>.

18, 1858, issue of *Mechanics Magazine* in which one T. Moy's technical assessment of the craft was published. He dismissed the vessel as "an absurdity."⁶²

By early 1859, another submarine inventor was beginning to practice his craft. This inventor would ultimately create the first and most famous of the Union submarines. Brutus de Villeroi, born Brutus Amedee Villeroi in 1794, had been a noted inventor in his native France. He was awarded his first patent in 1821 for a mechanism to enhance a guitar or lyre. He first began work on submarines in 1832, when he constructed an oar powered submarine which he called the *Batteau Poisson* (Fish Boat). The vessel included watertight ports through which a crew member could put their arms and interact with objects on the ocean floor. He used the vessel as a demonstration of the technology in an attempt to receive a contract to build submarines for the French Navy. The French were not convinced by the demonstration, noting the way the boat struggled against the current. The French felt that the boat would not be of use in planting explosives on the keels of vessels, which was the intended purpose of a military submarine. The inventor would try again in 1835, demonstrating the boat first for the Academy of Science in Paris, then the Societe General, and finally for representatives from the Dutch government. Between demonstrations he experimented with the number of oars, going from four to eight and then finally to six. He even added a primitive air purification system composed of a bucket and bellows. He also may have carried compressed oxygen

62. T. Moy, "The American Cigar Steamer," *Mechanics Magazine* 69, no. 1845 (December 18, 1858): 594, <https://babel.hathitrust.org/cgi/pt?id=nyp.33433069061376&view=1up&seq=610&skin=2021&q1=american%20cigar.>; "The Winans Steamer—Our Answer to the Builders' Communication," *Scientific American* 14, no. 14 (December 11, 1858): 109-110, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=50&skin=2021>.

tanks with him to extend the dive time. While he managed to impress a number of people with the demonstrations, no one would hire him. Brutus abandoned the project and pursued other ventures, including a sugar refinery in Greece for which he was knighted by the Greek king around 1840. Following this, Brutus began to refer to himself as Brutus de Villeroi in recognition of his knighthood.⁶³ He first traveled to the United States in 1848 to act as an agent for a French coal company operating in Pennsylvania. This venture failed, and he was dismissed from the company's employ in 1850. He returned to France but immigrated to the United States in 1856 and by 1857 had settled with his wife in Philadelphia, where he received patents for some of his previous inventions after submitting them to the Franklin Institute for review. Now in his sixties, the previous failed business venture with the coal company may have financially ruined him.⁶⁴

In need of profit, an event in the autumn of 1857 would see him return to the field of submarine navigation. On September 12, 1857, the SS *Central America* sank off the coast of the Carolinas. The ship had been carrying two and a half million dollars' worth of gold from California. The promise of such a large treasure quickly attracted the attention of salvagers, who approached the ship's underwriters with various solutions to the problem of recovering the gold from the wreck. In July 1858, Brutus de Villeroi approached the Atlantic Mutual Insurance Company, which had insured part of the gold, with the proposition of using a submarine to recover the gold. He would receive seventy-

63. Chuck Veit, *Natural Genius: Brutus de Villeroi and the U.S. Navy's First Submarine* (Morrisville, NC: Lulu.com, 2018), 5-6.

64. Veit, *Natural Genius*, 44-47.

five percent of the gold recovered in a year as payment for his work. The president of the company, John D. Jones, liked the idea and signed a contract with Brutus on July 28, 1858. Brutus quickly began to draw plans for a new boat and gathering investors to fund the project. Funding came from a number of wealthy backers, including a “Mr. Girard,” likely Jean Auguste Girard, nephew of the late Stephen Girard, who had been one of the wealthiest men in America and a relative of de Villeroi’s wife, Eulalie. As the project moved along, other investors became interested, including former Congressmen William Witte. Some investors, such as Martin Thomas, saw alternative uses for the vessel, such as cleaning and repairing the hull of the SS *Great Eastern* after its maiden voyage.⁶⁵

Meanwhile, the Winans’ strange vessel continued to attract attention in 1859. The January 1 issue of *Scientific American* contained the comments of several publications and correspondents on the craft, all of which were in general agreement with the editors on what they viewed as the vessel’s flaws. In the January 22 issue, another response from the inventors was published. This time they were responding to the criticisms in the issue of December 11, 1858. They once again defended their design, including the shape and means of propulsion. They claim they chose not to use sails “out of a conviction that the same pains and expense which are now usually divided between two modes of propulsion—sails and steam—will, when directed solely to one of them, secure increased safety, greater certainty of action, and shorter passages than have heretofore been realized.” The paper’s editors responded to the letter, stating that the “communication of Messrs. Winans does not alter the opinion we expressed of their novel steamer in No.

65. Veit, *Natural Genius*, 5-6.

14.” A far more interesting comment on the steamer would appear in the January 29 issue. One J. W. Norcross of Cicero, New York, who had previously commented on the vessel in the January 1 issue, stated that he had been misunderstood, and he went on to praise the vessel’s shape. The editors only published part of the response, simply stating that “the vessel itself will soon prove who are right and who wrong in their calculations.” They also state that the steamer already made a trial trip in smooth water, during which it made twelve miles per hour without using the full power of its engines. Ventilation had proven good, and the vessel drew only six feet of water with a light load of cargo.⁶⁶

Right below that is seen a letter to the editors from an S. H. N. of Philadelphia, Pennsylvania. It is his letter that makes this issue so interesting, for in it he proposes a new use for the vessel, one which had not yet been proposed. He states that the craft’s shape would make it an ideal naval ram. Giving a hypothetical French invasion as an example, he creates a scenario in which he proposes that the steamer, with a reinforced bow, could swiftly hole an enemy ship and escape before the enemy could respond. He goes on to state that “I therefore regard the invention as of great importance in this view, and it should be secured, if possible, to our country. With such vessels known to be ready

66. “Cigar-Shaped Steamer,” *Scientific American* 14, no. 17 (January 1, 1859): 137, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=141&skin=2021>; Ross Winans and Thomas Winans, “The Cigar-Shaped Steamer—Another Letter from the Builders,” *Scientific American* 14, no. 20 (January 22, 1859): 162, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=166&skin=2021>; J. W. Norcross, “The Winans Steamer,” *Scientific American* 14, no. 21 (January 29, 1859): 170, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=174&skin=2021>.

on our coast, no hostile fleet would dare to anchor in one of our harbors.” This was the first time a military use was suggested for this ship, and it would not be the last.⁶⁷

After a brief mention in the February 5, 1859, issue, which once again viewed the craft negatively and cited a *Life Illustrated* article as having the same opinion, a more detailed article appears in the February 19 issue, which declared the steamer a failed experiment. It cited a *Baltimore Sun* article which mentioned modifications being made to the steamer, as proof of the failure of concept. The article surmised that had the steamer “answered all the expectation of its designers, the above alterations would not have been made.” The editors go on to suggest that a keel be added, the floors raised along with the sides, and the propeller reduced in sides in addition to being moved to the stern. Only then would the Winans “have a steamer of a good and common model.”⁶⁸

In reality, the steamer, which the inventors named the *Winans*, was not a failure. While it was not a total success, as it did not meet all of the expectations of the inventors, it proved that a ship of that shape could function and handle well. The Winans were confident enough in the results to continue working on the boat. They found that the main flaw in the boat was the centrally located propeller. Though it did not suffer from all the issues critics had predicted, it did not propel the ship as fast as Ross and his son had hoped. Furthermore, the propeller’s sheath was bulky and quite large, sticking out from

67. Norcross, “The Winans Steamer,” 170.

68. “Winans Steamer Again,” *Scientific American* 14, no. 22 (February 5, 1859): 175, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=179&skin=2021>.; “The Cigar Steamer: A Failure,” *Scientific American* 14, no. 24 (February 19, 1859): 192, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=196&skin=2021>.

the sides of the ship, creating drag, and compromising what would otherwise have been a streamlined shape. Unfortunately, the sheath could not be significantly altered because it was an important part which kept the two halves of the hull connected and stable.

Another problem was the height of the deck above the waves. Because the craft floated low in the water, it was virtually impossible for the vessel's crew to stay dry when on deck. Furthermore, the only way to travel between the two halves of the hull was to go on deck and cross over the top of the propeller. Winans and his son made considerable modifications to compensate for some of these shortcomings, beginning with a lengthening and tapering of the hull, and included the removal of twenty-five feet from the bow and the installation of a new 39-foot section.⁶⁹ In late June 1859, a careless worker left a supply pipe open and accidentally sank the *Winans*, but it was quickly raised, and there was little damage.⁷⁰

Around the same time as Brutus de Villeroi was working on his second submarine, the Stevens Battery was once again mentioned in a letter to the editor about the use of lead and graphite paint in the July 30, 1859, issue of *Scientific American*. The writer states that Edwin Stevens used graphite instead of lead because he found it superior when it came to preventing rust. This article would seem to indicate that work

69. Crisafulli and Crisafulli, "The Winans Cigar Ships."

70. "Winans' Steamer," *Scientific American* 1, no. 1 (July 2, 1859): 4, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=8&skin=2021>; S. N. H. [pseud.], "The Cigar-Shaped Steamer Adapted for War," *Scientific American* 14, no. 21 (January 29, 1859): 170, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796695&view=1up&seq=172&skin=2021&size=125>.

had resumed on the Stevens Battery, but there is no evidence Stevens received further funding, so the work was likely extremely limited.⁷¹

Meanwhile, work continued on the *Winans*, and in August 1859 the vessel made another trial trip down Chesapeake Bay. According to the August 13 issue of *Scientific American*, which quoted another article in the *Baltimore American*, the trip was meant to test a change to the pitch of the propeller's blades and fuel consumption. The trip was "in every respect eminently satisfactory." The propeller rotating thirty-six times a minute, the craft reached a maximum speed of fifteen miles an hour and reached Annapolis, Maryland in good time without consuming too much fuel. This article shows significant change in the editor's opinion from their previously negative views in 1858 and early 1859. This article is quite the opposite, praising the work done and even going as far as to state that "quite enough was done to remove all doubt as to the ultimate and triumphant success of the principles involved in the propeller, and the power required to attain the maximum speed in this new form of naval architecture." The article did point out, however, that the *Winans* had yet to undertake a trial at sea.⁷²

Elsewhere, on August 25, 1859, de Villeroi's boat was completed and on public display. It was far larger than its predecessor, at thirty-five feet long with a capacity for up to twelve people. It featured a second hatch on the bottom of the hull that allowed

71. "Red Lead and Graphite for Iron Ships," *Scientific American* 1, no. 5 (July 30, 1859): 71, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=8&skin=2021>.

72. "The Winans Steamer," *Scientific American* 1, no. 7 (August 13, 1859): 104, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=108&skin=2021>.

divers to enter and exit the vessel while it was submerged. A hand spun propeller propelled the craft through the water, while a pair of diving fins, possibly the first of their kind, allowed the crew to control the angle of descent. While some of these features were notable improvements over the inventor's first submarine, others may have been changed for financial reasons. It is likely that the investors put de Villeroi on a budget. This may explain why the vessel relied on canvas bags coated in gutta percha, or latex, for ballast tanks. Lead ingots (i.e., a block of lead) inside the vessel provided additional ballast. Overall, the submarine operated like a mobile diving bell, with a pressurized interior allowing divers to enter and exit the vessel from the bottom hatch without water rushing in. It is likely that the pressure was maintained by opening compressed air canisters that were carried with the crew on the dive, similar to the method proposed for the first submarine to extend dive time. The divers were supplied with air by a hose connected to an air pump, though the exact method of connecting the hose to the diver is unknown. They may have simply kept the hose in their mouth with their teeth, or it may have been attached to a simple headgear or helmet. It is highly unlikely the divers wore a suit of diving armor, as the weight of such devices—typical diving armor weighed about 160 pounds—would make entering and exiting the submarine, as well as putting on and taking off the gear within the cramped confines of the submarine, virtually impossible. To keep the submarine stationary so the divers could enter and exit the vessel, a ball and chain anchor was deployed. The vessel's propeller was powered by six men pulling on a leather strap attached to a wheel which turned the propeller, likely with additional aid from a bevel gear. Like the first submarine, the salvage vessel had an air purification system, though the means was a closely guarded secret. It may have been the same

bucket and bellows method used on the Fish Boat, but it could have also been enhanced by some mechanical means. This secrecy may either be because he did not want anyone to copy his invention, or due to the fact that the investors did not want any details about the submarine given away. It may well have been a simple bucket and bellows and was simply kept secret due to the wishes of the investor.⁷³

The vessel was first demonstrated on August 25, 1859, off the coast of New Castle, Delaware. Problems arose from the start, as the submarine would not completely submerge, possibly due to an insufficient number of lead ingots. Though the vessel was submerged to the point that the crew was completely cut off from surface air, a few feet of the bow still remained at the surface. A malfunctioning air pump ended the demonstration. Despite the failure to completely dive, de Villeroi had proven that a crew could safely operate within the vessel without need to be supplied air from the surface. On October 2, 1859 he gave a second demonstration, this time at Marcus Hook, Pennsylvania. That time the submarine was able to successfully dive beneath the surface, but the same air pump malfunctioned again, and the crew was only able to stay underwater for one hour and fifteen minutes, a much shorter dive time than planned. It is also possible that the inexperience of the crew played a role in the failures of both demonstrations. Of the nine men known to have served as the inventor's crew, only two were above the age of twenty with the youngest being only sixteen years old. There were no further public demonstrations, but there may have been other test dives done in private. No dives were made on the *Central America*, which would remain untouched

73. Veit, *Natural Genius*, 67-71.

until 1988. Although a number of uses were proposed for the submarine, including salvage of other shipwrecks and examination of riverbeds, none were ever attempted. In the eyes of the investors, the submarine appeared a failure.⁷⁴

By December 1859, the Winans appear to have been satisfied with the trials and modifications of the *Winans*. In the December 3, 1859, issue of *Scientific American* it is announced that, according to the *Baltimore Sun*, the Winans were planning to build a new cigar ship on a larger scale, with improvements based on the results of the trials. In the meantime, work on the *Winans* continued, as the subsequent December 17, 1859, issue mentions a trip to Norfolk, Virginia for experiments. This is further elaborated upon in the December 24, 1859, issue, in which a correspondent from the *New York Herald* is quoted. According to his accounts, written on December 7 and December 9, 1859, a trip from Norfolk to Old Point Comfort fourteen miles away was made in forty-five minutes. It made a brief excursion to sea on December 6 and “exceeded all expectations.” It reportedly looked “like a whale sporting on the surface of troubled waters.” On December 8, it was sent out to sea in rough weather to see how it would handle rough conditions. It shared the water with a number of steamships, including the *Young America*, the wrecking schooner *Johnson* from New York City, and a steamer from the Union Line of Philadelphia. The vessel handled much better than the others, handling smoothly despite the weather. The correspondent mentioned that “under circumstances so highly calculated to produce heavy rolling and pitching, the undulations were so slight as scarcely to merit the name.” He further mentions that a number of the people on board

74. Veit, *Natural Genius*, 67-71.

the craft that day “were unaccustomed to the sea,” but none “experienced the slightest nausea or sea-sickness, which evidently would have been the case had they been on board of either of the other vessels.” The boat handled smoothly, and its speed was apparently unaffected by the rough seas. Its speed was eighteen and a half miles per hour.⁷⁵

Work on the craft continued the following year, as the January 2, 1860, issue of *Scientific American* mentions that it is “greatly changed.” The hull was being further lengthened at the bow. Modifications were also mentioned in “A Column of Varieties” within the January 7, 1860, issue. The article mentions another trial trip without giving details. In regard to modifications, the article mentions that, in addition to further lengthening the craft, the propeller was going to be moved from the center of the craft to the back “as we advised.” The former modification was made by lengthening the bow, but the latter modification was never made, as subsequent documentation can testify. The reason the propeller was not removed, if it is assumed that the modification was planned at all and this was not just a mistake on the magazine’s part, is probably due to the fact that this might compromise the stability of the hull. The propeller assembly and the surrounding sheath were the only things holding the two halves of the hull together. Removing it would split the ship in two. A new section of the hull had to be built from scratch, then connected to the bow and stern sections. The Winans were clearly unwilling

75. “A New Winans Steamer,” *Scientific American* 1, no. 23 (December 3, 1859), 376, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=380&skin=2021&q1=Winans.>; “The Cigar Steamer,” *Scientific American* 1, no. 25 (December 17, 1859), 403, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=407&skin=2021&q1=Winans.>; “Trial Trip of the Winans Steamer,” *Scientific American* 1, no. 26 (December 24, 1859): 412, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787587&view=1up&seq=415&skin=2021.>; Crisafulli and Crisafulli, “The Winans Cigar Ships.”

to undertake the significant reconstruction necessary to do this, but they apparently reduced the sheath below the center line of the hull to what was minimally required to maintain stability. Either the entire lower half of the sheath was removed or only a simple narrow frame was left below the waterline to add strength with minimal drag.⁷⁶

An incredibly detailed account of the history and modifications of the *Winans* appeared in the January 21, 1860, issue of *Scientific American* in the form of a long letter to the editor from a person who simply gave their identity as “B.” The letter summarizes the reasons for its design, lists various modifications, and gives the reasons for each modification. B. mentions that the curvature of the hull was changed to reduce the waves produced while underway and increase speed. The shape, pitch, and number of propeller blades were also modified. Modifications to the pitch, in particular, were apparently ongoing, and continued “until, improvement apparently ceasing, the desired information shall have been obtained in this particular.” Further details of the Norfolk experiments were also given. Apparently two lifeboats had been added to the vessel, “attached to the chimneys, near their tops,” which apparently “afforded a resistance to the wind.” They also “caused a steady list to leeward, proportionate to the violence of the gale, but never

76. “Dark Clouds,” *Scientific American* 2, no. 1 (January 6, 1860): 1, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796687&view=1up&seq=5&skin=20> 21.; “A Column of Varieties,” *Scientific American* 2, no. 2 (January 7, 1860): 23, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796687&view=1up&seq=27&skin=2021>.; Crisafulli and Crisafulli, “The Winans Cigar Ships.”

exceeding 10 degrees in the heaviest gusts, and amounting, at other times, to less than five.”⁷⁷

It was reported that two short trips out to sea from Norfolk were undertaken, with the second seeing the ship subjected to “a gale from the northwest” in which it proved to be able to handle the rough waters without any reduction in speed. The letter goes on to state that the Winans were planning on adding 200 feet amidship, “fit it up as a saloon with state-rooms,” as well as “multiply the water-tight compartments, and to otherwise prepare it for the purpose” of putting the *Winans* “in passenger service on some established route, in which, of course, it must work its own way into public favor and reputation.” In closing, B. mentions that in addition to Ross and Thomas Winans, William L. Winans of St. Petersburg, Russia was also “interested in the experiments that have been made.” He had apparently joined the project after “joint discussion.” Apparently “no one has taken a more active part than the gentleman now in Europe, who has brought to the subject the suggestions of a large experience in all matters of scientific and practical mechanics, and a fund of collateral information only to be obtained abroad.” William Winans was another son of Ross Winans who had been sent to Russia to work on building railroads on behalf of the Russian government. He had experience building boats, and the plant he operated in St. Petersburg was capable of ship construction and had been used to construct gunboats for Russia during the Crimean War. He had been able to get the Russians interested in the designs of his father and brother by emphasizing

77. “The Winans Steamship,” *Scientific American* 2, no. 4 (January 21, 1860): 51, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796687&view=1up&seq=53&skin=2021.&q1=winans%20steamship>.

their military capability, and at that time William was drawing up plans based on their designs for gunboats that he offered to build for the Russian Navy the following year.⁷⁸

In the January 28, 1860, issue of *Scientific American*, a response was published to B.'s letter. The editors seemed to have once again become skeptical of the craft, and they doubted the veracity of B's claims. They dismissed the claim that there was no reduction in speed in rough weather, stating that it was "a mechanical impossibility." They also stated that the trials had done nothing to prove that the craft was safer than conventional ships. They further stated that with all the modifications made thus far "it is remarkable that...it has just attained to that perfection which was reached many years ago by our best river steamboats." The editors closed by stating that "a more defective form and size of vessel for useful purposes could not, in our judgment, will be imagined." A February 17, 1860 issue of *The Engineer* had a far more negative, even mocking, critique of the craft which it stated was doomed to fail.⁷⁹ On May 26, 1860, *Scientific American* stated that the Stevens Battery had once again been discussed by Congress the previous week. It dismissed the craft as a "government fossil."⁸⁰

Meanwhile, work on the Winans's steamer continued through the summer, as mentioned in the July 14, 1860, issue of *Scientific American*. Also mentioned was another

78. Crisafulli and Crisafulli, "The Winans Cigar Ships.," "The Winans Steamship," *Scientific American*, 2, no. 5 (January 28, 1860): 73, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796687&view=1up&seq=77&skin=2021>.

79. "The Winans Steamer," *Scientific American*.

80. "A Column of Varieties," *Scientific American* 2, no. 22 (May 26, 1860); 343, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796687&view=1up&seq=347&skin=2021>.

successful trial on June 23, 1860. The August 18, 1860, issue once again mentions plans for a second steamer, and states that the steamer had now reached speeds of twenty miles per hour, though Ross Winans claimed that it could reach speeds of thirty to thirty-five miles an hour. By this point \$200,000 had been spent working on it. The plans for the future vessel are described in more detail in the December 1 issue. It was to be six hundred feet in length, and the inventors claimed it would be able to cross the Atlantic Ocean in only five days. Unknown to Ross and Thomas Winans, events beyond their control would soon intervene.⁸¹

81. "A Column of Varieties," *Scientific American* 3, no. 3 (July 14, 1860): 39, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787645&view=1up&seq=43&skin=2021>.; "The Cigar Steamer Again," *Scientific American* 3, no. 8 (August 18, 1860): 113, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787645&view=1up&seq=117&skin=2021>.; "The Winans Steamship," *Scientific American* 3, no. 23 (December 1, 1860): 363, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787645&view=1up&seq=367&skin=2021&q1=Winans>.; Crisafulli and Crisafulli, "The Winans Cigar Ships."

CHAPTER 2

THE CONFEDERACY

2.1 Early Confederate Submarine Development

The Confederacy was unprepared for a war at sea. The rebels only had a few ships that they could use to create a Navy, and although many Southern naval officers had left their posts in the U.S. Navy to serve in the Confederate Navy, there were not enough ships for them.

The newly appointed Confederate Secretary of the Navy, Stephen R. Mallory, had his work cut out for him. With thousands of miles of coast to defend, a large number of ships were needed. To combat this problem, old sailing ships, tugboats, commercial schooners, and many other vessels were seized by the Confederate authorities and put into service. Any weapons that could be acquired, even relics from the War of 1812, were used to arm the vessels. Privateering commissions were also offered to private groups and individuals willing to use their vessels to attack Union ships. On April 17, 1861, Jefferson Davis issued an invitation for private citizens to receive Letters of Marque and Reprisal from the government if they chose to serve the new nation as privateers. The United States practiced this method of warfare during the War of 1812, and the two submarine vessels built during that war were considered privateers. Privateering

presented an opportunity, not just for private owners of vessels, but also inventors and builders.⁸²

In the Confederacy, an interesting letter was widely publicized. The letter was the work of Reverend Franklin Smith of Tennessee. Smith was a locally renowned chemist and inventor. He also owned one of the best laboratories in the South. On June 10, 1861, a letter written by Smith appeared in the *Columbia Herald* in which he called upon all the South's skilled, patriotic inventors to build submarines to attack the Union blockade ships for the Confederate cause. The letter was published in other papers across the South, including the *Mobile Advertiser and Register* on June 26, 1861. Titled "Submarine Warfare," the letter began by explaining that "[e]xcepting our privateers the Confederate States have not a ship at sea. We may safely originate plans for blowing up the vessels employed in blockading our ports, without danger of being 'hoisted by our own petard'." Smith stated that such projects should "not be expected of Government Departments and Bureaus; projectors, with their 'seething brains and shaping fantasies,' are a terror to them." Smith believed that it was the private citizens of the South who needed to propose their own designs. He further argued that the Southern coastline "was better suited for submarine warfare than any other in the world. It has been most minutely surveyed and mapped, it has almost no tides, it has uniform currents, and a bottom always sandy, seeming to invite adventurous feet to travel over it. I would have every hostile keel chased from our coast by submarine propellers." Smith went on to describe his ideas for

82. Ragan, *Submarine Warfare*, 3-5.; Harris and Boyne, *Navy Times Book of Submarines*, 79.; Tom Chaffin, *The H. L. Hunley: The Secret Hope of the Confederacy* (New York City, NY: Hill and Wang Publishing, 2010), 33.

an ideal submarine, with basic ideas for construction, armament, and propulsion. He closed the letter stating that he was “preparing a detailed Memoir on Submarine Warfare, discussing matters not proper to be spoken of here, illustrated with engravings,” with copies sent “to the mayors and municipal authorities of Southern maritime cities.” Sadly, this memoir has not survived, with the final surviving copy last seen in a private collection in 1919. Still, the letter and the lost memoir may well have been the inspiration for many of the submarine projects that were created across the South. Soon after the letter was published, Smith began working on his own submarine which was built in Mobile, Alabama.⁸³

Soon after the appearance of that letter in the papers, the Union Secretary of the Navy received a troubling letter on June 25, 1861, from someone identified as E.P. Dorr of Buffalo, New York. Dorr was staying in Chicago, Illinois at the time, and he had met “a lady belonging to the New England States, who had been engaged for the past three years in teaching school, a little north of New Orleans. She left there a few days (six) since and arrived here yesterday morning.” The woman stated that “the rebels in New Orleans are constructing an infernal submarine vessel.” The submarine’s intended target was the blockade ship, the USS *Brooklyn*. It was reported to be armed with a “a sharp iron or steel pointed prow to perforate the bottom of the vessel and then explode.” This submarine was likely the mysterious submarine that was found in 1878 during dredging operations near New Orleans. The submarine had a three-man crew, composed of a

83. Ragan, *Submarine Warfare*, 5.; Franklin Smith, “The Blockade: Submarine Warfare,” *Mobile Advertiser and Register*, June 26, 1861, 2, <http://digital.archives.alabama.gov/cdm/compoundobject/collection/cwnp/id/216/rec/5>.

skipper and two crewmen operating the hand-cranked propeller. The crank shaft featured a differential gear, which made the propeller spin faster than the two crewmen were cranking. It is unknown who designed and built this vessel, but the metal plates that made up its hull were connected in a similar manner to the plates used for the armor of the early Confederate ironclad, the CSS *Manassas*, which was also built in New Orleans. It has been theorized that the engineers who worked on the ironclad may have worked on the submarine. The submarine appeared to have had a rubber hose connected to an opening near the conning tower which led to a flotation device on the surface. The flotation device allowed oxygen to enter the small craft as it submerged under the water. There are not any Confederate records relating to this rebel submarine, but in 1924, an eighty-one-year-old Confederate veteran named Frances J. Wehner stated during an interview with a local paper that he had helped build it. His story is considered to be credible according to the records of his service, but Wehner never revealed the origin of the submarine or the names of its engineers.⁸⁴

At some point while the mysterious New Orleans submarine was being built, another submarine was apparently being constructed by an unknown plantation owner that lived near the city. Noted late nineteenth century submarine pioneer Simon Lake would hear the story from a friend while researching the mystery submarine. His friend had met “a Southern gentleman” who knew of the boat's history. According to him, once

84. E. P. Dorr, Esq., Letter to the Secretary of the Navy, 25 June 1861, *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865 – 31 January 1866; Naval Forces on Western Waters 8 May 1861 – 11 April 1862* (Washington, DC: Government Printing Office, 1908), 288-289.; Ragan, *Submarine Warfare*, 8.

the plantation owner finished the vessel and was about to launch it, he wanted to attract attention to its potential by having its dive as soon as it was launched, then surface after a brief period underwater. He decided to crew it with “two of his most intelligent slaves.” He took them in the boat and taught them how to operate the tiller and the propeller. and how to surface once they dived. When the day of the launch came, the two slaves entered the vessel, and just as planned, the submarine was launched and soon dived beneath the surface. It did not, however, surface. Eventually the crowd took to some boats and attempted to snag the submarine with hooks and grappling lines, but they were unable to find the missing boat. Upon this turn of events, the submarine’s builder supposedly remarked that he should “have known better than to trust them pesky niggers anyway.” He assumed they had betrayed him and taken the submarine to the Union forces so that it could be used against its Confederate ships. Years later, long after the war’s end, the submarine was apparently discovered by accident during dredging operations for harbor expansion. Once raised from the depths, the skeletal remains of the two slaves were found still inside. Something had apparently gone wrong while diving, and the submarine took its slave crew down with her. The slaveowner now knew the fate of his slaves. They had been worth a thousand dollars, but now were not “wurth a damned cent,” as the “Southern gentlemen” stated. Lake wrote of this story in his 1918 book *The Submarine in War and Peace*. He associated this story with the Bayou St. John Submarine, but it does not completely match other bits of evidence which have become known, such as Francis J. Wehner’s testimony.⁸⁵

85. Simon Lake, *The Submarine in War and Peace* (Philadelphia: Lippincott —Footnote continued on next page.

Eight years prior to the publication of Lake's book, another version of the story appeared in the 1910 edition of *Confederate Veteran*, a journal for Southern veterans of the Civil War. The basic story remained the same, but a number of details changed. The source of the story was an "old lady" that "unfortunately...has forgotten the names and dates" of the events. Instead of being dredged up, it describes it as having "washed up on the beach of Lake Pontchartrain." The submarine was described as having a moveable "fins or wings....and the head seemed a receptacle for a storage battery." No such storage for a battery is present on the Bayou St. John submarine, though it may be one of the missing components of the submarine. The elderly lady claimed it had a crew of three, not two, and its builder was present when the submarine was opened. He apparently attracted the attention of the crowd gathered around the submarine when, while "wringing his hands," he blurted out "This explains it all, and for years I have thought them to be traitors!" When questioned, with some hesitance he admitted that "he was an inventor" and he had apparently designed the submarine to attack Union gunboats anchored on Lake Pontchartrain with torpedoes. He was assisted by "three other Confederates." No mention is made of the men being slaves. According to this version of the events, the three assistants were to serve as the crew while the inventor "was to direct their movements by signals from the shore." When the boat was launched and dived, no one responded to the inventors signals, and the submarine never returned. The inventor "concluded they had turned traitors and gone over to the Yankees, so fled to Europe." He had apparently returned home shortly before the craft washed ashore. The skeletal

Company, 1918): 39-41, https://www.gutenberg.org/files/46382/46382-h/46382-h.htm#CHAPTER_II.

remains of the crew were apparently buried near where the submarine washed ashore, with “a small monument” marking the sight of their burials. Unlike Lake’s account, no connection is made to the mysterious submarine found in Bayou St. John, and the source of the information did not know what became of the submarine. The article does, however, state that the vessel, which it simply calls “the fish,” had “remained for years one of the curiosities of the beach at Lake Pontchartrain,” which parallels the history of the Bayou St. John’s own history on display in a park near where it was found.⁸⁶

Taken together, these two versions of the same story may represent a third submarine constructed near New Orleans during the war, though there is the distinct possibility that the submarine mentioned in the story is the Bayou St. John submarine. If the former, then at some point during the early stages of the war, an inventor, who was likely a plantation owner, built a submarine armed with torpedoes and manned by two or three men, either slaves or assistants in the vessel’s construction. The vessel sank while attempting to dive soon after it was launched, and was apparently found years later, either being found during dredging operations or washed ashore. The inventor suspected he had been betrayed, and may have fled to Europe, possibly to avoid punishment for building an “infernal machine.” The remains of the crew were found inside and apparently buried near the site of the submarine’s discovery; their graves possibly marked by a simple monument to their memory. There is no evidence that human remains were found in the Bayou St. John submarine, so it may very well be a third New Orleans submarine. If so, its ultimate fate remains a mystery. As for the monument marking the graves of the dead

86. “Story of ‘Big Fish’ from New Orleans,” *Confederate Veteran* 18, no. 4 (April 1910): 158, <https://archive.org/details/confederateveter18conf/page/158>.

crew, no such monument has been found. Though some dismiss this story as fanciful, the fact that this story was so prevalent in the early twentieth century, when many of those involved in the Civil War were still alive, suggests that there might be some truth to this strange tale.⁸⁷

As that was going on, another Confederate submarine was being constructed. In September 1861, the Tredegar Iron Works in Richmond, Virginia was contracted by the Confederate Navy to build a submarine designed by William Cheney, an expert in underwater explosives. The craft was designed to have a three-man crew, one of whom was a diver in a forward diving compartment. When the submarine got near its target, the diver would exit the submarine and plant an explosive on the enemy ship's hull. He would then return to the submarine, which would then move to a safe distance before detonating the explosive. The explosive was either timed or detonated from the submarine by lanyard. Like the mysterious New Orleans submarine, it was supplied with air by a rubber hose attached to a float. The submarine's float was camouflaged so that it would be less visible to the enemy. When this submarine was finished is unknown, but its existence was reported by Mrs. Baker, a Union spy, to Allan Pinkerton of the Federal Secret Service. Mrs. Baker witnessed a demonstration of the vessel, in which the submarine successfully sank a scow being used as a practice target. It also reported that the submarine from the demonstration was the prototype of a larger submarine that was under construction. The submarine's target was the blockade ships on the James River.

On October 9, 1861, it appears that the first attempt to sink a Union vessel with a

87. Ragan, *Submarine Warfare*, 275-276.

submarine was undertaken by Confederate forces. Sadly, no records of an attack survive on the Confederate side. Only Union sources mention the attack. This has led some to conclude that no such attack took place. What is recorded, however, is an attempt to sink the Union fleet at Hampton Roads with mines by Lieutenant Robert D. Minor operating from the CSS *Patrick Henry*. Minor's report of the attack survives and gives a detailed account of the conditions on that day. At 8:00 a.m., Minor boarded the vessel at Mulberry Point and met with its captain. He secured two volunteers from the ship's crew and spent the day explaining the plan and the mechanism of the mines. At sunset, even though Minor discovered he had less gunpowder than he had wanted for the explosives, the plan proceeded on schedule. It was raining, and there was a strong wind and current, perfect for carrying the mines to the enemy fleet. Once the enemy fleet was visible in the distance, Minor, his volunteers, and other members of the ship's crew were lowered into the water in boats and proceeded as planned. The mines were set adrift, and after one of the volunteers sighted an unknown boat only a hundred yards away, they pulled back some distance and waited for any sign their plan was successful. There was none, as no explosion was heard. The group withdrew back to the *Patrick Henry*, where they joined the rest of the crew in preparing for any attack that might come if they were detected. As soon as the boats were lifted out of the water, the lookouts on the ship spotted a flurry of activity amongst the Union vessels. Signal lights were spotted flashing at Newport News. It was feared that the ship had been discovered, and the ship began the trip back to base, arriving back at Mulberry Point thirty minutes after midnight. No Union vessels

attempted to chase them, and they were never attacked.⁸⁸

It is clear that an attempt was made to sink the Union ships at Hampton Roads on October 9, and that mines were used, but was this the only attempt to sink the fleet that night? Is it possible that another group planned an attack on the Union fleet on the same night as Minor's attempt? It's clear that something put the Union vessels on high alert that night, but Union records mention no mines being found, and it appears that the *Patrick Henry* was not spotted. What caused the commotion that was witnessed by Minor's group that night? To find out, it is necessary to examine Union records.⁸⁹

It appeared that it was a submarine that put the Union vessels on high alert that night. If the deserter interviewed by the reporter at Fort Monroe is to be believed, the mysterious submarine set out from Seawall's Point that night, and attempted to sink the USS *Minnesota*, the flagship of the North Atlantic Blockading Squadron. The submarine, as described to the correspondent of the *New York Herald* by the Confederate deserter, used an Indian rubber suction plate to attach itself to the enemy craft so that the crew could attach the explosive. The vessel got caught in the grappling around the ship's jib-boom, nearly foundered, and barely managed to escape. Flag Officer Goldsborough's October 27 warning to the rest of the ships in his squadron was to look out for more than explosive mines. They should stay alert for a vastly different kind of "infernal machine," one in which a crew approach their target underwater and screw an explosive to the

88. Milton F. Perry, *Infernal Machines: The Story of Confederate Submarine and Mine Warfare* (Baton Rouge, LA: Louisiana State University Press, 1965), 93.

89. Perry, *Infernal Machines*, 93.

enemy ship's hull. He clearly had reason to believe that an enemy submarine was targeting his ships.⁹⁰

If this is the case, however, who were the submarine's crew, and where did the submarine come from? All signs seem to point to the tiny submarine that the Union spy witnessed being demonstrated in Richmond. It appears that though it was merely meant to be a test vessel demonstrating the technology of the larger submarine being built at the iron works, someone modified it to employ a new method of attack. The modifications removed the need for a diver and reduced the number of crewmen it needed to two. The modified vessel was then sent to Seawall's Point for an attack on the *Minnesota*. Goldsborough also reported that the vessel was spotted by pickets from the USS *John L. Lockwood*. Sadly, the logbooks for the ship for that month did not survive. This modified submarine is probably what alerted the ships that night, causing the commotion witnessed by Minor's group.⁹¹

When all of the evidence is considered, the attack can be reconstructed to some degree. Sometime on the rainy night of October 9, 1861, Cheeney's submarine set off from Seawall's Point to attack the *Minnesota*. Based on the account of the weather and water conditions on that night, it would have been a daunting challenge to steer the tiny craft to the target. The crew would have been struggling to keep the craft steady and on course. They had chosen a bad night to set out in their submarine. Despite the conditions, however, they were amazingly able to maintain control of the craft in the strong current

90. Perry, *Infernal Machines*, 93.

91. Ragan, *Submarine Warfare*, 36.

and reached their target. Here, another mistake was made. Thinking they had found the anchor cable, they prepared to attach their explosive to the hull. It was only then that they discovered they were now tangled in the jig-boom's grappling. Off target and now stuck near an enemy ship, the crew desperately struggled to free the craft, eventually succeeding. Unable to fight the current to make it back to Seawall's Point, the craft was steered toward a nearby rebel held shore. At some point the vessel was spotted by pickets from the USS *John L. Lockwood*, which put the fleet on alert, causing the flurry of activity witnessed by Minor. Before anything could be done, though, the craft reached the shore, and was taken overland back to Norfolk.⁹²

On October 21, 1861, another would-be inventor submitted his own proposal for a submarine to the Confederate Secretary of War Judah Benjamin. Private Charles P. Leavitt of Company K, Second Virginia Infantry in Stonewall Jackson's brigade, had presented an idea for "an instrument of war which for a better name I have called a submarine gun-boat." His plans included an oxygen purification system which removed carbon dioxide from the air with "a shower of lime water." The vessel was steam powered, and rather than an underwater explosive or a ram, his craft was armed with mortar cannon firing explosive shells. The vessel was to be towed to within range of the target. It would then submerge and travel towards the enemy ship undetected. Once it was next to the enemy, it would surface and open fire. Leavitt's proposal intrigued the Confederate Chief of Ordinance Josiah Gorgas. On October 26, 1861, he recommended

92. Ragan, *Submarine Warfare*, 36.

that the young private be granted furlough “to come on here and in this office or that of the Chief Engineer’s draw out his plans.”⁹³

Shortly afterwards, the crew of Cheeney’s submarine made another attempt to attack the Union blockade on the James River. That time, they were not so lucky. Pinkerton had relayed his information to General McClellan and the Secretary of the Navy. The Union sailors were on the lookout for the submarine. They had been told to look for the float that supplied oxygen to the submerged craft, and during the second attack, the float was spotted by the crew of one of the Union ships. The rubber hose was severed, and the vessel sank, taking its crew with it to the bottom of the James River. As with the first attack, Union records of the sinking are scarce, but Pinkerton mentions it in his postwar memoir, and Goldsborough refers to something as the “infernal machine” in an October 17, 1861, report to the Secretary of the Navy.⁹⁴

Goldsborough’s account mentions the “9th instant.” This means that he may be referring to the October 9, 1861, attack. Whatever the case, the “infernal machine” is only

93. Charles P. Leavitt, Letter to the Confederate Secretary of War, 21 October 1861. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 4 Vol. 1* (Washington, DC: Government Printing Office, 1900), 695-696.

94. Louis M. Goldsborough, Report of Flag-Officer Goldsborough to the Secretary of the Navy, 17 October 1861. In United States War Department, *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861–29 October 1861; North Atlantic Blockading Squadron 29 October 1861–8 March 1862* (Washington, DC: Government Printing Office, 1897), 333-334.

briefly mentioned, as the majority of the report discusses intel on the construction of the CSS *Virginia* using the remains of the USS *Merrimack*.⁹⁵

As November drew to a close and winter was fast approaching, three men in New Orleans, Louisiana, started a submarine project of their own, a project which made them the most famous submarine builders of the Civil War. Of these three men, the most famous was Horace Lawson Hunley. Originally from Tennessee, Horace had come into wealth through the marriage of his widowed mother to James R. Connor, a wealthy planter. By the end of the 1850s, Hunley had become a prominent citizen of New Orleans. He was a respected lawyer, worked at the Custom House in New Orleans, and owned an eighty-acre plantation in addition to a small tract of land in Texas. He was a skilled businessman, and his support of the Southern cause had more to do with a search for a new moneymaking opportunity than belief in the cause. In fact, he had spoken out against secession in 1860. Despite this he took up the cause of Southern patriotism with the coming of the Civil War. He had captained the blockade runner *Adela* when it ran the blockade in June 1861, in a failed attempt to rendezvous with a British merchantman off the coast of Cuba, and successfully returned to Louisiana on July 1. Horace Hunley was one of the men inspired by Smith's 1861 letter, as were James McClintock and Baxter Watson, the co-owners of a machine shop on Front Levee Street in New Orleans. James

95. Chaffin, *Hunley*, 61.; Louis M. Goldsborough, Report of Flag-Officer Goldsborough to the Secretary of the Navy, 17 October 1861. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861-29 October 1861; North Atlantic Blockading Squadron 29 October 1861-8 March 1862* (Washington, DC: Government Printing Office, 1897), 333-334.

McClintock, originally from Cincinnati, was once the youngest licensed riverboat captain on the Mississippi River and was a talented self-taught engineer. He and Watson were contracted to manufacture bullets for the Confederate Army. They had built and sold two bullet making machines, likely of McClintock's design. At some point in late 1861, Hunley befriended McClintock. It is unclear who first suggested the idea for the submarine, but what is clear is that, inspired by Smith's letter and the prospect of being paid as privateers, the three men started construction of their own submarine. Hunley was said to be the chief financial backer and provided financial support, while McClintock was probably the chief engineer. The submarine they were building was remarkably similar to what Smith had advocated.⁹⁶

2.2 A Time of Major Developments: Triumphs and Failures

As 1861 drew to a close, the Confederacy had done far more to develop submarine technology than the Union. On December 2, 1861, Leavitt received his requested furlough, and throughout that month was engaged in what the records only describe as "important government work." The lack of details about this work are likely due to the secrecy surrounding such projects.⁹⁷

96. Mark K. Ragan, *The Hunley: Submarines, Sacrifice, & Success in the Civil War* (Charleston: Narwhal Press, 1999), 18-19.

97. William Smith, Report of Commander Smith, Commanding USS *Congress*, to Flag-Officer Goldsborough Regarding Means for Protection Against Torpedoes, etc., 4 November 1861. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861-29 October* —Footnote continued on next page.

A letter from January 1862 provides the earliest known evidence of submarine construction and activity in Mobile, Alabama. On January 5, 1862, a Confederate Army examiner complained that a few days earlier, “some reprobate” boarded and sank a submarine in Mobile. This submarine was likely the one built by Franklin Smith in 1861.⁹⁸

In February, another submarine project ended in tragedy. Charles Wilkinson and Charlie Carrol, two Irish immigrants living in Savannah, Georgia, built their own submarine. While testing it on February 23, 1862, a faulty air valve caused the vessel to sink, and though Carrol escaped, Wilkinson was trapped and drowned. The *Savannah Daily Morning News* described the incident in a short article titled “Lamentable Tragedy.” It described Wilkinson as the primary inventor and commended “to the Confederacy the patriotism of these men.” It also encouraged the citizens of Savannah to ensure that the daughter that Wilkinson had left behind was taken care of.⁹⁹

Meanwhile, Horace Hunley’s group in New Orleans were putting the final changes on their own craft. On March 12, 1862, they finished and launched their craft, which they named the *Pioneer*. The *Pioneer* was thirty-four feet long with a three-man

1861; North Atlantic Blockading Squadron 29 October 1861-8 March 1862 (Washington, DC: Government Printing Office, 1897), 392-393.

98. Report of Commander Smith, Commanding USS *Congress*, to Flag-Officer Goldsborough Regarding Means for Protection Against Torpedoes, etc., 4 November 1861. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861-29 October 1861; North Atlantic Blockading Squadron 29 October 1861-8 March 1862* (Washington, DC: Government Printing Office, 1897), 392-393.

99. “Lamentable Accident,” *Savannah Daily Morning News*, February 24, 1862, 2, <https://gahistoricnewspapers.galileo.usg.edu/lccn/sn82015886/1862-02-24/ed-1/seq-2/>.

crew. It was armed with a torpedo secured to a cradle, behind the small conning tower. Once the submarine was underneath a target, the submarine's captain could secure the explosive to the bottom of the ship. It was powered by a hand-cranked propeller operated by the other two crewmen. The boat was crude and had a number of issues. It lacked any form of illumination while underwater. Initial tests had shown that there were leaks, though the latter were easily fixed. Still, Hunley's group were satisfied with their craft and applied for a letter of marque.¹⁰⁰

Soon afterward on March 31, 1861, Hunley's group got their letter of marque. F. H. Hatch mentioned this in a letter to the Confederate Secretary of State in Richmond. John K. Scott was the appointed commander of the vessel. Scott, like Hunley, was an employee of the Custom House, so he was likely recruited by him. In addition to the work in New Orleans on submarines, Franklin Smith continued his own work in Memphis. While Hunley's group received a letter of marque, Smith received a patent from Richmond for his submarine designs, the first of its kind in the South.¹⁰¹

The New Orleans submarines, on the other hand, met an abrupt end. On April 24, 1862, David G. Farragut, flag-officer of the West Gulf Blockading Squadron, penetrated the weak defenses that guarded the seaward approach to the Crescent City, arriving in the

100. Ragan, *Submarine Warfare*, 52.

101. Chaffin, *Hunley*, 72.; F. H. Hatch, Report of Collector F. H. Hatch to Confederate Secretary of War Judah P. Benjamin of the Request and Issuance of a Letter of Marque for *Pioneer*, 1 April 1862. In United States. Naval War Records Office, *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda, Series 2 Vol. 1, Statistical Data of Union and Confederate Ships; Muster Roles of Confederate Government Vessels; Letters of Marque and Reprisals; Confederate Department Investigations* (Washington, DC: Government Printing Office, 1921), 399-400.

city the next day. New Orleans had fallen. Hunley, Watson, and McClintock hastily scuttled their submarine in one of the city's canals to prevent it from falling into enemy hands before fleeing. The *Pioneer's* brief career ended. It was thought that it never engaged the enemy. The only casualties related to the submarine are said to have been two slaves who suffocated while being forced to test it, though this is unconfirmed. The 1861 mystery submarine was probably scuttled around the same time or soon after. While the mystery submarine remained successfully hidden for over a decade, the *Pioneer* was quickly found and raised by the Union, who studied the craft extensively before leaving it abandoned on the shore near where it was found.¹⁰²

Despite the setback caused by the fall of New Orleans, Hunley, Watson, and McClintock were in Mobile in early May, working on a new submarine project. The commanding general of Mobile's defenses, Dabney H. Maury, warmly welcomed them to the city and approved of the project. The new vessel they planned would be a significant improvement over their predecessor. Among the improvements planned was an increased length of thirty-six feet, more space for crewmen, and an electric motor to power the submarine, rather than a hand crank. They set up shop in the Park and Lyons Machine Shop on the corner of Water and State Streets. Unfortunately for them, electric motors were difficult to come by. It was known that motors of sufficient power were available in New York City, but they were unavailable to the Confederacy. They attempted to build one of their own, but resources were scarce, and after a few weeks, they abandoned the

102. Chaffin, *Hunley*, 70.; Ragan, *The Hunley*, 23-25.

attempt, instead turning to steam power for their submarine, but this presented obvious problems.¹⁰³

Elsewhere, in Richmond, Virginia, William Cheeney accepted delivery of a submarine at the Tredegar Iron Works on May 13. This was likely a larger version of the submarine that the Union spy observed in 1861, that was improved with new modifications. It included multiple view ports for visibility, a “false bow” that likely housed the diver, and an electric torpedo for use by the diver. On May 30, 1862, the Tredegar Iron Works were also testing an “underwater cannon,” possibly inspired by Private Leavitt’s idea for a submarine battery.¹⁰⁴

On June 24, 1862, Cheeney’s submarine was undergoing trials in the James River near Richmond. Since the USS *Alligator* was in the James River at the same time, this was the first time in world history that two opposing forces had submarines stationed in the same theater of war, though the two vessels never met.¹⁰⁵

Progress on submarine technology in the Confederacy continued through the summer, though there were some setbacks. At the end of the summer, around late August, William Cheeney deserted the Confederacy, taking his research with him. He travelled to Washington, DC and attempted to tell President Lincoln everything he knew about Confederate submarines. Lincoln would not meet with him, and he ended up leaving his written information with the White House porter. No one read it, and Cheeney was never

103. Ragan, *Submarine Warfare*, 80-82.

104. Ragan, *Submarine Warfare*, 80-82.

105. Ragan, *Submarine Warfare*, 80-82.

contacted for a response. Despite his defection, there were plenty of other submarine engineers willing to aid the Southern cause.¹⁰⁶

One such engineer was Francis D. Lee of the Confederate Army. In October of 1862 he approached General P. G. T. Beauregard in Charleston with an idea for a boat designed to operate with most of the craft submerged. It was armed with a spar torpedo. Beauregard liked the idea and sent Lee to Richmond to get approval.¹⁰⁷

Lee's proposal was rejected by both the Confederate Army and the Navy. Undeterred, General Beauregard wrote first to South Carolina's governor on October 8, 1862, and then the head of the State Gunboat Committee on October 12, 1862, in an attempt to get support. The next day Lee was once again on his way to Richmond. Back in the Confederate capitol, the Confederate Patent Office issued a patent to James Patton for a steam-powered submarine on October 14, 1862. Patton was a resident of Petersburg, Virginia, and it is unknown if his submarine was ever built. Two days later, Lee arrived in Richmond and, after some political wrangling and debate, got approval for his project on October 31, 1862. Elsewhere, in November of that same year, a Colonel E. H. Angamar was testing a rocket-powered torpedo in the waters of Mobile, Alabama. This device could be considered a predecessor of the modern torpedo. Angamar was also planning to build a rocket-powered vessel.¹⁰⁸

106. Ragan, *Submarine Warfare*, 80-82.

107. Perry, *Infernal Machines*, 65-67.

108. Perry, *Infernal Machines*, 65-67.; Ragan, *Submarine Warfare*, 80-82, 117-118.

In early January of 1863, Hunley's group gave up on the steam engine and returned to the hand-cranked propeller of their previous submarine. Despite well over half a year of trying to construct a good engine for the boat, the submarine had never been designed to carry a steam engine, and time was of the essence. McClintock instead installed a hand cranked propeller crewed by four men. It was armed with a torpedo towed behind the craft by a rope. The submarine was named the *American Diver*, but it is sometimes known as the *Pioneer II*. It was more hydrodynamic and had room for five crewmen instead of three. By the end of January, the submarine was complete and ready for trials. Trials for the *American Diver* continued through the first days of February, but on February 7, 1863, the *American Diver* sank to the bottom of Mobile Bay near Fort Morgan. It had run into rough weather on the way to the fort and was swamped.¹⁰⁹

In Mobile Bay on February 24, Commodore Hitchcock of the USS *Susquehanna* reported that a five-man submarine invented by a French immigrant had attempted to attack the blockade and failed, he also stated that three or four more were under construction in Mobile.¹¹⁰

By around mid-March 1863, Hunley's group, needed new supporters and financiers after the failures of the previous two vessels. Around March 15, Edgar Collins Singer of Texas (originally Ohio) founded the Singer Submarine Corps—also known as

109. Chaffin, *Hunley*, 78-79.

110. Robert B. Hitchcock, Memorandum of Information Recieved from a Confederate Deserter from the C.S.S. *Selma*, 24 February 1863. In United States. Naval War Records Office, *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda, Series 1 Vol. 19, West Gulf Blockading Squadron 15 July 1862–14 March 1864* (Washington, DC: Government Printing Office, 1905), 626-629.

the Secret Service Corps—in Mobile, Alabama. Hunley and his associates joined the group within weeks of its formation, and they soon had what they needed to begin work on their third submarine.

On April 9, 1863, a curious letter was written to the Confederate Secretary of State from an agent in Mexico describing a submarine invented by a Spaniard in Barcelona. The submarine was armed with an underwater cannon, and the agent urged the Confederate government to employ his services. Although the inventor was never employed, this shows that at least one effort was made by the Confederacy to hire a foreign inventor to build a submarine.¹¹¹

Further north, probably in late May, a major group was founded by Senator A. J. Marshall of Virginia dedicated to the construction of submarines. The Triton Submarine Company, as it was called, was composed of people from across the Confederacy. It remained active throughout the war. Back in Mobile, Colonel Angamar finished his rocket powered vessel on June 4, as Hunley's group continued to work on their submarine.¹¹²

July of 1863 saw the most famous submarine of the entire war finished. The boat, which was eventually named the *H. L. Hunley*, was originally simply called the *Fish Boat*. It was nearly forty feet long, powered by a hand-cranked propeller, and had a crew

111. J. A. Quintero, Letter to the Confederate Secretary of State, 9 April 1863. In United States. Naval War Records Office, *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda, Series 2 Vol. 3, Proclamations, Appointments, etc. of President Davis; State Department Correspondence with Diplomatic Agents, Etc.* (Washington, DC: Government Printing Office, 1922), 735.

112. Chaffin, *Hunley*, 100-102.

of eight men. It was a larger, more advanced version of the *American Diver's* design. It had the same armament system as its predecessor.¹¹³

Around the same day or soon after this submarine was finished, Angamar made his move on the Union blockade. On July 1, 1863, his rocket-powered vessel was launched at the enemy. The attack failed, and no further records of Angamar or his craft exist. The Union Navy did not even record an attack. Based on this information, it is possible that, like Pascal's torpedoes in the North, the craft veered far off course and never made it anywhere near the blockade. It was probably abandoned or scrapped soon afterwards.¹¹⁴

In the summer of 1863, Confederate sources mention the cigar ship in relation to the development of what would become the CSS *David*. In July 1863, Francis Lee mentioned in a letter to Armand Beauregard, General Beauregard's brother, that the semi-submersible was being built on the "Winan's model." St. Julien Ravenel, the *David's* designer, apparently saw the potential of the *Winan's* design for military use. He had read the *Scientific American* articles, and he felt that cigar shaped craft would make an ideal semi-submersible torpedo boat. The shape of the *David* was largely inspired by and bore a remarkable resemblance to the *Winans*.¹¹⁵

Meanwhile, back in Mobile, the *H. L. Hunley* was going through its trials in Mobile Bay. On the last day of July, a large crowd, including several military officials,

113. Chaffin, *Hunley*, 100-102.

114. Ragan, *Submarine Warfare*, 118.

115. Crisafulli and Crisafulli, "The David Connection," *The Vernian Era*, Last modified August 2, 2016, <https://www.vernianera.com/Winans /DavidConnection.html>.

witnessed the *Hunley* successfully sink a barge that had been set up as a practice target. Admiral Franklin Buchanan, in charge of Confederate naval forces in Mobile, while impressed, was still skeptical of its use. He instead recommended the submarine to Flag Officer John Randolph Tucker in Charleston, South Carolina, who then passed on the recommendation to General P. G. T. Beauregard, who was in charge of the defenses around the city. Beauregard was impressed with the design and requested that the submarine be moved to Charleston on August 5, with a second message urging haste on August 7. By then, the submarine was being moved out of Mobile, and by the next day, it was well on its way to its new home and its destiny. On August 11, the submarine was in sight of its new home. The following day it was unloaded off the tracks.¹¹⁶

By mid-August, the *Hunley* began making sorties out into the harbor in search of targets. It was decided to only operate at night in order to prevent the submarine from being spotted. James McClintock himself captained the vessel. Despite several sorties, however, the craft never engaged the enemy. This frustrated Confederate military authorizes to no end, and they requested that Confederate Navy officers be placed onboard as observers. McClintock refused, stating they would only get in the way.¹¹⁷

On August 20, Lee's torpedo boat was finally deployed against the USS *New Ironsides*. Despite construction having begun in early November 1862, supply shortages,

116. Chaffin, *Hunley*, 113-114, 115-116.; P. G. T. Beauregard, Correspondence to Quartermasters and Railroad Agents on Lines from Charleston, S.C., to Mobile, Ala., 7 August 1863. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 28, Part II: Correspondence* (Washington, DC: Government Printing Office, 1890), 265.

117. Chaffin, *Hunley*, 131-132.

a workmen strike, and the refusal by the Confederate government to supply iron for anything other than Charleston's ironclads delayed progress. In the end, construction had been rushed, and it never received armor plating. Three torpedoes had hastily been attached to the spar in the hopes that at least one would detonate. The ram had been launched on August 1 and finished by August 3. Now, it was finally ready for action. At 11:30 p.m. that night, the vessel came in sight of the *New Ironsides*. It made it within fifty yards of the vessel before the officer on the deck of the ironclad. The officer, Ensign Porter, hailed the vessel, and James Carlin, the ram's captain, responded, stating that the craft was a steamer named the *Live Yankee* when asked for identification. At this point, the ram was forty yards away from the Union vessel. Carlin ordered the engine stopped when he noticed that the vessel's current course would take it past the *New Ironsides*. He then ordered the helmsman to turn the vessel starboard to correct the course, but the crewman did not understand. Carlin continued to repeat the order, but it was soon too late. The tide had taken the partially submerged ram directly alongside the Union ironclad. By this point, Porter was getting suspicious. He demanded to know where the vessel had come from. Carlin told him they had come from Port Royal. Carlin then tried to start the engine, only to find that it would not work. Porter once again asked for identification as the crew of the *New Ironsides* was called to quarters. A rocket was launched to alert the other Union vessels in the area. At this point Carlin's crew were finally able to get the engine going and began to move away from the enemy craft, just as Ensign Porter demanded the ram's surrender. Carlin told him he would comply and come aboard the Union ironclad to stall for it to get away. The crew of the *New Ironsides* soon opened fire with cannons and muskets as soon as the ruse was figured out. The ironclad

raised anchor and began to move, while its fire missed the ram, which quickly disappeared into the night. Carlin briefly considered trying to use the ram to attack one of the monitors, but due to the faulty engine and the fact that the Union vessels were now on the alert, he decided to return to port. He wrote an extremely negative report of the ram when he returned, and it was never used again.¹¹⁸

Within that same besieged city, the *H. L. Hunley* continued its sorties. The submarine's crew stayed in contact with Maury back in Mobile, as he mentions on August 24 that the submarine's crew had refused to attack the USS *New Ironsides*, the same vessel Lee's ram had tried to sink, because the water was too shallow to dive under the ship. By this point, with things growing desperate and Union guns now in range of Charleston itself, the military had enough. A refusal by the *Hunley*'s crew to attack on August 23 due to poor weather was probably the final straw. The Confederate Army seized the submarine for use by the Confederate Navy. McClintock and his crew were sent back to Mobile, while Horace Hunley and a few other members of the Singer Submarine Corps remained in Charleston as advisors. Lieutenant John A. Payne of the CSS *Chicora* was chosen as the submarine's captain, and his crew consisted of volunteers from the *Chicora* and the CSS *Palmetto State*. It was not long before the crew met with disaster. In a report on operations around Charleston Harbor on August 30, mention is made of "an unfortunate accident" that occurred the previous day. It states that the "submarine torpedo-boat became entangled in some way with ropes, was drawn on its side, filled, and went down." This occurred during a public demonstration for an excited

118. Perry, *Infernal Machines*, 77-80.

crowd. The exact details differ from account to account. Some say that Payne fell on the lever controlling the diving planes after becoming tangled in the tow cable. Others surmise the wake of a passing steamer swamped the submarine, or that the sudden movement of the towing craft snapped the line connecting the *Hunley* to the ship. Whatever the case, Payne and two others escaped, but five men drowned.¹¹⁹

The same day that Union submarines were first reported by Confederate scouts in Charleston, the rebels were preparing their own craft for use, but it was not the *H. L. Hunley*. Work had been underway on a new type of vessel since 1862. The now completed CSS *David* was a semi-submersible, steam-powered craft with a crew of four. It was armed with a torpedo mounted on a spar. On September 22, 1863, it had been placed under the command of Lieutenant W. T. Glassnell. On the night of October 5, Glassnell made his move on the USS *New Ironsides*. As described in the report of the ship's captain, Captain S. C. Rowan, sentinels spotted a strange object floating towards the ship. They attempted to hail the craft but received no answer. Acting Ensign C. W. Howard, in charge of the men on deck, ordered the men to open fire. The crew of the *David* returned fire with muskets, and Howard was badly wounded. The wound proved to be fatal. Soon afterwards, the spar torpedo detonated against the side of the ship in a tremendous explosion. The blast sent a huge column of water into the air. Unfortunately

119. Ragan, *Submarine Warfare*, 40-41.; Harris and Boyne, *Navy Times Book of Submarines*, 91.; Charles H. Omsteadl, Reports of Col. Charles H. Omsteadl, First Volunteers, Georgia Infantry, Commanding at Fort Johnson, James Island, 13 August 3–September 1863. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 28, Part I: Reports* (Washington, DC: Government Printing Office, 1890), 551.

for the *David*, the water splashed down on it and drowned the fires in its engines. Three of its crew, Glassnel included, abandoned the ship. The torpedo boat appeared to drift off as the crew of *New Ironsides* continued to fire on her, until it was out of sight. Glassnell and one of the other crewmen were picked up by a Union coal schooner and taken prisoner. Unbeknownst to the Union sailors, the CSS *David* had managed to escape. The third crewman to jump overboard, Assistant Engineer Tombs, had managed to swim back to the craft, while the pilot remained on board because he was unable to swim. Together, they had managed to reignite the engines and limp back to Charleston. The ship had been damaged, with at least thirteen bullets penetrating the hull, but it had survived. The captured men had sketches of the semi-submersible in their pockets, and Dahlgren quickly sent the information to others in the Navy. He also advised that the Union Navy build improved versions of the vessel for its own use. On October 7, 1863, General Beauregard sent word to Maury of the attack, stating that “no damage is apparent; charge two small and too near the surface.” Unknown to him, the damage to the *New Ironsides*, originally thought to be minor, was found by its crew to be severe. Though the ship did not sink, the ironclad had to be temporarily taken out of action for repairs. More ships of the same design as the *David* were quickly produced. After the *David*'s successful attack on the *New Ironsides*, Admiral Dahlgren ordered the crews of the blockading vessels inside the bar at Charleston Harbour to deploy outriggers and netting around the ships whenever they anchored, and to send out rowboat patrols from dusk to dawn. He was not taking any chances.¹²⁰

120. John R. Tucker, Orders for Lieutenant Commander W. T. Glassell, C.S.
—Footnote continued on next page.

Meanwhile, the Confederates in Charleston had salvaged the *Hunley*. It had been a grisly affair removing the bodies, which were so bloated the arms and legs had to be chopped off to get them out. On September 19, Horace Hunley requested to take personal command of the submarine that bore his name with a crew of his choice. He selected men from Mobile who had worked on and with it since construction. Some of them had even worked with the *American Diver*. First Lieutenant George E. Dixon was selected to lead the crew. He had been stationed in Mobile since he was injured in the leg at the Battle of Shiloh. He quickly became involved in the submarine project. By early October, the submarine was back in the water, making mock attacks on the CSS *Indian Chief*. For a while, it looked like the submarine would be of use, but on October 15, tragedy struck. It was recorded in the Journal of Operations as “an unfortunate accident.” While Dixon was absent, Hunley himself served as captain for another practice attack. When the submarine

Navy, Commanding C.S. *David*, 22 September 1863, S. C. Rowan, Report of Captain Rowan, U.S. Navy, Commanding USS *New Ironsides*, 6 October 1863, S.C. Rowan, Report of Captain Rowan, U.S. Navy, Commanding Acting Ensign C. W. Howard of the USS *New Ironsides*, 6 October 1863, John A. Dahlgren, Report of Rear Admiral Dahlgren, U.S. Navy, Regarding the Operations of the Confederate Torpedo “David,” 7 October 1863, John A. Dahlgren, Report of John A. Dahlgren, U.S. Navy, Announcing the Death of Acting Master Howard, U.S. Navy, 10 October 1863. In United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 15, South Atlantic Blockading Squadron 1 October 1863–30 September 1864* (Washington, DC: Government Printing Office, 1902), 12-16.; Extract from Journal of Operations in Charleston Harbor, 1 September–31 December 1863. In United States. Naval War Records Office, *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 28, Part I: Reports*, (Washington, DC: Government Printing Office, 1890), 140-141.; James M. McPherson, *War on the Waters: The Union & Confederate Navies, 1861-1865* (Chapel Hill, NC: University of North Carolina Press, 2012), 178.

dove under the *Indian Chief* it did not rise again. This time, the entire crew died, including Hunley.¹²¹

On October 18, the Confederates went to work salvaging the *Hunley*. Due to weather, the submarine was not salvaged until November 7. As the blackened corpses of the crew were removed, it was determined that the crew had failed to close the sea cock that let water into the forward ballast tank. When they tried to surface by pumping the water out, they ended up flooding the crew's chamber. Despite the grim history of the craft, Lieutenant Dixon eventually managed to convince Beauregard to give the submarine another chance, and the *Hunley* was once again prepared for combat. Around the same time on November 14, General Beauregard issued a critique of the Confederacy's ironclads. He stated, among other things, that they were too slow, "unseaworthy, by their shape and construction," incapable of engaging the enemy at long range, and "warm, uncomfortable, and badly ventilated." Instead of ironclads attacking above water, he recommended that enemy ships should be attacked below water. He proposed that more ships like the *David* should be produced to do so. He felt that such vessels, built closer in size to a steamer with protective armor, could be used to raise the blockade of Charleston, the Atlantic and Gulf Coast, as well as reopen the Mississippi River. Although he was talking about torpedo boats, those are the same justifications used for submarine warfare.¹²²

121. Chaffin, *Hunley*, 141-150.

122. Chaffin, *Hunley*, 154-156.; P. G. T. Beauregard, Remarks Relating to Iron-Clad Gunboats, 14 November 1863. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and* —Footnote continued on next page.

At some point in late November of 1863, a group of Union soldiers in a foraging party captured some Confederate mail, amongst which were plans for a submarine. On November 27, 1863, the Adjutant-General of the Union Army was given a message warning of the submarine with the plans enclosed. The submarine was shaped like the *Hunley* but has the air hose-float assembly and diver chamber of Cheeney's submarine. According to the stolen letters, multiple submarines of this type were to be built for use west of the Mississippi, particularly in Texas. Unknown to the Union War Department, this was one of the Triton Company's submarine plans. Major General Jeremy F. Gilmer, the head of the Confederate Engineering Office for South Carolina, Georgia, and Florida, had dismissed it as too dangerous and a waste of money unworthy of the resources to build it.¹²³

In Charleston, the *Hunley's* third crew of Navy volunteers was ready. On December 14, 1863, Lieutenant Dixon was given the order to attack ships at the mouth of the harbor. He had the full support of the Army and Navy for any assistance he might require. Soon afterwards, the *Hunley* was called out of action for a refit. While the CSS *David* had been towing it out of the harbor, the tow rope for the torpedo had gotten caught in *David's* propeller, and the torpedo had nearly blown up both vessels before it

Confederate Navies: Office Memoranda. Series 1 Vol. 28, Part II: Correspondence (Washington, DC: Government Printing Office, 1890), 503- 504.

123. Ragan, *Submarine Warfare*, 155-156.; Edwin Stanton and Charles Pomeroy Stone, Letter from the Secretary of War to the Secretary of the Navy, Transmitting Information Regarding the Planting of Torpedoes in Pamunkey River, 27 November 1863, and 18 January 1864. In United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 9, North Atlantic Blockading Squadron 5 May 1863–5 May 1864* (Washington, DC: Government Printing Office, 1899), 411-412.

was freed. Because of this, it was decided that the torpedo would be mounted on a spar in front of the submarine, and the *Hunley* would have to do without a towing vessel. First Assistant Engineer Tomb of the CSS *David* recommended the change. Elsewhere that December, in Wilmington, North Carolina, a group of men, including R. W. Dunn, one of the people who had assisted in the construction of the *Hunley*, was attempting to construct a submarine for use in that valuable port city.¹²⁴

2.3 The Later Efforts: History is Made and the Final Projects

Harper's Weekly, a popular magazine of the North, published an interesting article on January 30, 1864. It stated that a French magazine had received information about a 69-foot-long steam powered submarine that had been finished in Mobile by Mr. Anstilt. Although it is unclear whether the boat was actually built or completed, it is possible it was one of the submarines built in Mobile. It was probably an attempted project at the very least.¹²⁵

124. Chaffin, *Hunley*, 164-165.; Junior Navy Officer M. Otey, Special Orders No. 271, 14 December 1863. In United States. Naval War Records Office, *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda, Series 1 Vol. 28, (Part II) Correspondence* (Washington, DC: Government Printing Office, 1890), 553.; J. H. Tomb, Notes from Papers of First Assistant Engineer Tomb, C.S. Navy, Regarding the Submarine Torpedo Boat, January 1865. In United States Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda, Series 1 Vol. 15, South Atlantic Blockading Squadron 1 October 1863–30 September 1864* (Washington, DC: Government Printing Office, 1902), 334-336.

125. Ragan, *Submarine Warfare*, 170-171.; “Rebel Submarine Battery,” *Harpers Weekly* 8, no. 370 (January 30, 1864): 77-78, <https://babel.hathitrust.org/cgi/pt?id=mdp.39015021733780;view=2up;seq=82;skin=mobile>.

On February 17, 1864, history was made. The *H. L. Hunley* became the first submarine to ever sink a ship in combat when it sank the USS *Housatonic*. The loss was recorded in the itinerary of military operations for the Northern District the following day as follows: “Sloop-of-war *Housatonic* destroyed by a torpedo off Morris Island.” The success of the *H. L. Hunley*, the earlier success of the CSS *David* in its attack on the *New Ironsides*, as well as the increasing numbers of torpedoes, were some of the major reasons the Navy never attempted another assault on Charleston again. Instead, they were content to simply keep the harbor closed to blockade runners. Secretary Welles told Admiral Dahlgren that despite the public demand for its capture and the symbolism of the fall of Charleston, a symbolic victory simply was not worth the potential risk to the ironclads. Thus, the ships remained outside the harbor away from any submarines, torpedoes, and semi-submersible torpedo boats. In order to prevent such a successful attack from ever happening again after the sinking of the *Housatonic*, Dahlgren ordered the ships stationed outside the bar at the entrance to the harbor to remain underway at all times at night or, if they had to weigh anchor, to send out rowboat patrols and netting in the outriggers.¹²⁶

A more detailed report of the sinking was given by Rear-Admiral Dahlgren on February 19, 1864. He believed that the submarine was a “David” class torpedo boat, unaware that the *Housatonic* had been the victim of the first successful submarine attack in history. The incident played out similarly to the attack on the *New Ironsides*. That night, a strange object had been seen approaching the ship. At least two of the crew fired

126. McPherson, *War on the Waters*, 179-180.

at it with small arms before the object struck the ship. No explosion was apparently heard, but the ship began to sink. Two of the lifeboats were lowered, and the nearby USS *Canandaigua* quickly approached to aid the survivors. Dahlgren believed that the success of this attack meant that “the whole line of the blockade will be infested with these cheap, convenient, and formidable defenses.” He then emphasized, as he had previously, the effectiveness of this method of warfare. He also ordered the blockade ships to avoid anchoring near the harbor and keep on the move. That same day, Lieutenant-Colonel Dantzler of the Confederacy reported that the submarine had not returned, but the arranged signal for a light to guide the submarine home “were observed and answered.” The submarine never returned, but the Confederate observers thought it had, so they did not report it missing until February 19. Beauregard responded the next day by ordering the men to “pay a proper tribute to the gallantry and patriotism of its crew and officers” as soon as their fate was known. The next day, the General announced in a telegram that he had received word that a ship had been sunk in the harbor, and it was believed that the *Hunley* was responsible. On the February 27, 1864, prisoners of war informed the Confederates that it was the *Housatonic* that had been sunk, but they also informed them that Dixon and his crew were not captured, so there was “little hope of the safety of that brave man and his associates.” Apparently, it was decided not to inform the public of its loss, because the *Charleston Daily Courier* article on February 29, 1864, had announced the sinking and praised the crew of the submarine without mentioning its loss. The announcement raised the morale of the besieged city. By early March, the public was still unaware of the fate of the submarine. One man wrote home to his wife on March 3 that no word had been received of the submarine and it was feared lost, only to write the

following day that the submarine's crew were safe according to the *Charleston Mercury*. By March 10, it was announced to headquarters "that nothing since has been heard either of Lieutenant Dixon or the torpedo boat. It is therefore feared that that gallant officer and his brave companions have perished. On April 29, Major-General Maury was given a detailed account of the attack and the missing crew, along with a theory that it was sucked into the hole made in the *Housatonic* and sank with her.¹²⁷

It may never be known what caused the loss of the *H. L. Hunley* that fateful night. After archaeologists raised it from the bottom, the aft ballast pump was examined in hopes of finding something to do with the sinking, but no answers were found. Another theory was that a "lucky shot" sank the vessel, but this has since been disproven. It is now generally believed that the submarine sank as a result of the blast, and a report in 2017 theorized that the shockwave from the blast killed the crew. This does not explain the report of the signal, however. Perhaps the blast merely incapacitated enough of the

127. McPherson, *War on the Waters*, 179-180, 190-192.; John A. Dahlgren, Report of Rear-Admiral Dahlgren, U.S. Navy, 19 February 1864. In United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 15, South Atlantic Blockading Squadron 1 October 1863–30 September 1864* (Washington, DC: Government Printing Office, 1902), 329-330.; O. M. Dantzler, Report of Lieutenant-Colonel Dantzler, C.S. Army, 19 February 1864, P. G. T. Beauregard, Endorsement, 20 February 1864, P. G. T. Beauregard, Telegram, 21 February 1864, P. G. T. Beauregard, Telegram, 27 February 1864, Extract from the *Charleston Daily Courier*, 29 February 1864. In United States Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 15, South Atlantic Blockading Squadron 1 October 1863–30 September 1864* (Washington, DC: Government Printing Office, 1902), 335-337.

crew for the submarine to be inoperable, and it drifted to the bottom. There is still a lot to learn about this vessel.¹²⁸

Work on submarines would continue after the sinking of the *H. L. Hunley*. On March 23, 1864, Confederate Secretary of the Navy Stephen Mallory approved the “enterprise” of John P. Halligan. Halligan was in Selma, Alabama and his “enterprise” was the building of a submarine for use in Mobile, Alabama. On April 9, a torpedo boat, the CSS *Squib*, attacked the USS *Missouri* but failed to sink it. Although the *Squib* was not a submarine or even a semi-submersible, this incident showed that the Confederates were still determined to use spar torpedoes like the one that was used on the *Hunley*. On April 12, Union Major General Stephen Hurlbut received information from informants of a steam powered submarine, complete with retractable smokestack, which was being built in Mobile, and would be operational by May 10, 1864.¹²⁹

128. Bradley Blankemeyer, S. Wiese, and M. Scafuri, “Analysis of the AFT Ballast Pump Onboard the American Civil War-Era Submarine, *H. L. Hunley*.” *Industrial Archaeology Review: The Association for Industrial Archaeology* 38 (May 2016): 35-46, <http://dx.doi.org/10.1080/03090728.2016.1156844>.; R. M. Lance, H. Warder, and C. R. D. Bass, *Forensic Science International: Science Direct* (Durham, NC: Duke University, June 12, 2016). <http://dx.doi.org/10.1016/j.forsciint.2016.11.038>.; R. M. Lance, L. Stalcup, B. Wojtylak, and C. Bass, “Air Blast Injuries Killed the Crew of the Submarine *H.L. Hunley*,” *PLoS ONE*. 12, no. 8 (23 Aug. 2017). E0182244. <http://doi.org/10.1371/journal.pone.0182244>.

129. Ragan, *Submarine Warfare*, 210-212.; Stephen Mallory, Order of the Secretary of the Navy to Commander Jones, C.S. Navy, to Further the Enterprise of J. P. Halligan, March 23, 1864. In United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 21. West Gulf Blockading Squadron 1 January 1864–31 December 1864* (Washington, DC: Government Printing Office, 1906), 882.; John S. Barnes, Additional Report of Captain Barnes, U.S. Navy, Transmitting a Drawing of Torpedo Boat. United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 9, North Atlantic* —Footnote continued on next page.

On August 5, 1864, as the Battle of Mobile Bay raged, another Confederate submarine, possibly the same one Hurlbut had been told about, may have met its fate. Apparently named the *Captain Pierce* after its captain, the steam powered submarine was reported captured by *Harper's Weekly* after its boiler exploded while trying to participate in the battle, killing all of its three-man crew. Post-war accounts, however, indicate that Captain Pierce himself managed to escape, though he lost his leg and was captured. The stories that it participated in the battle and was the real reason the USS *Tecumseh* sank are probably an exaggeration.¹³⁰

On October 10, Baxter Watson, one of the men from Hunley's group, wrote to Confederate President Jefferson Davis proposing that a submarine be built with an electric engine, and that all he would need was five thousand dollars so that he could sneak into New York City or Washington, DC to buy one. By the time the letter reached Richmond, it is unlikely that Davis had much time to read it with the war all but lost. By the middle of that month, John P. Halligan's submarine, named the CSS *Saint Patrick*, was ready for trials at sea. General Maury warmly welcomed the new vessel to Mobile. The Union were aware of its presence there thanks to a letter sent from a spy in Selma on November 27, and the Assistant Secretary of the Navy sent a letter to Farragut warning him of its presence on December 5.¹³¹

Blockading Squadron 5 May 1863–5 May 1864 (Washington, DC: Government Printing Office, 1899), 601-602.

130. Ragan, *Submarine Warfare*, 225-226.

131 Ragan, *Submarine Warfare*, 228-229.; Gustavus Fox and Edward La Croix, Letter from the Assistant Secretary of the Navy to Rear-Admiral D. G. Farragut, U.S. Navy, Transmitting Information Regarding Confederate Torpedo Boat Built at Selma, —Footnote continued on next page.

By the end of 1864, however, Maury was less than cheerful over the actions of the commander of the city's new submarine than he had been in November 1864. Halligan apparently refused to attack the enemy. On January 13, 1865, Maury reported to Richmond that Halligan had been transferred by Commodore Farrand, then in charge of the fleet in Mobile, and appealed to Jefferson Davis to place the submarine under his command. Davis responded three days later stating that the "Secretary of Navy does not know that his department has any control over the boat, but has directed Captain Farrand, if under his control, to turn it over to you."¹³²

As the Union campaign against the city of Mobile intensified, patience with Halligan was wearing thin. On January 26, Maury summarized his troubles with Halligan. He had hoped to have the boat ready before the attack on Mobile Bay, but it had not arrived until the end of the year. Once it did arrive, Halligan had done nothing. By the time he had the submarine under his command, he had discovered that Halligan had run off with some of the parts that were necessary to operate the submarine. Halligan was found staying at the Battle House, and the parts recovered. The new commander of the submarine, Lieutenant Walker of the Navy, said he would be ready to attack the next day. Thus, on January 27, the *Saint Patrick* finally made an attack on the Union blockade.

Ala., 5 December 1864 (enclosure written 20 November 1864). In United States. Naval War Records Office. *The Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 21, West Gulf Blockading Squadron 1 January 1864–31 December 1864* (Washington, DC: Government Printing Office, 1906), 748.

132. Dabney H. Maury, Letter to President Davis, 13 January 1865, Jefferson Davis, Indorsement, 18 January 1865. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II: Correspondence, Etc.* (Washington, DC: Government Printing Office, 1894), 781.

It attacked the USS *Octorara* and would have succeeded in becoming the second submarine to sink a ship in combat had its torpedo not misfired. The Union crew was in a panic, and their cannon and musket fire wildly inaccurate. One brave man managed to leap onto the surfaced submarine and grab the smokestack, demanding to be given rope to trap the submarine. Shots were apparently fired at him, and he was forced leap off the submarine as it escaped. The CSS *Saint Patrick* only made two more sorties after that.¹³³

Early February would see the second deployment of the CSS *Saint Patrick*. This second sortie was meant to serve as a distraction so that a blockade runner could escape in early February. The distraction worked, but it was decided it was too risky, so the ship never left. This means the CSS *Saint Patrick* was probably the torpedo boat mentioned in the February 16 report by Union Lieutenant Commander Low as being launched a few days prior.¹³⁴

133. Ragan, *Submarine Warfare*, 239-241.; Dabney H. Maury, Report of Major-General Maury, C.S. Army, Regarding the Conduct of the Contractor of the Torpedo Boat *Saint Patrick*, 26 January 1865, H. L. Clay, Endorsement, 18 February 1865. In United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865–31 January 1866; Naval Forces on Western Waters 8 May 1861–11 April 1862* (Washington, DC: Government Printing Office, 1908), 267-268.

134. Ragan, *Submarine Warfare*, 241.; W. W. Low, Report of Lieutenant-Commander Low, U.S. Navy, Giving Information Obtained from Refugees Regarding Affairs in the Vicinity of Mobile, 16 February 1865. In United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865–31 January 1866; Naval Forces on Western Waters 8 May 1861–11 April 1862* (Washington, DC: Government Printing Office, 1908), 41.

Further south, a disturbing report was received in New Orleans. On March 13, 1865, Major A. M. Jackson, of the 10th U.S. Colored Heavy Artillery, forwarded a spy's report to command which described five Confederate submarines. One of the submarines was in Houston, Texas, while the remaining four were in Shreveport, Louisiana. They were apparently made by the Singer Submarine Corps, the same group that Hunley and his associates had joined in 1863. This assumption is based on an 1864 order to move some of the group to the western Confederacy. Some of the men who worked on the *H. L. Hunley* may have also worked on these submarines. Based on descriptions, these vessels looked remarkably similar to that lost submarine. They were forty feet long and had a crew of eight. They were each armed with two torpedoes, one mounted on a spar on the bow, the other towed behind the submarine on a wooden plank, though only one torpedo may have been intended to be deployed at a time. There was apparently a plan to transport the Houston submarine to Louisiana to sink the former CSS *Tennessee*, which had been captured in the Battle of Mobile Bay, while the four Shreveport submarines remained where they were built for fear of Union spies. The spy's report urged caution, for an attack was believed to be certain.¹³⁵

In April 1865, the CSS *Saint Patrick* was deployed for the final time. The submarine's final mission was to sneak supplies to the defenders of Spanish Fort while they were under siege. Although the records do not say what happened afterwards, it is

135. Ragan, *Submarine Warfare*, 241-246.

safe to assume it was scuttled when Mobile fell. It was a weapon used too little, too late.¹³⁶

The final submarine related incident of the war occurred in June of 1865. A group of Union troops was sent up the Red River north of Shreveport, Louisiana, to accept the surrender of the ironclad CSS *Missouri* and a group of submarines built by the Singer Submarine Corps, the same group that had helped build the *Hunley*. By the time they arrived, the submarines had all been scuttled by their crews.¹³⁷

136. Ragan, *Submarine Warfare*, 250-252.

137. Ragan, *Submarine Warfare*, 253.

CHAPTER 3

UNION SUBMARINES

By 1861, crude diving equipment and diving bells had been developed and were in use during the Civil War. Breathing apparatuses, commonly known as “submarine armor,” were being used by divers. Despite this, submarine technology still remained in its infancy.¹³⁸

3.1 Early Efforts and the Long and Frustrating Development of the U.S. Navy’s First Submarine

At the start of 1861, as the nation was going through a crisis worse than any before, de Villeroi’s submarine was moved across the river to Delanco, New Jersey. That was possibly due to a cheaper mooring cost. The submarine was still there when the Civil War began.¹³⁹

As the secession crisis worsened, the Stevens Battery began to attract more attention. *The New York World* assigned a reporter to look into the battery, and on February 23, 1861, *Scientific American* published another article on the subject. At that time, they had only praise for the craft and condemnation for the government for not

138. Ragan, *Submarine Warfare*, 2-3.

139. Veit, *Natural Genius*, 73.

building ironclads like those of France and England. The article cited Robert Stevens as the inspiration for inventors in England and France who were currently working on ironclads for their nations' navies. Soon after the Civil War began, a second article on the vessel appeared in the paper on April 20, 1861. It once again claimed that the British and the French were inspired by the Stevens Battery to build their ironclad vessels, going so far as to call them nothing "but imitations of the ship or battery of the late Robert L. Stevens; and, although our press has ridiculed the latter by naming it *Stevens' Folly*, *The Nondescript*, &c., yet, from a limited knowledge of the nondescript, I believe that it would be more than a match for either." The article also claimed that "it may be completed and made ready for service in three to four months." The semi-submersible continued to attract attention in the following months.¹⁴⁰

As the crisis deepened and war loomed, a number of ideas were submitted to the United States government to resupply the isolated Fort Sumter in Charleston harbor. One of the ideas submitted by a concerned citizen, involved using submarines to sneak past the Confederate defenses in order to resupply the fort with what they needed. The plan was quickly dismissed.¹⁴¹

On April 12, 1861, the Civil War began as Confederate forces opened fire on Fort Sumter in Charleston Harbor. Days later on April 19, President Abraham Lincoln

140. "Altering Our Naval Vessels," *Scientific American* 4, no. 8 (February 23, 1861): 121, <https://babel.hathitrust.org/cgi/pt?id=pst.000062999083&view=1up&seq=113&skin=2021&q1=altering%20our%20naval%20vessels.>; "Steel Plated Ships," *Scientific American* 4, no. 16 (April 20, 1861): 251, <https://babel.hathitrust.org/cgi/pt?id=pst.000062999083&view=1up&seq=243&skin=2021&size=125>.

141. Wesley Moody, *The Battle of Fort Sumter: The First Shots of the American Civil War*, (New York: Routledge, 2016), 99.

announced that all Southern ports would be blockaded. The United States Navy lacked sufficient ships to blockade the harbor when the war began, making it nothing more than a paper blockade. Still, it presented the South with the possibility that at some point in the future, it could be cut off from the sea.¹⁴²

The first submarine related incident in the Civil War occurred in the North. In the opening months of 1861, just as the Secession Crisis was giving way to Civil War, a German immigrant named Julius H. Kroehl made several attempts to sell his design for a submarine to the United States Navy. Kroehl had immigrated to the United States due to the political unrest in Germany in the 1840s. Having been inspired by what he had seen of Alexandre's demonstration nearly a decade before, the ironworker shifted to work on underwater demolition and diving bells in New York City in the 1850s. Eager to get a government contract, Kroehl proposed an idea for a submarine that he hoped to sell to the U.S. Navy. It was one of several ideas he pitched to the military in the first half of 1861. He proposed that his submarine could be used to enter Southern harbors and eliminate underwater obstacles ahead of Union ships. The Navy showed no interest in his design, and it was never built.¹⁴³

On May 4, 1861, just weeks after the bombing of Fort Sumter, the Stevens Battery was the focus of a *Harper's Weekly* article, based on the account of a reporter for the *World* newspaper who managed to get access to the construction site. The reporter was able give a more accurate measurement of the craft than previous guesses, estimating

142. Moody, *Battle of Fort Sumter*, 3.

143. Ragan, *Submarine Warfare.*; Delgado, *Misadventures*, 3-4.

that it was four hundred feet long and fifty feet at the beam, but he still gave the same incorrect number of guns as the 1856 article. He did, however, provide evidence that a naval ram had been added during the 1854 redesign. He wrote that “the bow is very sharp, and there are good evidences that it was intended to be fortified in this locality by what is termed dead wood but in this case was dead iron.” The reporter was impressed by the sheer size of the vessel, and the article clearly showed that the craft was attracting a lot of attention.¹⁴⁴

In Maryland, the Secession Crisis and the subsequent Civil War brought work on the *Winans* (the “Cigar Ship”) to an abrupt halt and plans for a second ship were abandoned. The inventors did not plan to stop working on the *Winans* ship, but the war kept them from doing any further work. Ross Winans himself was a strong advocate of states’ rights and had Southern sympathies as did many others in Maryland. This ultimately got him into trouble. On May 14, 1861, after returning from a session of the Maryland House of Delegates in Frederick, he was arrested on the orders of General Butler as the train stopped at Relay House. He was charged with making and selling weapons to the Confederates in Virginia. He was then held prisoner in Fort McHenry. His friends quickly went to Washington, DC , where they convinced President Lincoln that Winans was innocent. Lincoln ordered General Scott to secure his release, and Winans was allowed to return to his family. The June 1, 1861, issue of *Scientific American*

144. “Stevens’s Bomb-proof Floating Battery,” *Harper’s Weekly* 5, no. 227 (May 4, 1861): 284-285, <https://babel.hathitrust.org/cgi/pt?id=mdp.39015085429630&view=2up&seq=276&skin=2021&size=300>.

dismissed the charges of disloyalty, stating that “although Mr. Winans was an old resident of Baltimore, he was a native of New Jersey.”¹⁴⁵

Further north, at midnight on May 16, 1861, the harbor police in Philadelphia noticed a strange skiff crewed by two men departing from the wharf at South Street. Following them to nearby Smith Island, the police discovered the two men loading pigs of lead into a submarine. The men were immediately taken into custody. At 2:00 a.m., the boat was towed to the pier at Noble Street, where it was chained. The two men turned out to be teenagers. They were sixteen-year-old Henry Kreiner and seventeen-year-old Alexander Rhodes, two of the people that Brutus de Villeroi had hired to crew his vessel. The submarine was the 1859 salvage vessel. The boys claimed that the vessel was being prepared for a demonstration at the Navy Yard and that the French inventor had permission to move the vessel in preparation. The authorities in charge of the yard, however, had never been contacted by de Villeroi and had no knowledge of any planned demonstration. The two crew members were released after a few days, and the submarine, after briefly being towed to the Navy Yard, was returned to its owner after it was determined that it was not a threat. De Villeroi hoped that the craft would be evaluated and attract public attention. His plan worked, and his vessel was the talk of the town. Two weeks later, Captain Samuel F. Du Pont, the Commandant of the Philadelphia

145. “The Arrest of Ross Winans,” *Scientific American* 4, no. 22 (June 1, 1861): 338, <https://babel.hathitrust.org/cgi/pt?id=pst.000062999083&view=1up&seq=331&skin=2021&size=125&q1=winans>.

Navy Yard, ordered a full examination of de Villeroi's submarine by three of the Navy Yard's engineering officers to investigate its potential use to the Union Navy.¹⁴⁶

Examinations of de Villeroi's salvage vessel were completed and a report was written on July 7, 1861, by Commanders Henry K. Hoff and Charles Steadman, together with Chief Engineer Robert Danby. They considered the boat a model demonstrating de Villeroi's principals. They felt the vessel, while not designed for war purposes, was well built, and its technology could be adapted for war purposes. However, they were concerned about the boat's ability to move. The salvage boat was designed to operate as a sort of mobile diving bell, with the craft towed to the site of the wreck and then released to dive. As such, it was not designed to move fast, nor very far. The examiners concluded that the boat lacked sufficient power to operate in a manner fitting for military purposes. Still, the group recommended the vessel to the Navy, stating that it met all of the Navy's criteria. It could stay safely submerged for lengths of time without contact with the surface or harm to the crew, and it could dive and surface repeatedly. It also allowed men to enter and exit the interior while underwater, keeping the divers safely supplied with oxygen from a hose. The air purification system, described as some sort of "apparatus" that cleaned the air through a chemical reaction, was also highly praised. As for the problem of propulsion, the examiners felt that the issue could be resolved by creating a larger version of the vessel with a larger crew.¹⁴⁷

146. Ragan, *Submarine Warfare*, 13-16.; "The Arrest of Ross Winans," *Scientific American* 4, no. 22 (June 1, 1861), 338.; Veit, *Natural Genius*, 77.

147. Veit, *Natural Genius*, 78-80.

Soon after the report was released, de Villeroi offered to sell the submarine, complete with all its specifications, plans, drawings, and its “secrets” to the United States Navy. The French inventor offered to personally train a crew and command the vessel in all of its operations. The owners of the vessel further proposed to use the vessel to blow up rebel ships at the Norfolk Navy Yard with the submarine in return for payment equal to the damage inflicted on Confederate forces. Should the government not accept that offer, the owners proposed an alternative—they would supervise the construction of a new submarine, one specifically designed for military purposes, with a budget of \$14,000. The government would fund the work, and the submarine would be completed forty days after the work was contracted. The group would be paid for their work upon the successful testing of the new vessel by a government commission. The owners would also sell the 1859 submarine to the government to serve as a training vessel for crews of the new submarine, on which a Navy crew could be taught the basics of operating the vessel. The report was soon on the desk of the Secretary of the Navy, Gideon Welles. Despite the report, the government was slow to act on it.¹⁴⁸

Weeks after the favorable report on de Villeroi’s submarine, another potential weapon received similar attention. On July 24, 1861, Secretary Welles was authorized by Congress to appoint a board that would examine the Stevens Battery later in the year. As the Union was considering the usefulness of de Villeroi’s submarine, the Stevens Battery once again made the news. The July 26, 1861, issue of *The New York World* praised the unfinished vessel and went as far as to claim that it would have been able to resupply Fort

148. Veit, *Natural Genius*, 80-81.

Sumter had it been finished before the war started. The article urged the government to complete the battery to defend New York. With attacks from Confederate ironclads on Northern cities believed imminent, the article stated that it was crucial for the city's defense.¹⁴⁹

On August 31, 1861, *Scientific American* published its largest discussion of the Stevens Battery yet in their paper. Over three pages at the beginning of the issue were devoted to the history, concept, and development of the craft, complete with illustrations. Described as "impregnable," the vessel was said to be superior to virtually any warship then afloat. The only real criticism was of the government for not finishing the craft, and removal of the "veil of secrecy" which made it "impossible to keep such matters secret from an enterprising rival." They argued it would cost half as much to finish the battery as it would "to get a mailed ship-of-war of 6,000 tons." The article closed by ridiculing the fact that "the government is advised to throw away this work, and to build mailed ships on modern principles! We would urge the public, for their own sake, to instruct themselves and their representatives in this matter before it is too late."¹⁵⁰

Around August or September of 1861, the 21st Regiment Indiana Volunteers were camped near the Winans' vessel. While the regiment was camped there some soldiers, including a few officers, investigated the vessel, either out of curiosity or to assess the possibility that it could be used as a weapon. One of the soldiers, George C. Harding,

149. Tucker, "The Stevens Ironclad Battery," 18.

150. "The Stevens Battery," *Scientific American* 5, no. 9 (August 31, 1861): 129-132, <https://babel.hathitrust.org/cgi/pt?id=uc1.31158007775264&view=1up&seq=133&skin=2021&size=125&q1=august%2031,%201861>.

wrote of this incident. He wrote that the “appearance of the boat inside was by no means inviting. It was dirty and hot, and going into it was a good deal like crawling into a hollow log.” He was also informed that a model existed for the planned second steamer. Sadly, he offers no description, and no photographs of the model are known to exist. As for the potential of the steamer as a warship, Harding stated that the ship “might be capable of mischief in running down vessels but could carry no guns of any consequence.” The ship would remain guarded by the 2nd Maryland Infantry to prevent it from being seized by Confederate sympathizers.¹⁵¹

At some point during this period Ross and Thomas Winans would use the left over parts from the modifications of the *Winans*, particularly the two ends removed from the bow and stern, to construct a strange contraption that somewhat resembled a smaller version of the cigar ship, with only a single rudder at the stern and no means of propulsion. Referred to by contemporary sources as the “Winans Water Tank,” this strange vessel was apparently built for the purpose of collecting sea water for boiler experiments for the *Winans*. This craft is of particular interest because of its similarity to a submarine. It was apparently designed to be operated by two to three people, with two berths located in a cabin beneath a central tower. On either side of the tower, running almost from the tip of the bow to nearly the tip of the stern, was a narrow railing and deck for the crew to stand on. The steering mechanism for the rudder was located at the top of this tower. The vast majority of the interior was made up of six large empty chambers,

151. Crisafulli and Crisafulli, “The Winans Cigar Ships.”; G. C. Harding, *The Miscellaneous Writings of George C. Harding* (Indianapolis, IN: Carlton & Hollenbeck, 1882), 202-203.

three in the bow and three in the stern. These chambers were designed to be filled with water, like ballast tanks. They were filled using a sea-cock controlled by valves running along the top of the deck. A smaller chamber located beneath the central cabin could be filled using a sea-cock operated with a valve on the floor of the cabin. Overall, the vessel was about 110 feet in length and sixteen feet in diameter. It was made of iron plates, one fourth of an inch thick with internal plates serving as rivets, much like the submarines of the time. Two points at the tip of the bow and the stern were meant to allow a tug to tow the craft where it needed to go, with the rudder allowing some control over the direction while under tow. Although clearly similar to a submarine, it could not be classified as one, as there was no way to empty the tanks from the interior, and it had no means of propulsion. Furthermore, the Winans never showed any interest in building submarines, despite the similarities of their vessels to those underwater craft.¹⁵²

As the months dragged on, there was still no response to de Villeroi's offer to the Navy. The favorable report had been forwarded to the Chief of the Bureau of Yards and Docks, Joseph Smith, in the capital, but no response was given. It is likely that given how busy the Navy was with the ongoing war, the report was not given priority. On September 14, 1861, Brutus de Villeroi grew tired of waiting and wrote a letter to President Lincoln himself. He wrote of the advances in submarine technology over the years, and the advantages of using them. Submarines, he claimed, could be used for reconnaissance, to land men on enemy coastlines, to move bombs under the keels of enemy ships undetected, and to easily deploy divers for all sorts of work, including the

152. Crisafulli and Crisafulli, "The Winans Cigar Ships."

removal of objects from the bottom, before recovering them. All of these tasks are performed today using submarines and the SEAL teams carried by them. The French inventor was a visionary ahead of his time. Lincoln appears to have been intrigued by the idea and may have consulted with Gideon Welles, the Secretary of the Navy. Welles would receive his own letter from de Villeroi soon afterwards. He wrote that the experiments conducted with the boat had produced satisfactory results and asked for an answer to his offer. Welles questioned Smith in response.¹⁵³

On October 5, 1861, the Stevens Battery was once again mentioned by *Scientific American*. The writers stating that Britain's latest ironclads were being built with features already present in the Stevens Battery. Congress had appointed a committee to look into the "expediency" of finishing the craft, rather than making "an appropriation."¹⁵⁴

An attack on the USS *Minnesota* at Hampton Roads on October 9 involving a Confederate submarine alarmed the ship's crew. Though Union reports of the attack are sketchy, the incident appears to have been enough for Flag-Officer Goldsborough, the commanding officer of the *Minnesota* and the entire Atlantic Blockading Squadron, to warn Commander William Smith of the USS *Congress* on October 27, 1861, to "Be on the alert for submarine infernal machines," particularly one which "the insurgents at

153. Veit, *Natural Genius*, 81-82.

154. "English Shipbuilders Still Following Stevens's Floating Battery," *Scientific American* 5, no. 14 (October 5, 1861): 219, <https://babel.hathitrust.org/cgi/pt?id=pst.000062999090&view=1up&seq=226&skin=2021&size=125>.

Norfolk” possessed. He recommended deploying weighted ropes around the ships to discourage any attempts by a would-be attacker.¹⁵⁵

On October 16, Smith gave his response to Welles’ questions regarding the proposed use of de Villeroi’s submarine. He stated he had glanced over the report. Though he stated that he was annoyed by the lack of explanation for the air purification system and the method by which the submarine dove and returned to the surface, he verified that de Villeroi had been correct when he stated that the experiments with the vessel had produced satisfactory results. He stated that a larger version of the craft with a trained crew could be a useful tool against enemy forces. He had his doubts about the project, but felt it was worth pursuing. It “would be a safe experiment for the government.”¹⁵⁶

On October 19, 1861, a little over a week after the failed submarine attack on the USS *Minnesota*, the “Winans Water Tank” was spotted by Flag Officer Goldsborough’s North Atlantic Blockading Squadron at Hampton Roads while under tow of the tugboat *Ajax*. It was apparently on its way out to sea from Baltimore to collect seawater for experiments. The Admiral saw no reason to doubt the crew, but the fleet was still on

155. Louis M. Goldsborough, Report of Flag-Officer Goldsborough, to Commander Smith, 27 October 1861, United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion; Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron, 16 July 1861 – 29 October 1861; North Atlantic Blockading Squadron, 29 October 1861 – 8 March 1862* (Washington, DC: Government Printing Office, 1899), 363.

156. Joseph Smith to Gideon Welles. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

edge, and he was not taking any chances. He had the vessel detained and refused to release it. He also had Chief Engineer Charles H. Loring of the *Minnesota* examine the water tank and submit a sketch and report of the vessel and its inner workings. The following day he wrote to the Secretary of the Navy about the craft. Goldsborough noted that though “I have no particular reasons to suppose that there is any want of good faith” in the intentions of the crew of the water tank:

the construction is remarkable, and it could be so easily converted into an instrument of destruction if possessed by the enemy, even by accident, that I have thought proper to forbid its being carried away from here, except by your authority. In going from this to Cape Henry it might get adrift from the tug, and thus fall into the hands of the insurgents, who could readily, with its small draft of water, tow it up to Norfolk at night, close along shore, there prepare it with explosive materials, and then try to use it against us as an infernal machine.¹⁵⁷

He sent Secretary Welles a copy of the custom-house permit issued to the vessel on October 17, 1861, noting that its permission to depart Baltimore and return was only good until October 20. Goldberg found this strange since the vessel had been sized on October 21. He closed his letter by stating that he thought it best that the vessel be kept at Baltimore and experiments halted “until a happier state of things may exist, and when

157. Smith to de Villeroi, 17 October 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861 – 29 October 1861; North Atlantic Blockading Squadron 29 October 1861 – 8 March 1862* (Washington, DC: Government Printing Office, 1899), 349-350, 363.

they may be carried out as desired without giving rise to any apprehensions on our part.” That same day, Loring submitted his report to Goldsborough. This report is our best source of information on the poorly known craft, complete with a detailed sketch as instructed by the flag officer.¹⁵⁸

On October 21, 1861, Ross Winans’ “Water Tank” was still being discussed by Union authorities. Secretary of the Navy Gideon Welles received a telegram from Major-General John A. Dix, who was stationed at Fort McHenry in Baltimore. Dix was apparently in support of the experiments, and asked Welles to order its release to “aid the cause of science.” He assured Welles that “the police will see that it is not applied to any use hostile to the Government.” Welles gave the order, and Nix sent a letter to Goldsborough that same day informing him of the order. Welles had not received Goldsborough’s letter at the time, so this was the first he had heard of the strange vessel. The following day, Goldsborough complied with the order, giving the *Ajax* permission to tow the tank “to Cape Henry or its vicinity, for the purpose of filling it with sea water and then towing it back to Baltimore.” The custom-house permit was returned, and the tug went on its way. Welles finally received Goldsborough’s letter around October 23 and wrote to the flag officer on that date informing him of this. He told Goldsborough that

158. Smith to de Villeroi, 17 October 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania, 347-348.

“permission was granted before your letter was received, or the Department would have hesitated before giving leave for the tank to be taken after sea water.”¹⁵⁹

On October 26, Flag Officer Goldsborough wrote to Major-General Dix to ask about the “Winans Water Tank”:

May I take the liberty of enquiring of you whether the tank, about which you wrote me on the 21st instant, has returned to Baltimore? In my judgement, that affair ought to be very closely watched and not permitted to leave Baltimore again. Surely the experiments of testing the applicability of salt water to high-pressure steam can be conveniently deferred to a more propitious time for conducting them. Were the tank to get adrift from a tug, and thus fall into the hands of the insurgents, disastrous consequences might ensue, as from the nature of its construction it could very readily be converted into an engine of destruction. I had a drawing made of the tug while it was detained here by my orders, and therefore speak with full information concerning its construction.¹⁶⁰

Goldsborough’s suggestion was apparently followed, for the water tank never left the port at Baltimore again and remained securely moored next to the *Winans*.¹⁶¹

At some point during that time, as people were suggesting various means of dealing with the dreaded CSS *Virginia*, General Woll at Fort Monroe suggested that the

159. Gideon Welles, Secretary of the Navy, to Flag-Officer Goldsborough, 23 October 1861. United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 4 Vol. 1*, (Washington, DC: Government Printing Office, 1899), 695-696.

160. Crisafulli and Crisafulli, “The Winans Cigar Ships.”

161. Crisafulli and Crisafulli, “The Winans Cigar Ships.”

Winans be used to ram and sink her. He had heard of the claims of its great speed and felt that it could easily chase down and sink the much slower *Virginia*. The idea was never carried out, and the cigar ship remained in Baltimore.¹⁶²

Not long after the submarine responsible for the attack on the *Minnesota* met its demise on the James River, Union Secretary of the Navy Gideon Welles finally agreed to de Villeroi's proposition. On November 1, 1861, de Villeroi signed a contract with Martin Thomas, who was partial owner of the 1859 submarine. The Navy agreed to the proposal to build a larger submarine at Neafie and Levy Shipyard within forty days, on a budget of \$14,000 dollars. Ten additional days were provided for the vessel's evaluation and preparation for launch. Brutus de Villeroi served as the superintendent for construction and captain of the submarine. He was to be paid two thousand dollars a year for his service in the Navy. Furthermore, if his mission to destroy enemy ships was successful, he and the submarine's owners would be paid a prize of \$86,000, with Martin Thomas in charge of distribution of the profit. Finally, the inventor was allowed to keep his secret ideas in a sealed document to be kept by William Hirst, a lawyer. The document could not be opened until either the prize money was received, or Brutus de Villeroi died, was disabled, or neglected his duty. The inventor was told to select only the number of crewmen absolutely necessary for the vessel. The Navy supplied any others, as necessary. As work on the new submarine began, the Navy had a particularly important mission in mind for her: it was to be used to sink the Confederacy's new ironclad, the

162. Ragan, *Submarine Warfare*, 3.

CSS *Virginia*, currently under construction at the Navy Yard in Norfolk, Virginia.¹⁶³

It was at that point that the de Villeroi 1859 submarine disappeared from all records. It is clear that the Navy was not interested in it, for all subsequent documentation relates only to the construction of the new submarine. No training ever took place within the 1859 vessel, and it appears that it was not used at all. Its ultimate fate is unknown. While there is significant evidence that it was simply abandoned and allowed to sink in a creek in New Jersey, there is also another possibility. Perhaps the submarine was cannibalized for parts for the Navy's vessel. Several features of the 1859 boat were used on the new vessel and using parts from the old submarine would have sped up construction. Could it be that parts from the old submarine were used so that construction could be easily finished by the deadline?¹⁶⁴

If this were the case, however, that does not necessarily mean that the submarine was destroyed. Though the new vessel certainly had features that had been used in its predecessor, it had quite a few new features and improvements. Certain processes that were accomplished one way on the 1859 salvage vessel, such as diving, were accomplished by different means in the new vessel. Other processes, including quite possibly the air purification system, were improved upon in de Villeroi's third submarine, with technology that was far superior to the older vessel. Because of that, not all of the parts of the old vessel would be useable on the new military submarine. Thus, this author proposes a third theory combining the previous two. Perhaps the submarine was partially

163. Veit, *Natural Genius*, 82-84.

164. Veit, *Natural Genius*, 82-84.

cannibalized for parts, and the remainder, of no further use to the inventor or his project, was abandoned on a New Jersey creek and allowed to sink. Which of these theories is true? The historical record gives us no clue. Fortunately, renewed interest in de Villeroi and the USS *Alligator* in recent times has led to extensive research into the matter, and several searches have been conducted along the creeks in New Jersey for the lost 1859 submarine. Perhaps one day searchers will find its remains, and another lost chapter of Civil War history will at last be told.¹⁶⁵

De Villeroi's new vessel was propelled by eighteen (though some sources say twenty) oars. The oars were hinged, enabling them to remain open on the power stroke and fold on the return stroke. This allowed them to present only the smallest possible surface to the water. The oars were protected by an oar guard, which ran along the side of the oars. It had a capacity for up to twenty-two crewmen. It lacked the diving planes of its predecessor. Instead, it used two retractable air tanks, one fore and one aft, to control the angle of descent or climb. They were attached to the submarine by chains and could be deployed or retracted with a crank. Six other hatches which lined the top and bottom of the vessel led to chambers which stored four 300-pound kegs of lead each for ballast. This could be released through a lower hatch in the event of an emergency to quickly surface. Four ballast tanks, two on each side of the vessel, ran underneath the rower's benches. They could be filled or emptied of water by pumps. Air was purified by a mechanical device connected to pipes that ran along the length of the vessel, releasing clean air. Once started, the device continued to work automatically. For weapons, the

165. Veit, *Natural Genius*, 200.

vessel had two electrically activated torpedoes, or mines in modern terminology, which two divers would attach to the bottoms of targets. The divers and torpedoes resided in a separate diving chamber, possibly the first of its kind, located in the bow. The chamber could be flooded and emptied and could double as an additional ballast tank. Divers were supplied with air via a hose connected to pumps, just like its predecessor.¹⁶⁶

Meanwhile, back at the James River, the men on board the blockade ships were preparing for further attacks by “infernal machines” and the coming of the dreaded CSS *Virginia*, known by the Union as the *Merrimack*, after the ship whose remains were used to build her. On November 4, 1861, Captain William Smith of the USS Congress submitted his plan for a defense against “fire craft, torpedoes, infernal machines, etc.” Smith called for chains to be suspended from spars forming a frame around the ship. The chains created a net-like barrier over fourteen feet deep around the ship. “Should such a machine as the one that attacked the *Minnesota* approach us and come near the cable,” Smith wrote, “it must be caught in the net and held there until we believe it. Or should it pass outside the net, the tube which floats on the surface to supply the inmates with fresh air would be caught on the A spars, and the supply of fresh air be cut off, causing suffocation, and if it should pass outside of the spars, it would go entirely clear of the ship, doing no harm.” Smith despaired that he could not recommend any means to defend the ships from the *Virginia* other than good old-fashioned “hard knocks,” but he was confident his plan would protect the blockade from submarines. Flag Officer Goldsborough agreed, and quickly endorsed what may have been the first anti-submarine

166. Veit, *Natural Genius*, 200.

nets ever devised. Meanwhile, on November 16, 1861, the Stevens Battery once again appeared in *Scientific American*. It was mentioned as one of at least five ironclad vessels under construction at the time, though the semi-submersible itself was the only one amongst them to be “first-class.”¹⁶⁷

Meanwhile, in Philadelphia, work had been limited on the Union submarine in Philadelphia. Almost from the start of construction, problems arose. Brutus proved difficult to work with. He claimed that Thomas had not consulted him when he agreed to a forty-day construction period, despite the fact that Thomas claimed that he did. On December 7, 1861, three days before construction was supposed to end, de Villeroi asked for an extension of fifteen to twenty days so that “delicate pieces of the interior” could be installed. He blamed Thomas for the insufficient time allowed for construction. Smith agreed but told the inventor “[t]hat you were not consulted as to the time for constructing the vessel is no fault of mine.” The new deadline was also missed, despite the hard work of all involved, including Martin Thomas, who worked so hard that he fell ill from exhaustion. Further problems were caused when Neafie and Levy admitted they could not manufacture the oars, which had to be subcontracted out. A new machine had to be built just to make the oars, causing further delays. Worse still, because of de Villeroi’s insistence on secrecy, none of the workmen building the submarine were even allowed to

167. “British and American Iron-Clad Ships of War,” *Scientific American* 5, no. 20 (November 16, 1861): 313, <https://babel.hathitrust.org/cgi/pt?id=uva.x001601380&view=1up&seq=319&skin=2021>; Smith to Goldsborough, 4 November 1861. United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861 – 29 October 1861; North Atlantic Blockading Squadron 29 October 1861 – 8 March 1862* (Washington, DC: Government Printing Office, 1898), 392-393.

know what they were building, which resulted in confusion. The submarine was supposed to be finished in forty days according to the contract, but it was still in the early stages of construction. Despite that, de Villeroi was given the benefit of the doubt. With such dreaded weapons of war as the CSS *Virginia* being developed in the South, the North needed weapons to combat them. The purpose of de Villeroi's submarine was to sink the *Virginia* before it could harm the fleet blockading the James River. The deadline for its completion was extended.¹⁶⁸

On December 14, 1861, *Scientific American* reported on the committee examining the Stevens Battery. They stated that the committee consisted of "Com. Stringham, Professor Joseph Henry, of the Smithsonian Institute, and other eminent gentlemen." They continued to inspect and test the principles of the craft even as construction continued. The committee soon finished its examination and submitted its report to Congress on December 24, 1861. With the exception of Professor Henry, everyone on the committee recommended abandoning work on the craft and to stop funding the project.¹⁶⁹

By December 28, 1861, de Villeroi's submarine still was not finished, even though de Villeroi had promised that it would only take a week more. Smith granted him

168. Smith to de Villeroi, 7 December 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.; Smith to de Villeroi, 10 December 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.; Veit, *Natural Genius*, 135-136.

169. Tucker, "The Stevens Ironclad Battery," 20.; "Notes on Military and Naval Affairs: Miscellaneous," *Scientific American* 5, no. 24 (December 14, 1861): 371, <https://babel.hathitrust.org/cgi/pt?id=uva.x001601380&view=1up&seq=378&skin=2021&size=125>.

twenty additional days but warned that it was the last time he would give an extension. As work continued on the craft, E. Biedermann, an American citizen residing in London, England, sent a letter to the Union Secretary of the Navy, Gideon Welles. In the letter, he wrote of a submarine inventor he had heard about, a German named Wilhelm Bauer. Six years prior to the Civil War, Bauer had been employed by the Russians to build a submarine for them during the Crimean War. The *Diable Marin*, which means “Sea Devil,” was a fifty-two-foot-long submarine launched in 1855. The vessel made at least one-hundred thirty-four successful dives. The most notable of these dives was made in celebration of Tsar Alexander II’s coronation, in which a four-man brass band was transported to the bottom and sang the Russian National Anthem, which could be heard from the surface. Though the submarine later sank in an accident with no loss of life, it was still a spectacular achievement. This submarine was not the first to be built by the German inventor. He had built an earlier submarine named the *Brandtaucher*, or “Fire Diver” for his native Germany in 1850 to combat a Danish naval blockade. The submarine scared the enemy ships further out to sea, but was lost in an accident in February 1851, though the crew escaped. The exploits of these submarines, particularly the latter, impressed Biedermann, who sent drawings of the craft and specifications with his letter to Welles. Unaware that a submarine was already under construction in Philadelphia, Biedermann encouraged him to have a submarine constructed. Biedermann was confident that a skilled American engineer could replicate the success of the German’s inventions. For Welles, this letter served as further encouragement to continue de Villeroi’s project. In his endorsement of the letter, he wrote that submarine warfare

was a “novel mode of warfare,” and was now considered “legitimate since the enemy has inaugurated it against us.”¹⁷⁰

By January 17, 1862, it had been twenty days since an extension had been given on de Villeroi’s contract, and the submarine still was not finished. Thomas and de Villeroi were by that point not on good terms, as Thomas had refused to supply some of the things de Villeroi requested due to financial concerns. That angered the inventor, who complained to Welles, Smith, and Hirst, citing that he was entitled under the contract to whatever he deemed necessary. Smith stopped payment to de Villeroi and his crew in order to encourage them to hurry up and complete the work.¹⁷¹

As work progressed on de Villeroi’s vessel, Edwin Stevens was determined to finish the Stevens Battery despite the lack of interest by Congress. It helped matters that the unfinished semi-submersible continued to attract public interest. The vessel was the subject of no less than three articles in the January 18, 1862, issue of *Scientific American*. In the first article, the writers once again compared it to the ships being constructed in England. They argued that since the ship was unfinished, it could be modified into something similar to a British ironclad, if the government desired something along those lines. They also repeated their earlier argument that it would be cheaper to finish the battery than it would be to build an entirely new warship. They closed their article by stating that they “can see no reason why the Stevens Battery may not be finished in a way

170. Ragan, *Submarine Warfare*, 40, 74.; Harris and Boyne, *Navy Times Book of Submarines*, 69-71.

171. Veit, *Natural Genius*, 135-136.

to make it the safest and best sea boat, the swiftest, the most manageable and altogether the most efficient and formidable of any iron-clad vessel in the world.”¹⁷²

The second article reported that on January 4, 1862, a group of Army and Navy officers, along with other “distinguished gentlemen,” were invited to witness a demonstration of the durability of the armor design that would be used for the Stevens Battery. Shells fired from a 6-inch Parrot and a 10-inch gun glanced off the armor. The cannons themselves demonstrated a steam powered reload system and India rubber springs used for recoil, which the writers found particularly interesting.¹⁷³

The final article simply summarized the committee’s report and Professor Henry’s dissenting opinion on Steven’s Battery. The authors admitted that while they had “doubts about the practicability of one or two of Mr. Steven’s plans, as we have about all mechanical devices before they are tried, but there is not one of those proposed for the battery which we should like to see tested.” The majority did not think that construction of the Stevens Battery should continue, but Professor Henry was the one who voted for it to be continued.¹⁷⁴

Back in Philadelphia, on January 22, Smith warned that the government would soon consider the contract void on de Villeroi’s submarine. Thomas promised that the

172. “Experiment in Relations to the Stevens Battery,” *Scientific American* 6, no. 3 (January 18, 1862): 42, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=46&skin=2021>.

173. “Report on the Stephens Battery.” *Scientific American* 6, no. 3 (January 18, 1862): 43, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=47&skin=2021>.

174. “Stevens Battery.” *Scientific American* 6, no. 3 (January 18, 1862): 41, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=46&skin=2021>.

vessel would be ready soon; however, as they were preparing to launch the submarine on January 29, they noticed that the oar guards hindered the use of the oars. The submarine to be taken back to the shop to fix the problem. Brutus de Villeroi did his best to draw attention away from this embarrassing oversight by stating it was the ice in the river that prevented the launch, stating that he was afraid it would damage the oars.¹⁷⁵

By late February, arguments amongst Thomas and de Villeroi led to the latter attempting to take full control of the project. On February 25, the inventor wrote to Smith stating that since the contract was “broken not only by the expiration of the time, but also by the incapacity of furnishing the compliment for the propeller, consequently there is no more contractor.” Though the contract was void, however, de Villeroi believed his “nomination as chief engineer retains me in the service of the government and does not render me subordinate to the chances of a bankrupt contractor. I have besides another title, that cannot be mistaken, that of inventor of the system.” He told Smith that the only course of action was to authorize Neafie and Levy to supply the complement needed for the vessel. He had already talked to the men at the shop, and they only awaited word from Smith to do so. If the Commodore would just give the word, de Villeroi claimed the boat would be ready in twenty-four hours. Should this not be done, and they continued as they had, then Brutus warned the boat would again be unready at the moment it was to depart. He enclosed the assurances of Neafie and Levy as proof that they were behind him. Smith’s response was swift. He made it clear that Brutus was connected to the project and the government work through Martin Thomas and the contract. The contract

175. Veit, *Natural Genius*, 135-136.

was forfeited. Smith had also been made aware of the inventor's refusal to sign "a certificate of completion of the boat" because Thomas continued to refuse to give Brutus everything he demanded. As such, "the Government has declined to receive the boat and consequently stopped further expenditures for superintendency and labor and cannot proceed further until you and the contractor come to some terms for completing and delivering the vessel." As for Neafie and Levy, the "Department has no control over the builders...and do not know them in the contract."¹⁷⁶ By early March, people were beginning to question whether de Villeroi even knew what he was doing. One of the demands he had made was for sixteen twelve-inch squares of silver, one-eighth of an inch thick. This would cost \$2,400. These were supposedly for the batteries that would detonate the submarine's torpedoes. This was far more than was necessary, however, as a typical battery only required four-inch square plates that were 0.0068 inches thick. This only cost \$14.51. Commodore Smith, despite Thomas's willingness to give in to the inventor's demands to prevent more delays, was naturally skeptical of the demand of far more silver than was necessary and consulted several scientists on the matter. They reported that only the surface area of the plates mattered, and the weight of silver did not matter. If that was not enough, Thomas also added a citation from a chemistry textbook for students when he showed the findings to de Villeroi. The inventor was furious, stating

176. De Villeroi and Thomas to Smith, 7 December 1861, Miscellaneous Letters Sent and Received, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.

that they knew nothing about how he planned to use the metal, and if the scientists felt that they could do a better job, then they were welcome to try to take his place.¹⁷⁷

As the CSS *Virginia* neared completion, pressure mounted on the Union government to construct more ironclad ships and other weapons to counter the dreaded Rebel ironclad. Seeing an opportunity to finally get the semi-submersible finished, Stevens sought to find ways to prove that the vessel's design worked. To do this, in 1861 he had purchased a one-hundred- and one-foot long iron steamer named the *Naugatuck*, a vessel which had been one of the first iron propeller driven ships to operate in the United States. Edwin Stevens began to modify the craft into a semi-submersible to demonstrate some of the technology that would be incorporated into the completed Stevens Battery. The vessel's propeller was replaced with dual propellers of the Stevens family's own design. Two ballast tanks, one fore and one aft, were added to the craft to allow it to submerge up to three feet. Andrews Centrifugal Pumps ensured that the tanks could be filled within eight minutes. Should the vessel run aground while engaged with the enemy, emptying the tanks would quickly free the craft. With the ballast tanks empty, its speed would be doubled from nearly five to ten miles per hour (four to nine knots) for a quick escape. Since it was far smaller than the Stevens Battery, it could not carry as much armor, so it would need to rely on its ability to dive to protect itself from enemy fire. Though the hull had been built entirely out of iron, the only armor was a band surrounding the main deck that was reinforced by oak underneath. This structure was four and a half feet thick, similar to the original design for the armor of the Stevens Battery.

177. Veit, *Natural Genius*, 135-136.

The only structures on deck besides the smokestack were a pilot house and an aft deckhouse, which were later reinforced with boiler plate for protection. The armament consisted of the first 100-pound rifled Parrott gun ever produced, which was located amid ship on a unique mount of Edwin's own design. Like the guns of the Stevens battery, the gun was rotated to face a hole to the interior of the ship for reloading. In this case, the gun crew was positioned below deck. The reload method was extremely efficient, as it only took twenty-five seconds to reload the gun. India rubber absorbed most of the recoil. The main armament was supplemented by two twelve-pound howitzers mounted on pivots behind the pilot house and smokestack, with one on each side of the deck. The vessel's twin propellers allowed it to turn in a full circle in just two minutes. In total the vessel had a crew of twenty-four men. By March of 1862, the vessel was finished, and Stevens offered it to the U.S. Navy at no cost. Despite the generous offer, the Navy refused to accept the semi-submersible, stating that they did not want a craft with untested technology. Stevens then turned to the United States Revenue Cutter Service, which happily accepted the vessel. Stevens had renamed the craft the USRC *E. A. Stevens* after himself, but most people referred to the vessel by its old name, so it came to be known as the USRC *Naugatuck*.¹⁷⁸

At this same time in Philadelphia, work on de Villeroi's submarine continued at a sluggish pace. By March 8, 1862, it was still unfinished. In a letter to President Lincoln, de Villeroi blamed the delays on the refusal of Martin Thomas to provide "certain

178. De Villeroi and Thomas to Smith, 7 December 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

articles” needed for the vessel. These “articles” were likely the expensive chemicals needed for the air purification system. Some of the engineers considered them unnecessary, but de Villeroi refused to operate the submarine without them. Because of this, it was the ironclad USS *Monitor*— not a submarine— that saved the Union fleet from total destruction.¹⁷⁹

On that same day, Thomas wrote to Commodore Smith, proposing that it might be a good idea to proceed on the project without de Villeroi:

If Mr. de Villeroi will not undertake an operation, we are willing to do so if compelled to do without him (reserving to him all his legal rights in case of success which might be considered forfeited). Mr. Schott is now in New York for the purpose of consulting five of the most experienced sub-marine workmen and divers, that we are informed would be willing to undertake the blowing up of an enemy’s vessel; and we feel competent with “the secret” which would be at your disposal (by Mr. de Villeroi’s dereliction) to manage the boat with their assistance.¹⁸⁰

The Commodore was too busy to respond. On the same day Thomas sent his letter, the ironclad CSS *Virginia*— the ship that the submarine was supposed to sink—had made its move on the fleet at Hampton Roads. In the subsequent battle, it was only the timely arrival of the USS *Monitor* on March 9 that saved the fleet. Thus, it was an ironclad, not a

179. Ragan, *Submarine Warfare*, 48.

180. Thomas to Smith, 8 March 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.

submarine, which saved the Union fleet from total destruction. In addition to dealing with the aftermath of the attack, the Commodore had received word that his son was among the casualties. On March 10, still having received no response from Smith, Thomas gave in to de Villeroi's demands for the silver to prevent the project from ending abruptly. Brutus, however, criticized Thomas, now saying the metal's value was only \$1500 to \$1600. Thomas, he stated, was offering to pay too much for the metal, and such a move was a crooked business deal.¹⁸¹ Smith finally responded on the following day. He sadly stated that the "time for the successful employment of the boat I imagined has passed-at all events, your contract has been forfeited, and I can do nothing further in the matter." Despite that, however, he went on to state that if "you choose to undertake to operate the boat on your own account, the government will hold to the contract and pay as provided in case of success." Amazingly, despite the frustrating delays, failure to provide the submarine long after it was supposed to be done, and its failure to stop the *Virginia* before it could attack the fleet at Hampton Roads, Smith and the Navy were still willing to proceed with the project.¹⁸²

As frustrations mounted over de Villeroi's vessel, his was not the only submarine the Union was considering. On March 12, 1862, Senator Preston King informed Lincoln that a local Washington inventor, Pascal Plant, had an idea and model for "an invention which he supposes can with security to itself and its managers be navigated and can

181. Veit, *Natural Genius*, 140-142.; De Villeroi and Thomas to Smith, 7 December 1861. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

182. Veit, *Natural Genius*, 142.

destroy any vessel whether Iron Clad or not.” He recommended that Lincoln meet with him. The following day, Lincoln met with Plant. His invention turned out to be a submarine gunboat propelled by gun powder blasts fired from vertical rotating cylinders that were located at either end of the submarine. The weapons were similar to the propulsion system. This rocket powered submarine interested Lincoln, and he sent it to the Board of Examiners at the Navy Department for examination. The examiners, however, reported that the craft’s concept was based too much on mere speculation, and the explanations for its mechanism were not enough for the Board to recommend construction. The idea was abandoned.¹⁸³

While the Navy Department grew increasingly frustrated working with de Villeroi, and ironclad mania swept the nation in the aftermath of the Battle of Hampton Roads, the Treasury Department ordered the USRC *Naugatuck* to depart New York for Hampton Roads in mid-March. A friend of Edwin Stevens, William W. Shippen from the Stevens-owned Hoboken Land and Improvement Company was placed in command, with two officers of the Revenue Cutter Service serving under him. The inventor’s own engineer, Thomas Lingle, was the chief engineer. Things seemed to finally be looking up for Stevens. While he still had not secured funding for completion of the Stevens Battery, the *Naugatuck* was heading for the front lines. With both ships already receiving publicity, any success the semi-submersible ironclad enjoyed at Hampton Roads would prove the practicality of the Stevens brothers’ designs. Already, by the end of the month a bill had been introduced in Congress that called for \$783,000 to be used to finish the

183. R. V. Bruce, *Lincoln and the Tools of War* (Auckland, New Zealand: Papamoa Press, 1956), 177.

Stevens Battery, and the French Minister had shown interest in seeing the plans for the craft. It seemed that finally he would be able to finish the project he and his brother had started decades ago.¹⁸⁴

As the *Naugatuck* made its way to the front, the debate over the Stevens Battery continued in Congress. In late March, Senator Clark argued against completion of the craft based on the fact that the men firing the guns were unprotected by the casemates. The funding for the craft was not approved that April.¹⁸⁵

At the end of March, de Villeroi once again tried to take full control of the project. His crew joined in the effort. One Louis Hennem wrote a letter to the *Philadelphia Public Ledger*. In it, he blamed not only the delays in the project, but also the losses at the Battle of Hampton Roads on Martin Thomas. Had he merely given Brutus everything he asked for, the submarine would have been ready for action at Fort Monroe, and the *Virginia* sunk or rendered unfit for combat. Meanwhile, de Villeroi himself resumed his letter writing to the Navy. This time, he decided to go over Commodore Smith's head, and on March 29 wrote a letter to the Secretary of the Navy signed by both himself and his entire hand-picked crew.¹⁸⁶

184. Thiesen, "Revenue Cutter," 141-154.; "New Steam Floating Battery, *Scientific American* 6, no. 13 (March 29, 1862): 202, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=208&skin=2021&size=125>.; Stevens Battery for France," *Scientific American* 6, no. 13 (March 29, 1862): 203, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=208&skin=2021&size=125>.

185. "Aiming Guns by Means of Mirrors," *Scientific American* 6, no. 15 (April 12, 1862): 230, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=235&skin=2021&size=125>.

186. Veit, *Natural Genius*, 142.

On April 9, 1862, as the Navy struggled to complete de Villeroi's submarine, the *Naugatuck* arrived at Hampton Roads. There, it joined the James River Squadron. Two days later, on April 11, the CSS *Virginia* and the other rebel vessels on the James River sailed out in an attempt to lure the USS *Monitor* out. The *Monitor* did not engage, but the *Naugatuck* moved to engage the ironclad from a distance. Neither ship was able to damage the other, and since the *Monitor* was the intended target, the Confederate ships withdrew, with no casualties on either side. The following day, an article appeared in *Scientific American* proposing that the problem of the unprotected gunner in the Stevens Battery could be fixed by simply aiming with a mirror.¹⁸⁷

In Philadelphia, de Villeroi did not get the response to his letters that he wanted, so he once again wrote to Commodore Smith on April 12. This time, he blamed not only Thomas but the Commodore himself, saying that it was his fault for failing to resolve the debate over the silver. The Commodore responded by reminding de Villeroi of his own failings in the project and refuted his accusations. After this, de Villeroi's behavior became increasingly erratic and paranoid. Thomas, Hirst, Smith, and others tried to get him to cooperate by giving in to all of his demands, but their efforts were in vain. Brutus demanded that both Smith and Secretary Welles communicate directly with him, then refused to open any of their letters when they did so. He refused to meet with anyone else

187. "Aiming Guns by Means of Mirrors," *Scientific American*.; Thiesen, "Revenue Cutter," 147-148.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 2 Vol. 1, Statistical Data of Union and Confederate Ships; Muster Roles of Confederate Government Vessels; Series 1 Vol. 7, Letters of Marque and Reprisals; Confederate Department Investigations* (Washington, DC: Government Printing Office, 1897), 220.

who tried to see him. He ignored any friendly requests to respond, and even direct orders, as well as threats to open the sealed document in Hirst's possession. Elsewhere, an interesting mention was made of de Villeroi's submarine in the April 12, 1862, issue of *Scientific American*, which states that the "submarine boat in that city (Philadelphia)" is "shaped like Winan's cigar steamer."¹⁸⁸

Meanwhile in Washington, on April 17, a Naval Appropriations Act was passed that called for \$783, 294 to be used to finish the Stevens Battery, but only if the Secretary of the Navy felt that the craft would be of effective service. A second board was established to examine the craft. Their conclusion was that the design would work with some modifications, but Welles vetoed the appropriation of funding for the craft.¹⁸⁹

On April 21, 1862, yet another proposal reached Lincoln for a submarine, this time from Oliver B. Pierce. He proposed a submarine that would tow a torpedo behind it to sink a vessel. Lincoln once again recommended the design to the Navy. It was examined by Admiral Joseph Smith and Samuel Pook. Elsewhere, April 29, Lieutenant David Constable of the Revenue Cutter Service relieved Shippen of command of the *Naugatuck*. Constable was a veteran officer that had served on the USRC *Harriet Lane*, which had fired the first naval shot of the Civil War.¹⁹⁰

On May 1, 1862, de Villeroi's completed submarine was finally launched, almost a year to the day that the French inventor's second submarine had been spotted cruising

188. "The Philadelphia Ledger," *Scientific American* 6, no. 15 (April 1862): 230, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=166&skin=2021&size=125&q1=ledger.>; Veit, *Natural Genius*, 142.

189. Tucker, "The Stevens Ironclad Battery," 20.

190. Thiesen, "Revenue Cutter," 148.; Bruce, *Lincoln and the Tools of War*, 177.

in Philadelphia. In the end, it was launched without any involvement by de Villeroi. He was not even informed. Despite all the difficulties and frustrations in the long construction process, and de Villeroi's continued absence, the submarine's launch was a momentous occasion for the rest of the people involved in the project. Martin Thomas rode on the bow of the submarine despite his illness, and Mr. Leavy, one of the builders, proudly stood on its hull as it was launched into the water. Hirst excitedly wrote to Smith of the event, ending the letter by stating "I begin to feel proud of this thing." The *Philadelphia Inquirer* reported that morning in the Local Intelligence Section about its planned launch, and the following day described the event, although it claimed it was initially launched on April 30. By May 2, it was ready for action at the Philadelphia Navy Yard.¹⁹¹

Unfortunately, the submarine's troubles did not end despite its successful launch. Its inventor remained unreachable, although numerous attempts were made to contact him. Hirst sent de Villeroi a letter the day of the launch in order to inform him that he had been consulted on the possibility of replacing de Villeroi on the project but had permission from the Navy to give the inventor and his crew their backpay and reinstate

191. "The Government Submarine Vessel: Local Intelligence Section," *The Philadelphia Inquirer*, May 1, 1862, 8, [http://infoweb.newsbank.comlibproxy.usouthal.edu/iw-search/we/HistArchive/?p-product=EANX&p-nbid=M5BG5CQXMTUyMjc20DA5Mi4yMTk3NzQ6MTozNTozOTluMjQ1LjlyMS4xMDU&p](http://infoweb.newsbank.comlibproxy.usouthal.edu/iw-search/we/HistArchive/?p-product=EANX&p-nbid=M5BG5CQXMTUyMjc20DA5Mi4yMTk3NzQ6MTozNTozOTluMjQ1LjlyMS4xMDU&p;); "The Launch of the Government Submarine Vessel: Local Intelligence Section," *The Philadelphia Inquirer*, May 2, 1862, 8, <http://infoweb.newsbank.comlibproxy.usouthal.edu/iw-search/we/HistArchive/?p-product=EANX&p-nbid=M5BG5CQXMTUyMjc20DA5Mi4yMTk3NzQ6MTozNTozOTluMjQ1LjlyMS4xMDU&p>; Veit, *Natural Genius*, 42-144.; Hirst to Smith, 1 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

him to his position on the project. Brutus responded by stating that “I thank you for the explanations you have given me in your last; but in all I see nothing official.” G. Bryan Schott attempted to contact de Villeroi on behalf of Hirst multiple times but was repeatedly told that he was away from home. He expressed his frustration in a letter to de Villeroi on May 1. The following day, as the submarine was moved into position at the Navy Yard to prepare for its deployment, the inventor wrote to Commodore Smith directly, asking whether or not he was still in the service of the government. If he was, he demanded that he receive his instructions “direct” and also demanded payment, both for himself and his crew. He stated he refused to answer because “his position” was not “official for me.” He was aware of the orders to take the submarine to Fort Monroe with him as engineer, but he refused to go without “official orders” and “before everything is settled.”¹⁹²

The troubles with de Villeroi and his submarine continued over the next few days. On May 3, Hirst, Schott, and Smith wrote to the inventor in an attempt to inform him that he was to be officially re-instated in his position on the project. They once again assured him that both he and his crew would receive their backpay. Hirst begged de Villeroi “to conform to the orders of the government. Your invention is on the point of being illustrated and successful. I have worked hard to bring it up to the present moment.”

192. de Villeroi to Smith, 2 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.; Hirst to Smith, 1 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

Begging him to go to the Navy Yard, he warned that within “a few days the opportunity may pass, never to return.” Schott, for his part, expressed his frustration with the French inventor, who never seemed to be at home when Schott visited to deliver letters and documents, including one from Washington. Brutus’s wife would always tell him he was not at home, though on at least one occasion it was later discovered that de Villeroi had been at home at the time, as a servant had seen him. With still no response after the latest “useless visit,” Schott had just about had enough. In his own letter, Smith repeated the order for de Villeroi to report to the Navy Yard so that he and his vessel could be transported to Fort Monroe, in addition to a warning that “the secret deposited with me” would be opened and the boat would be sent off without him. That same day, Hirst also wrote to Smith, explaining the difficulty of trying to contact de Villeroi. “I know not what the motive of M. de Villeroi may be. His course is most extraordinary. He is very distinct, and like all inventors full of kinks, and without any business capacity. I feel it my duty to protect him from himself.” Hirst was starting to doubt whether de Villeroi would be willing to cooperate with the government and warned that if he received his pay up front, he might not feel obligated to continue his work. While recommending that an officer be found to serve as superintendent, he asked Smith to write to de Villeroi to inform him that he had been authorized to act on behalf of the Department, hoping that this would convince the inventor that he had received the “official” orders he had demanded. Two days later, on May 5, 1862, Smith complied with Hirst’s request and sent a letter to de Villeroi relaying the information. He also sent a letter to Hirst informing him arrangements had been made for payment of de Villeroi and his crew once de Villeroi fulfilled “all his obligations to the Government.” Hirst responded with two more

letters to Smith. In the first, he expressed his opinion that the contract should still be followed, as he believed that the forty-day period specified in the contract and the need for the inventor's certificate of approval for deployment could be waived as long as "the contractor has acted in good faith." Waiving the condition of inspection, while unusual, could also be done if the government deemed it necessary, and during emergencies such as a war, it may be advantageous to do so. Hirst also reported that he had sent Smith's orders to de Villeroi, but he had yet to receive any response. He had also talked with two of de Villeroi's crew, and one stated he was confident "that at any time which the *Merrimac* has been lying at anchor, as reported in the papers, it would have been mere sport to destroy her, and without the least difficulty or danger." The second letter was a private letter in which Hirst tried to assuage Smith's concerns about the reliability of the craft.¹⁹³

I regret that you have any doubt as to the success of the propeller. It is a sure thing. I am not sanguine, generally, but in this matter I have not the slightest doubt of success. But we must force Mr. de V. on, for his own sake, as well as the Government. If he will not act, without delay, do not hesitate to strike the blow. It is a thousand times more "sure and safe" than the *Monitor* was. That depended on a fight — this, on no such danger. The young Frenchman, Jean Cartwright is willing to go without De V. So is his companion, and they say would do better without him, under the orders of an energetic young officer. There is no risk in the

193. Hirst to Smith, 1 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

experiment at all — I hope you will not allow an hour to be lost.¹⁹⁴

Hirst remained baffled by de Villeroi's strange behavior. He recommended that Smith give him "the strongest kind of order" in the hopes that this would motivate the inventor to action. "You might safely write De Villeroi that I have all the power to settle the matter. I shall not abuse your confidence nor use it in any way except first approved by you. But it will bring him to me and enable me to advise with effect. He always used to trust to my advice, implicitly; and I can easily restore his confidence if given a chance."¹⁹⁵

Meanwhile, on May 5, 1862, in Washington, Pook and Smith submitted their report on the submarine proposal to Lincoln. They found that the proposed craft had an insufficient air supply, which could not be replenished under water, and that it could not exceed a speed of one knot. Furthermore, the towing of the torpedo "would much tend to embarrass the steerage and impeded its progress considerably." They concluded "that though the plan is ingenious, the experiment would hardly warrant the proposed expenditure." The idea was rejected.¹⁹⁶

194. Hirst to Smith, 1 May 1862, 71. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

195. Hirst to Smith, 1 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

196. Bruce, *Lincoln and the Tools of War*, 177.; Samuel Pook and Joseph Smith to Gideon Welles, Monday, 5 May 1862, Abraham Lincoln Papers: Series 1. In General Correspondence, 1833 -1916, *Library of Congress*, <http://hdl.loc.gov/loc.mss/ms000001.mss30189a.1583100>.

Back in Philadelphia, Hirst and Smith's efforts to get de Villeroi back to work were in vain. The following day, May 6, 1862, Hirst sent a telegram informing Smith that he had discovered that de Villeroi had moved from the boarding house some time ago. He left no forwarding address, and all of the letters and orders sent to him remained unopened at the boarding house. The inventor's wife would occasionally return there, but she refused to take the letters to her husband because none of them had been mailed from Washington, DC. Later that day Hirst also sent a letter to Smith, in which he expressed his opinion that, while he was determined to see that de Villeroi's interests be protected, "the Government ought to act with decision." He also stated that it was imperative that the crew be gathered. Four were already at his office, and the rest were expected to arrive the following day. A test trial of the submarine was to be held on the following Thursday. Hirst requested the presence of an officer for observation. Hirst also warned Smith "that the air pump and some other articles necessary for the boat" were being held as collateral by the keeper of the tavern where de Villeroi had lodged the crew. Hirst recommended that Smith order the tavern owner to surrender the parts, as they were the property of the government, not de Villeroi.¹⁹⁷

On May 7, the inventor was finally able to get in contact with the Navy. However, rather than contact Smith or Hirst, he sent a letter directly to the Secretary of the Navy in Washington. In the letter, he complained that it was the fault of the contractor, not his own, that the submarine's construction and deployment had been met with so many

197. Hirst to Smith, 5 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

delays. He further complained that apparently, he was the one dismissed even though the contractor was to blame. He was under the impression that the contract was null and void and, as such, he was confused by the apparent contradictions of being dismissed yet expected to keep a crew housed and fed. He claimed that according to a letter received March 10, the contract was void and all involved in the project discharged from service, yet another letter in April stated that an officer from the Navy was being sent to check on the status of the project. Brutus de Villeroi was angered by the fact that the officer never bothered to contact him. As the inventor of the submarine, he felt that the officer should have come to him, not the others working on the project. The rest of the letter reveals the paranoia of the inventor at this time. He dismissed the people who had been trying to contact him as “strangers” and insisted upon receiving orders “direct from the government only.” He accused some of his men of “being perverted into spies and traitors” and expressed his frustration over the fact that his submarine had been launched without his consent. He was not even informed, having found out after reading the newspaper. He felt mistreated by the government. Brutus warned that people “of my character and work can become dupes or victims of an intrigue, but one does not play with them, like with puppets. I have nothing more to do with the Government until new personal and direct conditions will be made. The first condition is to settle for the months of arrears and a regular commission.”¹⁹⁸

Meanwhile, Smith mailed letters to Hirst and de Villeroi. He assured Hirst that

198. de Villeroi to Welles, 7 March 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

officers had been assigned to observe the trial, gave him orders to send Commodore Pendergrast to receive the equipment held by the tavern keeper, and authorized him to open the sealed pack of secrets should de Villeroi not cooperate. In his letter to de Villeroi, he once again attempted to ensure his cooperation, this time with a warning that the Department of the Navy was prepared to use the secrets within the sealed file and deploy the submarine without him.¹⁹⁹

On May 7, as the Navy struggled with de Villeroi over his recently completed submarine, the *Naugatuck* joined the USS Monitor and other Union vessels in an attempt to shell the Confederate batteries in the hopes of drawing the CSS *Virginia* out. The following day, *Naugatuck* and the other ships opened fire on the battery at Sewell's Point under the close observation of President Lincoln, who viewed the action from a steam tug. The enemy forces were eventually drawn out, including the *Virginia*. However, the ironclad soon withdrew back to the safety of Norfolk, and the action ended inconclusively.²⁰⁰

Of far more interest, however, are a pair of letters written by Hirst to Smith that same day. In the first, he explained that de Villeroi was still absent from the boarding house. When the letter marked as being from Washington had been delivered, Mrs. de Villeroi merely picked it up and tossed it aside. The behavior of the de Villerois continued to baffle Hirst. He also reported that the parts from the boarding house had

199. Smith to Hirst, 7 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

200. Thiesen, "Revenue Cutter," 148.

been retrieved, and the submarine had been tested using five of its oars. Though it had performed well, the pumps were leaking, and a few other issues needed to be fixed. Work on these issues had commenced immediately following the test. The second letter—marked “PRIVATE”—revealed that Smith had apparently attempted to guess what the secret was and believed he had found it. Though the letter he sent to Hirst apparently did not survive, the response from Hirst does:

I am glad to find that you believe you have de Villeroi’s secret, and would not undeceive you, did I not feel bound to say that I should then hesitate very long to sign a certificate (on which I knew you would rely) on such a ground. The mode you state is that which a party used that went in a boat a year ago on the Mississippi, and they are still down. So, M. de V. told me some time after when he was in the habit of coming here.²⁰¹

The letter revealed that there was another submarine being worked on somewhere along the Mississippi River, likely sometime around April or May 1861. Like de Villeroi’s submarine, it employed some type of air purification system. Unlike the Frenchman’s vessel, however, it had apparently failed, and according to the letter sank, taking its crew with it. Brutus apparently heard about this failed attempt while trying to secure a government contract for his work, and at some point, it was mentioned to Hirst while he was working on his own submarine. Just who built the submarine and why, the letter does not say, but based on the limited information provided, a number of facts can

201. Hirst to Smith, 8 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

be surmised. It would have been built sometime in early 1861, possibly just before the war. Since there does not appear to be any proposals submitted to the military for a submarine from anywhere along the Mississippi River, it was not intended for military purposes. The story does not match any of the known submarine projects from this time period, so it was not made by any of the known inventors. Since it is unlikely that de Villeroi would be aware of any projects within the newly formed Confederacy, it was likely built and tested in the North, somewhere along the upper Mississippi. Finally, since it was not for military purposes, it was probably built for some civilian business, be it salvaging like de Villeroi's 1859 submarine, or some other diving business. Whatever its purpose, it failed and sank, its remains possibly still where it went down somewhere along the river. The letter then goes on to state that, despite his frustrating behavior, de Villeroi still deserves some credit and respect "for having succeeded in accomplishing what has been tried in every country in Europe and here, without success."²⁰²

On May 10, 1862, Norfolk was abandoned by the Confederates. The following day, the dreaded CSS *Virginia* met its end, not because of a submarine or an ironclad, but due to the actions of its own crew, who scuttled it after it was found that it could not escape up the James River. On that same day, de Villeroi finally contacted Smith. Sadly, for Smith, the inventor merely wrote to him so that he could complain. He repeated the same rants he had made to the Secretary of the Navy about contractors perverting his men into spies and traitors, and once again vented his rage over the submarine being launched

202. Hirst to Smith, 8 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

without his approval. Brutus further stated that he had refused to open any of the letters, as he would not touch anything that “had been in the hands of faithless persons.” He accused the government of having “brutally dismissed” him despite having fulfilled the governments expectations “punctually.” He once again demanded “direct” contact with the government, and explained that if anyone wished to contact him, letters should be deposited in the post office, since he would no longer tolerate letters that had been in the hands of “strangers.”²⁰³

The following day, news reached Philadelphia that Norfolk had been captured and the CSS *Virginia* scuttled to prevent it from falling into the hands of Union forces. The submarine’s intended target was no longer a threat. Concerned over what this meant for the project, Hirst wrote a letter to Smith asking whether work was to continue on the submarine. He urged Smith not to abandon a “vessel...so useful to the government.” On May 12, Smith responded, stating that work was to continue, and the submarine would remain at the yard until further orders were received. That same day, both Secretary Welles and Smith sent letters to de Villeroi. Both dismissed de Villeroi’s claim of having been wrongly dismissed by the government, with Smith taking particular offense at this accusation. They placed the blame for all of de Villeroi’s problems squarely on the Frenchman himself and urged him to open the various letters that had been sent to him. Smith also received a letter from Hirst updating him on the progress with the underwater craft. He needed Smith’s help to keep the crew together and pay them. Four had already

203. de Villeroi to Smith, 10 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

signed an oath of allegiance, and he recommended paying them right away. He also noted that it would be “necessary to have a head in place of Mr. de Villeroi on the boat. M. Wickersham, who was on the expedition to Sebastopol to raise the sunken ships warmly recommends Mr. Samuel Eakins, who was 18 months at that submarine work.” “M. Wickersham” was Morris S. Wickersham, a local merchant that had previously served as treasurer of the Philadelphia Marine Exploring Company during the aforementioned work in Sebastopol, Russia. The company had been hired to clear almost a hundred sunken vessels that had been scuttled in the waters there during the Crimean War. He may have also been one of the investors in both the 1859 boat and the military submarine. Samuel Eakins had been one of the best divers working on the project in Sebastopol. He also had experience with explosives, both on land and underwater, having enlisted in the Ordinance Department of the U.S. Army in 1848 or 1849. He and Wickersham had even worked together to design and patent an underwater cannon for demolition. His experience made him an excellent candidate to replace de Villeroi.²⁰⁴

The letter went on to explain that another test run had been made using fifteen of the eighteen oars, this time with Eakins on board for a quick dive. Hirst reported that it was even faster than expected. He also stated that he had received no word from de Villeroi and feared that he had “abandoned the matter.”²⁰⁵

204. Veit, *Natural Genius*, 147-148.; Hirst to Smith, 8 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

205. Hirst to Smith, 8 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, —Footnote continued on next page.

On May 13, Smith mailed his response to Hirst's letter from the previous day. He agreed with Hirst's plan for payment and asked him to engage the services of Eakins. Once appointed superintendent, he would receive the same wages de Villeroi was originally paid. Hirst responded with a list of the old crew and their time in service. Only two, Alexander Rhodes and Jean Lambert, were recorded as "still in service," with Hirst noting that both, particularly Rhodes, were excellent crew members. He also sent a list of the new crew Eakins was selecting with their oaths of allegiance. The boat was once again tested using twelve of its eighteen oars with satisfactory results. One of the old crew members, Henri Lambert, who was supposed to sail for Liverpool, was attempting to get out of the voyage to rejoin the crew. Eakins received and accepted his appointment on May 14, 1862. His appointment was approved the following day by Smith, who also advised that they should not bother trying to find a full crew because "the occasion for using the boat has gone by, and it may never be employed as an instrument of war." He advised Henri not to get out of the voyage. Smith further lamented that the entire project "has been a source of much annoyance, and I regret ever to have had any connection with it."²⁰⁶

As the Navy department continued to struggle with de Villeroi while his submarine sat in Philadelphia, action in Virginia continued without it. With the *Virginia* scuttled, only a few Confederate gunboats remained to oppose the Union vessels. General

Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

206. Hirst to Smith, 8 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

McClellan, hoping to resume his Peninsula Campaign, requested for naval forces to threaten Richmond from the river. In response, Flag Officer Louis M. Goldsborough assigned Commodore John Rodgers to take a squadron up the James River. The USRC *Naugatuck* was assigned to the James River Squadron, joining the ironclads USS *Monitor* and *Galena*, and the wooden gunboats, *Aroostook* and *Port Royal*. The semi-submersible and the rest of the squadron journeyed up the James River on May 15, 1862. The Confederates had focused their defense on Drewry's Bluff, eight miles south of Richmond. Some of the remaining gunboats had been sunk at the river there to obstruct the progress of enemy vessels, while the rest had been withdrawn to Richmond itself. The Confederate defenses consisted of fortifications on the bluff. The Confederates had erected eight heavy artillery pieces, some of which had been taken from the sunken Confederate vessels. With the bluff rising one hundred feet above a sharp bend in the river, the defenses were formidable and ideal for defending Richmond.²⁰⁷

The James River Squadron encountered little in the way of resistance as they advanced up the river. At 7:45 a.m. they reached Drewry's Bluff with the *Galena* in the lead. As the *Galena* got within four hundred yards of the obstructions, the Confederates opened fire, hitting the ironclad twice. In the exchange of fire that followed, its armor proved inadequate to withstand the hits, and shots soon began to penetrate its armor. Because of the narrowness of the river, the rest of the Union vessels could only move into position one at a time. By 9:00 a.m., the *Monitor* was in position near the *Galena* and opened fire. The armored warship proved its durability as all the Confederate's shots

207. Thiesen, "Revenue Cutter," 148.

bounced harmlessly off its armor, but its fire on the forts had limited effect. It had not been designed for bombardment, so the angle of its shots was limited. Despite this, it managed to damage the fort with the *Galena* before withdrawing. The *Naugatuck* moved in to take its place in position near the *Galena*. In this ultimate trial by fire, the *Naugatuck* proved a formidable vessel. Despite having weaker armor than other ironclads, its ability to partially submerge proved effective. The Confederates had a difficult time hitting it, and the shots that hit did little damage. The reloading system kept the crew safe from musket fire and the shots of sharpshooters coming from the fortifications on shore. Unfortunately, like the *Monitor*, the vessel was not designed for bombardment of fortifications. Despite this, it kept up a steady fire on the forts. Then, in the midst of the battle, disaster struck. The 100-pound Parrott gun exploded. The blast and shrapnel damaged the deck and the pilot house. Its commanding officer, Lieutenant Constable, was hit by some of the shrapnel, but fortunately only received a slight head injury, so he remained at his station. Another crew member was not so fortunate, receiving a serious contusion. The damage to the armor also allowed a musket shot to penetrate, resulting in another crew member getting shot in the arm. Despite the damage, however, the semi-submersible ironclad kept up fire on the fortifications with its remaining guns, the two 12-pound howitzers. The battle continued until a little after 11:00 a.m. By that point, the *Galena* had suffered extensive damage, and thirteen of its crew were dead with a number of others injured. It had been hit forty-eight times, and eighteen of those shots had penetrated its armor. On top of that, the ironclad's ammunition had been exhausted, so Rogers ordered his squadron to retreat to City Point, Virginia. The *Naugatuck*, with its speed, managed to reach the location that evening, with

the rest of the warships arriving the following morning. That same day, a board convened by Rodgers examined what was left of *Naugatuck*'s Parrott gun and determined that the experiments and numerous tests undertaken on the cannon had weakened the gun prior to its installation on the semi-submersible. Soon afterwards, the vessel was used to swiftly carry those wounded in the battle to Fort Monroe for medical treatment.²⁰⁸ Despite the *Naugatuck*'s initial performance, the battle's outcome would ultimately ruin Steven's plans to get support for his project through positive battlefield results.

In Philadelphia, despite the selection of Eakins as a suitable replacement, there were several attempts to contact de Villeroi in an effort to get him to return to the project. At the very least, officials needed to get him to settle his affairs with the government regarding pay. Samuel Powel, one of the original investors in the 1859 submarine, attempted to contact de Villeroi to urge him to meet with Mr. Hirst at his house. Mrs. de Villeroi had apparently urged him to help in the matter. The following day, May 16, Hirst wrote to Smith again. He once again attempted to reassure Smith's doubts on the project, and also informed him that seven of the old crew wished to return to the boat, in addition to Henri Lambert and John Frank. He advised him to at least keep a full crew until the submarine had been properly tested.²⁰⁹

208. Thiesen, "Revenue Cutter," 148-152.

209. Powel to de Villeroi, 15 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.; Hirst to Smith, 17 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

Smith's reply the next day was that the number of crew "is left at your discretion." That very same day de Villeroi sent letters to both Secretary Welles and Smith. Based on his writing, it is clear that by this point he realized that the Navy had run out of patience with his antics. He explained away his strong words in previous letters as having been due to his "French character," as he told Welles. Though he still made the same demands for payment, as well as direct contact with the government and Smith, his wording was far less aggressive and more pleading. He asked for new proposals and conditions for work under government contract. He even made a halfhearted attempt at an apology to Smith, explaining that his wording "was not intended to be personal. The French express their discontent in stronger terms than you do, and for them a dismissal is always a humiliation, which they cannot well digest, when there are no grave motives." Two days later he received his response from Smith. Smith once again explained that it was the inventor's fault for not reading the letters. He told de Villeroi that he "had always considered you party to the contract" but criticized him for letting his "quarrel with the contractor" interfere with his government work. As for further work, Smith stated that "The department has no further propositions to offer." That same day, Powel reported his failure to contact de Villeroi. His letter had been returned unopened by Mrs. de Villeroi. Hirst also sent a letter to Smith in which he expressed his fear that France or Britain might intervene in the conflict now that Union forces were dealing "tremendous blows" to the Confederacy. Should this happen, he felt the submarine may be needed.²¹⁰

210. Powel to de Villeroi, 15 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and —Footnote continued on next page.

On May 20, 1862, Smith sent another letter to de Villeroi. Apparently, Secretary Welles had forwarded the letter de Villeroi had sent him back to Smith without responding. Smith reiterated that the government had given Hirst the authority to act on behalf of the Navy Department, and de Villeroi had no right to question this decision. If he wished to contact the government to resume work, he would have to do so through Hirst. He also let Hirst know that should de Villeroi contact him, the government would be willing to allow him to resume his role as superintendent, “but he must decide forthwith.” The following day, Hirst told Smith that it would be “useless to seek M. de Villeroi.” After numerous attempts over the course of the month to contact him, he felt further efforts would be useless. Still, he wrote one more note to de Villeroi that same day.²¹¹

On May 22, 1862, Smith sent Hirst important instructions: “The Submarine Propeller being reported ready for service, please turn it over to the Commandant of the Navy Yard, to whom I have written directing that it be sent to Fortress Monroe by the first Conveyance.” It appeared that the submarine would see action after all. In a second letter, Smith reminded Hirst that if all efforts to contact de Villeroi failed, he was to come to an agreement with Samuel Eakins to replace de Villeroi. Then, two days later, de Villeroi finally contacted Hirst. While he had been respectful in his previous letters to Welles and Hirst, however, he did not show the same courtesy to Hirst that time. It is

Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

211. Hirst to Smith, 21 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

likely that the only reason he contacted him was because Smith and Welles refused to deal with him directly. In the letter, he reiterates his complaints about payment and dismissal. He also blamed Martin Thomas yet again for failing to provide him the parts he required for the vessel and demanded direct contact with the government. He still refused to accept blame for the delays in construction and demanded the sealed packet of secrets. Hirst responded on May 26. He told de Villeroi that he had done everything he could to try to help him in the matter, but “too much time has been lost and the Government has resolved to put the propeller in service.” Regarding the issues, he simply stated “Is it not your fault?” The government would be taking care of payment of the crew. If he wanted compensation and back pay, he was to send Hirst the bill. He reminded the inventor of the numerous letters he had been sent, which de Villeroi chose to ignore. The boat had suffered enough delays, and repairs had been necessary to both the air chamber and the main interior of the boat to prevent leaks. Nonetheless, Hirst stated he would wait for de Villeroi to reply before sending his correspondence to the government.²¹²

Back at Hampton Roads, it appeared that faith in Steven’s little semi-submersible had been shaken. Despite the fact that none of the vessel’s crew members lost their life in the Battle of Drewry’s Bluff, and only one of the two injured crewmen had been injured by enemy fire, the explosion of its main gun had cast a shadow over its otherwise spotless service on the James River. Although Commodore Rogers’s board had found that the gun

212. Hirst to de Villeroi, 26 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

had been worn out prior to installation and his insistence that the vessel could still be of use to his squadron with the remaining guns, the Treasury Department sent orders for the *Naugatuck* to head for Washington Navy Yard for repairs on May 26, 1862. While it was in Washington for repairs, its commanding officer was promoted to captain for his services by Lincoln on May 29 during an audience with his cabinet. The vessel would remain in Washington, DC following his promotion and reassignment.²¹³

On May 30, 1862, Hirst received the only reply he would get from de Villeroi to his May 26 letter. It was just another letter complaining about payment again. In a letter to Smith on May 31, Hirst simply stated that “The reply of M. de Villeroi needs no comment. It speaks for itself.”²¹⁴

That month, circumstances were not going well for Stevens in New Jersey. On May 31, 1862, *Scientific American* reported that yet another “scientific board” had examined the Stevens Battery and advised Congress against investing more money in the project.²¹⁵

In Philadelphia, Samuel Eakins was appointed superintendent of Brutus de Villeroi’s submarine on June 1, 1862. It was clear to the government that he would get results. All further attempts to get Brutus de Villeroi to return to the project were

213. Thiesen, “Revenue Cutter,” 148-152.

214. Thiesen, “Revenue Cutter,” 148-152.

215. “Notes of Military and Naval Affairs: Miscellaneous,” *Scientific American* 6, no. 22 (May 31, 1862): 338, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787702&view=1up&seq=342&skin=2021>.; Hirst to de Villeroi, 30 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1784-1963, Records of the Bureau of Yards and Docks, Record Group 71, National Archives and Records Administration, Philadelphia, Pennsylvania.

abandoned, and the dereliction of duty clause of his contract was invoked. Though Brutus would still try to contact the government afterwards, the government wanted nothing more to do with an eccentric, egotistical inventor. Brutus de Villeroi would no longer have any say in the use of the submarine he invented. Furthermore, while his entire crew was eventually paid all the backpay the government owed them, de Villeroi himself does not appear to have seen a cent of his own. On June 2, Smith mailed Hirst a letter regarding payment for the old crew as well as Hirst himself. He closed the letter by stating “We have nothing at this moment for the boat to do. It must therefore remain at the Yard for the present. If I had the matter to arrange again, I would see that more secured measures are taken to bind the inventor.” Apparently, whatever they needed the submarine for in May was no longer an issue. Then, on June 13, the Secretary of the Navy ordered Flag Officer Goldsborough to “send one of your small and swift steamers” to Philadelphia to tow it to the James River. On June 15, Goldsborough ordered Acting Master Amos P. Foster of the USS *Satellite* to “bring it here with as little delay as possible.” It is possible that it was at this point that the nameless submarine acquired its name, USS *Alligator*, though it was neither officially commissioned nor named. Four days later, the Secretary of the Navy reported that the “submarine propeller under contract with Mr. Martin Thomas will leave Philadelphia at 11 o’clock this day.” He described its armament as “two torpedoes,” which were probably stored in the diving compartment. Twenty men were sent down with it to serve as its crew. The initial telegram did not specify how the *Alligator* was to be used, simply stating that it would be used “to clear obstructions in the James River, or any other submarine work you may think proper.” The Secretary recommended examining the wreck of the CSS *Virginia* and

other wrecks. A second order on June 21 urged Goldsborough to use its to destroy the Petersburg Bridge on the Appomattox River. The *Alligator* arrived at Hampton Roads on June 23, and Goldsborough immediately ordered Acting Master Foster to proceed with it up the James River, receiving extra gunpowder from Commander Poor. As the submarine was towed upriver the next day, Goldsborough expressed his doubts over the strategy to the Secretary of the Navy, but he concluded by stating “We will do our best. This is all I can at present promise.” The submarine and its crew were sent to Commander Rodgers of the USS *Galena*, just as the Confederate submarine by Cheeney was undergoing trials further upriver. *Alligator* arrived at City Point, Virginia the following day. Further north, Stevens continued to appeal to Congress. On June 26, 1862, he appealed to Congress once again with a letter proposing a means of completing the Stevens Battery.²¹⁶

3.2 The Fate of the USS *Alligator* and More Proposals

In Virginia three days later—June 29, 1862—the USS *Alligator* was sent back down the James River to Goldsborough. Rogers did not think that blowing up the obstacles in the river was a good idea because they would just sink to the bottom again, and the Appomattox River was too shallow for the submarine to submerge, so it would be quickly destroyed by musket and cannon fire, or it would be captured. To make matters worse, Confederate soldiers held the shoals, and the Commander’s ships were within

216. Veit, *Natural Genius*, 147-148.; de Villeroi to Smith, 30 May 1862. In General Correspondence, Miscellaneous Letters Sent and Received 1773-1985, Records of the Veterans Administration, Record Group 15, National Archives and Records Administration, Philadelphia, Pennsylvania.; Fontenoy, *Submarines: An Illustrated History*, 4-6.

range. The submarine could not be protected and, if it were captured, Rogers feared it would be extremely dangerous to Union ships. Finding no further use for the submarine, Goldsborough sent it to the Washington Navy Yard on July 4, 1862. When word came out that the construction of the CSS *Virginia II* was underway, authorities briefly considered sending its back down river to destroy the ironclad, but the submarine's crew refused to go back upstream. The same day orders were received for the *Alligator* to depart Hampton Roads, Stevens again appealed to Congress with a letter, this time giving a detailed response to each complaint made about his design. He was still trying to get the funds to finish his warship.²¹⁷

Soon after the *Alligator* joined it at the Washington Navy Yard, the *Naugatuck* received its next assignment. It was tasked with guarding the harbor in New York, the same job the Stevens Battery was meant to have. It left the Washington Navy Yard on July 9, 1862.²¹⁸

A few weeks later, the *Alligator* received a new commander while in the Washington Naval Yard. Lieutenant Thomas O. Selfridge was a hero of the Battle of Hampton Roads, where he bravely served on the doomed USS *Cumberland* as it was attacked by the *Virginia*. He was not pleased with his new command but accepted it anyway. He traveled to the New York Navy Yard where he recruited a new crew from

217. Stevens, "The Stevens Battery," 67.

218. Thiesen, "Revenue Cutter," 148-152.

the USS *North Carolina* and was shocked when so many men volunteered to crew the *Alligator* that he had to choose the men to crew the vessel.²¹⁹

As a new crew was being gathered for the *Alligator*, Edwin Stevens desperately tried to get funding for the Stevens Battery. On July 10, 1862, he appealed to both Senator John Hale and Representative Charles Sedgwick, who were the chairmen of the Senate and House Naval Committees. Stevens's efforts were in vain, and on July 17, Congress decided to turn over to Stevens all of their interests, rights, and title to the massive semi-submersible. This meant that all responsibility for the craft, including funding for completion and launching, was solely on the shoulders of Edwin Stevens. Congress had washed its hands of the affair, and Stevens's luck had run out. While Congress turned its back on Stevens, some of the public continued to support his idea. Articles promoting the Stevens Battery continued to appear, with one such article supporting the completion of the craft appearing in *Scientific American* on August 2, 1862.²²⁰

In Washington, Selfridge and his new crew set out in August to test the *Alligator*, but the tests were disastrous. The submarine nearly sank on August 4 during a test on the Potomac River when the crew ran out of oxygen and, in a panic, all rushed to the hatch at the bow of the boat at the same time. Selfridge apparently never taught them how to operate the air purification system. The movement of the entire crew of twenty-two

219. Tucker, "The Stevens Ironclad Battery," 20.; Stevens, "The Stevens Battery," 67.; Thiesen, "Revenue Cutter," 148-152.

220. Stevens, "The Stevens Battery," 67.; Tucker, "The Stevens Ironclad Battery," 20.

rowers to the bow shifted the weight so much that the ballast weights and tanks could not keep the ship balanced, and the bow of the submarine dipped below the surface, the stern sticking out of the water at an angle. It was only after Selfridge managed to calm the crew down and get them to exit the submarine one at a time that disaster was averted, and the *Alligator* prevented from sinking. Superintendent Samuel Eakins issued a critical report based on Selfridge's experience on August 6, 1862, and Selfridge issued his own extremely negative report of the submarine to Secretary Welles on August 8. Selfridge and his crew were relieved of duty and reassigned to the USS *Cairo*. The biggest complaint had been the submarine's oars, and their inability to maneuver the ship. Work began on replacing them with a hand-cranked propeller.²²¹

Months later, a brief and curious note appeared in the October 4, 1862, issue of *Scientific American*, under a section titled "Miscellaneous Summary." "What has become of Winans's spindle-shaped steamer? We have been watching for its development with much interest." Later, a correspondent answered the October 4, 1862, note published in *Scientific American* in the subsequent November 29 issue, explaining that the steamer "is at the wharf of Messrs. Winans at the ferry bar in this city (Baltimore), as harmless as a dove, without any intent of running the blockade as some of our wise folks here said it intended to do, to act as a ram for the Confederates; but as far as I can learn it was built for nothing but an experiment." The correspondent explained that the Winans "are now building one (cigar ship) in London, the same plan of hull, seven hundred feet long, with screw propellers, one fore and aft, instead of the wheel surrounding the hull amidship as

221. Ragan, *Submarine Warfare*, 88-91.

in the present one. The larger vessel was to be built here, but our national troubles put a stop to it.” He also mentions that there “is also a water tank here, the same shape as the steamer, which was intended to bring salt water from sea to be used in experimenting, as there was an engine and boiler put on the wharf for the purpose; but unfortunately for science, on its first trip, the tank was captured by the Government officers at Fortress Monroe: but through the intervention of General Dix, it was released. Under these circumstances the Messrs. Winans thought it better to spend their money in a foreign land.” This shows that the suspicion of Winans’ loyalties during “our national troubles” led to a halt to his experiments in the United States and the experiments he and his sons were conducting had been moved to Europe. It also reveals the paranoia surrounding the strange craft, for not only were people recommending the Union Navy seize it for use as a ram, but they were also afraid it would fall into the hands of the Confederates. Soon afterwards, an inventor in Washington, DC, Pascal Plant, the same one who had proposed the creation of a rocket-powered submarine earlier that year, began to develop his own rocket-powered torpedo, as Angamar had tried to do for the Confederacy, which was approved for testing in December 1862. A target was set up at the Washington Navy Yard, and the torpedoes were fired. The first missed the target and buried itself in a mud bank. The second veered far off course and sank a civilian schooner, the *Diana*. A few weeks later a third torpedo shot out of the water and exploded on the opposite shore. The Navy was not impressed, and the project was abandoned.²²²

222. R. B. Forbes, “Shipbuilding—Iron and Wood Combined,” *Scientific American* 8, no. 22 (May 30, 1863): 342, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080795259&view=1up&seq=346&skin=2021&size=150>.; “Miscellaneous Summary: A National—Footnote continued on next page.

During February 1863, bidding was about to begin on contracts for a new type of monitor. Planning for the class had begun in the summer of 1862. Such craft could be used to deal with the strong Confederate defenses along the Mississippi River and its tributaries. It was clear that the currently existing gunboats stationed there would not be sufficient, and with more Confederate ironclads reported to be under construction, it was clear that a new type of vessel would need to be designed to deal with these threats. Assistant Secretary of the Navy Gustavus Fox proposed light draft monitors as the solution. The specifications required a craft with a draft of only four-feet, lighter armor than other monitor designs, a length of around 221 feet, and a beam of around forty-one feet. They, like the *Monitor*, were to be armed with a single turret containing two guns. Fox turned to John Ericsson, the designer of the USS *Monitor*, for the design, but Ericsson was already busy with the construction of monitors based on three other designs. Ericsson's work delayed creation of the plans. By August, the inventor still had not begun the design, despite Fox's urging, and by mid-September Ericsson had given up on a four-foot draft and, upon the recommendation of Fox, increased it to six-feet. The general plan for the vessels was not finished until October 5 and delivered on October 9, 1862. Ericsson's design was simple and could be quickly constructed. It was turned over to Chief Engineer Alban C. Stimers for completion. Stimers had worked closely with Ericsson on the *Monitor*, serving as supervisor of construction, and had served aboard it during the Battle of Hampton Roads. He was also extremely busy, and he had no

Disgrace," *Scientific American* 7, no. 14 (October 4, 1862): 218, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080796679&view=1up&seq=76&skin=2021&size=125&q1=summary>.

draftsman to spare for the plans. Only two men were assigned to project by mid-November. Nonetheless, he set about completing the designs and changing them with his own improvements. He changed the engines, boilers, and machinery. This meant the design drew too much water, so, he had to assign an engineer to fix the design to make them bigger. The most radical design change Stimers made, which may have partially been the idea of Rear Admiral Joseph Smith if his [Smith's] account is to be believed, was to make the ironclads semi-submersible, like the Stevens Battery. This would allow them to partially dive in combat to make them a difficult target for enemies, and they could surface for faster travel or to free themselves if they grounded. This could be done by adding large, two-foot wide ballasts tanks to the sides of the ship, which were emptied and filled by complex pipes, valves, and pumps. On February 1, the design was completed and submitted to the plans to Fox. He estimated that they would cost \$260,000 dollars to build.²²³

A few days later, in Washington, the Bureau of Construction and Repair began to advertise for bidding on the new semi-submersible monitors, which would come to be known as the *Casco*-class monitors, on February 10, 1863. Contractors from across the Union were encouraged to visit Stimers's office to examine the specifications and plans. Bidding for contracts was set to begin on February 25, 1863.²²⁴

223. Gibbons, T. *Warships and Naval Battles of the Civil War* (New York: Gallery Books, 1989), 38.

224. William H. Roberts, "Without Experience or Precedent: Transformational Technology and the Light Draft Monitors," in *Technology, Violence, and War: Essays in Honor of Dr. John F. Guilmartin, Jr.*, eds. Robert S. Ehlers, Jr., Sarah K. Douglas, and Daniel P. M. Curzon (Boston: Brill, 2019), 112-132.

A few other events of note occurred that month. On February 11, the Union Secretary of the Navy formed the Permanent Commission to review all future inventions, including submarines, submitted to the Navy Department. By late February 1863, Stimers was in Port Royal, South Carolina, and in his absence, Fox wrote to John Ericsson on February 21 to confirm his approval of the design. Fox assumed that Ericsson had been shown the plans by Stimers and was satisfied. A few days later, on February 24, Ericsson sent a shocking reply. He had not even seen the new plans until Fox had sent the letter, and he viewed the new design as ridiculous and unsound. He disavowed any responsibility for whatever disastrous consequences that would result from the design. He also criticized the semi-submersible idea, which he felt was terrible. He coldly remarked that if Fox liked the idea, then he wished him the best of luck, but he would not be responsible for the results.²²⁵

In Washington on February 25, the day after the construction of submarines by the enemy in Mobile was reported, Fox was met with more frustration when the bids for contracts only ranged from \$380,000 to \$395,000, while Stimers had predicted bids twice that. It seemed the Union Navy would have to advertise for bids again. Fox asked Ericsson if he could supply plans. On February 27, Ericsson offered to build four monitors based on his original design for only \$375,000 each. They would be ready in four months. Fox complained the next day that while he was offering to build them three months faster than the contractors, he was charging only \$11,000 dollars less for a far simpler design. Fox asked him to make a new offer. Ericsson did not reply right away,

225. Roberts, *Civil War Ironclads*, 112-113.

and on March 2, the first two contracts of twenty were awarded for semi-submersibles based on Stimers's design. One, the USS *Napa*, would be built by Harlan and Hollingsworth in Wilmington, Delaware, while the other, the *Yazoo*, would be built by Merrick and Sons in Philadelphia. The following day, Ericsson offered to build six vessels for the same price and time he had offered previously. Fox, by this point uninterested in further delays and Ericsson's simpler design, rejected the proposal. More contracts would be awarded in the coming days.²²⁶

Elsewhere, in Washington, DC, the USS *Alligator* was ready for action once again. After it was moved to Hampton Roads, on March 31, 1863, Acting Rear-Admiral Lee ordered Acting Master J. F. Winchester of the USS *Sumter* to tow the submarine to Port Royal, South Carolina, where it would join up with the fleet that was about to attack Charleston, South Carolina. *Alligator* would be used to clear away mines and other obstacles ahead of the attacking ironclads. The *Sumpter* left the next day. By this point, other submarine projects were in the works in the North. One private group in Newark, New Jersey calling itself the American Submarine Company began planning construction of its own submarine, the *Intelligent Whale*, at the start of April. Headed by Scovel Merriam, the submarine's designer, Augusta Price, and Cornelius Bushnell (no known relation to the *Turtle's* inventor David Bushnell), they hoped to convince the Navy to buy their submarine. They had also heard that Congress had passed a bill granting the President permission to issue letters of marque, so if they could not sell it to the Navy, they may have hoped to at least become privateers. Construction of their submarine

226. Roberts, *Civil War Ironclads*, 112-113.

began later that year. Lincoln's refusal to grant such letters combined with construction delays, the Navy's refusal to buy or finance the submarine, and other issues with cost kept the submarine unfinished until after the war was over.²²⁷

The USS *Alligator*, meanwhile, never made it to Charleston. On April 2, the USS *Sumter* was caught in a terrible storm off the coast of Cape Hatteras, North Carolina. The ship began taking on water. In a desperate attempt to save the ship, Winchester ordered the tow cables snapped, and the Union submarine drifted free and sank. The ship was saved, but the submarine was lost. So ended the career of the U.S. Navy's first submarine.²²⁸

On the same day, the *Alligator* went down, more of the contracts for the *Casco*-class were awarded. By this point, around half of the ships had been contracted and begun construction. None of the builders could have known how frustrating the project would become.²²⁹

By April 5, word would have probably reached Rear Admiral Francis Du Pont, the commander of the attacking force, that the submarine was gone. His attack proceeded

227. Harris and Boyne, *Navy Times Book of Submarines*, 83.; Ragan, *Submarine Warfare*, 136-137.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 8, North Atlantic Blockading Squadron 5 September 1862–4 May 1863* (Washington, DC: Government Printing Office, 1899), 636.

228. Ragan, *Submarine Warfare*, 107-108.

229. Roberts, *Civil War Ironclads*, 112-113.

without it two days later, ending in defeat. Whether or not the *Alligator* would have changed this outcome will never be known.²³⁰

On the same day as Du Pont's disastrous attack on Charleston, Edwin Stevens contacted the New York Harbor Defense Commission in an attempt to sell the Stevens Battery to them for half the money cost to make it. Two days later, on April 9, 1863, *Scientific American* wrote another pro-Stevens article stating that they eagerly awaited the government's acceptance of the deal, stating that "we do not see how the Navy Department can excuse itself from accepting this splendid vessel."²³¹

Du Pont's failed attack on Charleston had a major effect on the light draft semi-submersible monitor project. Stimer returned from Charleston with plans to add a ring of armor around the base of the turret, increase the armor of the pilot house, and added back-up steering gear below the deck along with a strengthening of the rudder. He also added improvements that had nothing to do with the lessons learned at Charleston. These changes were clearly made due to Stimers's ambition and desire to make a name for himself. He kept working on designs and rejecting proposals from contractors throughout the month. Meanwhile, in Brooklyn, by late April or early May, Captain Edward B. Hunt of the Union was testing a secret one-man submarine project in the Brooklyn Navy Yard.²³²

On May 26, 1863, Stimers finished his design changes and submitted them. By this point, fifteen of the twenty contracts had been awarded. Fortunately, little work had

230. Veit, *Natural Genius*, 193.

231. Veit, *Natural Genius*, 193.

232. Ragan, *Submarine Warfare*, 146.

been done, and the majority had not even had their keels laid down, so it would be easy to make the changes. The delivery date was extended to compensate for construction delays. Despite this, however, the various builders made little progress because Stimers insisted on remaining in charge of all design alterations and plans. Originally, the Union Navy had given the contractors largely free reign over how they built the designs and what to do if the plans did not specify certain aspects of construction. Now, Stimers was rejecting all their ideas and insisting on everything following his centralized design plans. Worse, the drawings necessary for the centralized design were not finished, and the papers detailing changes were not issued to the contractors. Furthermore, though the changes would cost more money, the government would not pay for the additional cost. Work slowed almost to a standstill.²³³

Later that June, a highly advanced submarine, complete with periscope, was proposed to the Northern Permanent Commission by Professor Hortsford of Massachusetts. His planned submarine was to be fifty-six feet long with a crew of twenty-six. It appeared to be a more advanced version of the *Alligator*.²³⁴

On June 24, the last of the twenty contracts for the light draft semi-submersible monitors were awarded. Despite the government's refusal to pay contractors additional money for the changes, they agreed to them. Work continued slowly and the contractors were beginning to complain about the difficulties imposed by Stimers. By July 1863, the light-draft monitors had progressed very little. Prior to the May 26 revisions, this would

233. Roberts, *Civil War Ironclads*, 112-113.

234. Roberts, *Civil War Ironclads*, 118-123.

have been the original due date. Now, they were supposed to be finished by September 1863, and barely any work had been done at all. Thus, on July 11, 1863, the Secretary of the Navy intervened. Welles stated that all directions given to the contractors would have to go directly through Rear Admiral Gregory. Unfortunately, Stimers defied the order by giving his instructions to local inspectors to relay to the contractors, so changes continued.²³⁵

As the war continued and other submarine and semi-submersible projects, both in the North and the South, moved forward, the *Naugatuck* remained in New York City. By this point, the crew's boredom had resulted in multiple incidents of misbehavior, requiring disciplinary actions, including crew members being thrown in irons or worse. Excitement appeared to be coming their way even as unrest brewed in the city as a result of new draft laws. During the riot that followed, the semi-submersible was tasked with guarding McDougal General Hospital, located at Fort Schuyler. In the end, the action proved minor and brief, and the *Naugatuck* never had to fire a shot. It would remain in New York City until the end of the war.²³⁶

Elsewhere in the North, the permanent commission endorsed Horstford's idea, recommending construction on July 27, 1863. A few days later, on July 29, the Secretary of the Treasury officially changed the name of Stevens's semi-submersible revenue cutter

235. Roberts, *Civil War Ironclads*, 112-113.

236. Thiesen, "Revenue Cutter," 152-153.

from *E. A. Stevens* to *Naugatuck*. Though the boat was already referred to as the *Naugatuck*, this made the name change official.²³⁷

As the enemy accepted delivery of the *H. L. Hunley* in Charleston, Rear Admiral Dahlgren, commander of the Union blockading fleet off that besieged city, made an unusual request of Secretary of the Navy Gideon Welles. On August 11, he requested iron vessels “constructed like a boat, but closed perfectly on the top, so that it could be submerged very quickly.” He hoped that such vessels could be used to destroy submerged obstacles in Charleston Harbor and requested “three or four” of them. It is clear that the Confederates were not the only ones seeking to use submarines in the waters surrounding Charleston. Back in Washington, the Permanent Commission was already examining plans for a one-man submarine designed to do just what Dahlgren wanted. Submitted by Ensign Andrew Hartshorn, the boat was apparently already constructed and successfully tested. Dahlgren received a response to his letter on August 24, 1863, from Secretary of the Navy Welles, stating they would look into his request.²³⁸

In September of 1863, hearing that the Union government was planning to build ironclads that were ocean-going, one of which was estimated to cost four million dollars, Stevens tried one last time to get government support for the Stevens Battery. He offered to complete the battery himself, which he boasted could withstand fire from any gun in

237. Thiesen, “Revenue Cutter,” 152-153.

238. Ragan, *Submarine Warfare*, 135, 139.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 9, North Atlantic Blockading Squadron 5 May 1863 – 5 May 1864* (Washington, DC: Government Printing Office, 1897), 435-436, 513.

the United States or Europe, in exchange for a payment of \$1,500,000 upon completion. He claimed it would be the most powerful warship in the world, and it could be finished faster and cheaper than any new construction. The government turned him down. Stevens quickly made a second offer. He would sell the battery as it was to the government for \$250,000. The government would then only need to spend a million dollars to finish it, saving the half million the government already spent. Secretary Welles turned the offer down, and Stevens once again failed to get any funding.²³⁹

One final mention of the *Winans* in relation to the war is made in the September 26, 1863, edition of *Scientific American*. The issue quotes a *Philadelphia Ledger* article which states that an inventor had proposed that the best defense for the nation's harbors "would be swift-steaming, powerful rams, constructed on the plan of the Winan's steamer, cigar-shaped, the best for strength and speed. A whole fleet of attacking vessels could be destroyed by one such ship. It is singular that the Government has never given sufficient attention to the peculiar construction of this vessel; but we suppose it is only another instance of how hard it is to introduce a principle which revolutionizes established systems and requires a change in fixed habits and old ideas." The editors dismiss this idea, stating that as "far as we have been able to ascertain, the Winan's cigar-shaped steamer...was a failure...The form of the cigar is not the best for a common steamer, and is very objectionable for a steam ram." They go on to state that "great projecting iron wedges, called horns, which have been procured to the bows of several armor-clad vessels, to act as rams, appear to be objectionable. In striking with a slanted

239. Tucker, "The Stevens Ironclad Battery," 20.

bow, they will either be bent or broken, or if one strikes square and enters the side of an armor vessel, it will strike fast and fill up the breach.” The editors conclude that “rams should be constructed with straight vertical stems of great strength, for the purpose of chiefly crushing in the sides of the enemy.” They argued that such craft should be built “of moderate size,” which would enable them to be more maneuverable. When combined with a powerful steam engine, they would be fast and maneuverable enough to easily strike enemy vessels and avoid being struck themselves.²⁴⁰

Further North, it appears that the Confederacy was not the only side that suffered losses due to submarine accidents. On September 30, 1863, Major Edward B. Hunt asphyxiated after his submarine sank during tests. He was rescued from the water comatose but died on October 2. When his widow died in September 1885, he was described as “a man of scientific attainment quite unusual in his profession,” and his cause of death was listed as “the discharge of suffocating vapors from a submarine battery of his own invention.” Despite his death, work on at least one one-man submarine, probably that of Ensign Hartshorn, continued that Fall.²⁴¹

At the start of October, Dahlgren is said to have received the submarines he had requested earlier, or at least two of them. An interesting report by Confederate observers dated October 4 states that “a small submarine affair was observed today with the fleet

240. “The Cigar Steamer: Steam Rams,” *Scientific American* 9, no. 13 (September 26, 1863): 201, <https://babel.hathitrust.org/cgi/pt?id=coo.31924083647275&view=1up&seq=205&skin=2021>.

241. Ragan, *Submarine Warfare*, 136.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 28, Part I* (Washington, DC: Government Printing Office, 1897), 140-141.

and was towed over the bar and brought inside by one of the blockading vessels.” The next day, the report mentions that amongst the enemy vessels is “a small craft having the appearance of a submarine boat (mentioned in journal yesterday).”²⁴²

On October 8, another interesting report was made by the Confederates—”the two nondescript affairs previously reported inside the bar now thought to be constructed to remove torpedoes. As seen from Sullivan’s Island, they are described as elliptical in shape, low in the water, and flush deck.” Based on these observations, it appears that Dahlgren did indeed receive the submarines he asked for. It is likely that he had two, possibly three, in his fleet to remove torpedoes and other underwater obstacles threatening his ships. Since no records of these craft exist on the Union side, and they are not mentioned again by the Confederates, what became of them is unknown. Perhaps they were simple vessels not meant for long-term use and discarded after they had fulfilled their purpose.²⁴³

As Dahlgren received his submarines and the *Hunley* sent another crew to a watery grave, construction of the semi-submersible monitors in the North continued to be plagued with problems. On October 28, 1863, Gregory discovered what Stimers had been up to and ordered him to stop. Stimers constant attempts to change the craft were halted.

242. United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 28, Part I* (Washington, DC: Government Printing Office, 1897), 140-141.

243. Ragan, *Submarine Warfare*, 150.

Unfortunately, by this point labor and materials were in short supply, and construction, already behind schedule, was still a slow process.²⁴⁴

3.3 Disappointment, Rejection, Embarrassment, and the Wasted Opportunity of the USS *Spuyten Duyvil*

On January 7, 1864, if the Union Navy had not known about the *Hunley*, they were about to know. A group of deserters from Charleston was interrogated, and they gave a fairly detailed description of the *Hunley*, though they called it the *American Diver*. That same day, Rear-Admiral Dahlgren issued orders for his ships to take necessary precautions against both the *David* and a torpedo boat “of another kind.” Unaware that the *H. L. Hunley* now had a spar torpedo for surface attacks, he ordered netting positioned around ships, the ironclads to anchor farther apart, and for all ships to avoid anchoring in the deep parts of the channel.²⁴⁵

In the aftermath of the sinking of the *Housatonic*, interest in submarine and semi-submersible technology continued in the North. In early April, the Northern Permanent Commission was bombarded with multiple proposals for submarines. On April 14, 1864, some readers from Philadelphia sent a letter asking what had become of the Stevens Battery and why nothing had been heard of its when “our want of efficient *sea-going*

244. Roberts, *Civil War Ironclads*, 124.

245. United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 35, Part I* (Washington, DC: Government Printing Office, 1897), 30-31.; United States. Naval War Records Office. *Official Records of the Union and Confederate Navies in the War of the Rebellion: Office Memoranda. Series 1 Vol. 15, South Atlantic Blockading Squadron 1 October 1863 – 30 September 1864* (Washington, DC: Government Printing Office, 1897), 227-229.

iron-clads is so apparent.” In their response on April 30, the editors blamed “ ‘old fogey’ naval officers who are nothing if they are not opposed to progress. We laugh at the English for being stubborn and conventional, but we defy anyone to point out a case where the Government at war and requiring ships declined to vail of those at its disposal, because some octogenarians did not like them.” They reported that the semi-submersible was where it had always been at Hoboken, “patiently biding its time.” That time would never come, for like many ideas proposed, it was not completed due to lack of government interest.²⁴⁶

On April 19, 1864, the recently finished CSS *Albermarle* attacked the Union vessels stationed at the captured town of Plymouth, North Carolina. Small and with a light draft, it was precisely the kind of threat that the light-draft monitors were designed to deal with. Unfortunately, none of the light-draft monitors were finished, and the Confederate ironclad sank one Union gunboat and drove off the other vessels. Confederate forces retook the town of Plymouth the following day. The Navy Department needed the semi-submersible monitors. Under pressure, Stimers and his assistant, Engineer Allen, headed to Boston in May to personally finish construction of the ship from the class that was closest to completion, the USS *Chimo*. Finally, on the night of May 5, 1864, *Chimo* became the first of its class to be launched. Soon afterwards, Stimers left, leaving Allen to supervise its completion. Two days later, the USS *Casco* was launched. Immediately, there were problems. On May 12, it was reported

246. More Than One [pseud.], “The Stevens Battery,” *Scientific American* 10, no. 18 (April 30, 1864): 278, <https://babel.hathitrust.org/cgi/pt?id=uva.x001601383&view=1up&seq=284&skin=2021>.

that *Chimo* had only two to three inches of freeboard. This was without its crew, stores, or gun turret, and with only part of its coal supply on board. Should it be fully loaded, it was estimated that only the area around its turret would remain above the water. If it tried to partially submerge, it would sink.²⁴⁷ The *Casco*-class could barely float. Stimers was blamed for this fiasco. He desperately tried to defend himself, but the best defense he could present in his May 31 letter to Fox stated that they would be the best vessels in the Union Navy if they floated six more inches above the water.²⁴⁸

By the summer of 1864, there was increased fear of Confederate rams and spar torpedoes. News of the commissioning of new ironclad rams in the Confederacy such as the *CSS Virginia II*, the *CSS Richmond*, and the *CSS Fredericksburg* led to concern that these ironclads would decimate the Union blockade, much as the *CSS Virginia* had severely damaged the blockading ships during the Battle of Hampton Roads in 1862. In response to this threat, the Navy decided to construct spar torpedo boats, similar to those used by the Confederates. This resulted in the picket launches that eventually sank the *CSS Albemarle* in October 1864, as well as an unusual vessel originally named the *USS Stromboli*. This strange looking, armored craft was eighty-four feet, two inches long, with a crew of twenty-three men. It was the brainchild of William W. Wood, Chief Engineer of the United States Navy with assistance by First Assistant Engineer John Lay. Like the *David*, the *Stromboli* was semi-submersible, able to dive so that only one foot of the hull was above the surface when attacking. The vessel's spar torpedo was reloadable. Rather

247. Roberts, *Civil War Ironclads*, 124.

248. Roberts, *Civil War Ironclads*, 124.

than being attached to a barb designed to be rammed into the enemy hull, the torpedo was detached under the target. The spar would retract once the torpedo was detached, and the retracting spar pulled the cord which triggered the torpedo. Once released, the spar was retracted into a flooded compartment in the bow with a rotary engine. Within four seconds, this small chamber would be completely drained with two centrifugal pumps. Crew members would then enter the chamber through a manhole to load a new torpedo onto the spar. Once the torpedo was attached, the crew left the chamber, the chamber was flooded, and the spar was extended out of the chamber. The elaborate machinery for arming and reloading the torpedo required nine to eleven of the crew to operate, but the entire process was quick. Theoretically, the semi-submersible would be able to detonate one torpedo every three to four minutes. The design was approved and ordered on June 1, 1864. Work swiftly began on the new vessel at New Haven, Connecticut.²⁴⁹

As work began on the *Stromboli*, Welles had run out of patience with Stimers. On June 3, he asked Ericsson to fix the issues with the semi-submersible ironclads, and the Swedish inventor agreed to remedy the situation on the day after, just as the third of the semi-submersibles, the USS *Tunxis*, was launched. On June 5, Gregory and Stimers visited the *Chimo* and proposed fixing the problem simply by adding a wooden deck. Following that, Gregory, Stimers, Ericsson, and Chief Engineer James King held a

249. Gibbons, *Warships*, 168.; Roberts, *Civil War Ironclads*, 124.; C. G. Reynolds, "Yankee Super Ship? Sortie of *Spuyten Duyvil*." *The American Neptune* 42, no. 2 (1982): 85-86, <https://babel.hathitrust.org/cgi/pt:id=mdp.39015018431430&view=1up&q1=Spuyten>.

meeting at Ericsson's house in New York. It ended badly for Stimers, who was forced to depart while the rest of the group discussed solutions to the problem.²⁵⁰

Two major submarine projects were proposed to the Permanent Commission in June 1864. The first was a submarine proposed on June 9 by noted nineteenth century submariner Lodner Phillips and his partner, known only as Peck. Phillip had already built submarines. His proposal was steam powered and apparently could allow crewmen to stay under water up to twenty-four hours and was armed with a cannon that could fire on the surface and underwater. It has been theorized that Phillips waited until 1864 to propose a submarine to the Navy because he tried sell one of his submarines to the Navy twelve years earlier only to be rejected. This time, however, the Navy was more accepting. The second proposal was made on June 14 by Julius H. Kroehl, the same man who had tried to sell the Navy a submarine design in early 1861. By now he was the chief engineer of the Pacific Pearl Company, a pearl harvesting group, and had been working on a submarine since late 1863. The submarine was designed to allow divers to enter and exit the submarine through the bottom like a diving bell. It was to be used to clear underwater obstructions and torpedoes. It was hand cranked, but Kroehl said that he could make an engine powered by compressed air for the military. The Navy assigned W. W. Wood to inspect the submarine to see if it was of any value to the military.²⁵¹

Elsewhere, On June 17, 1864, Welles removed Stimers from his position of General Inspector. Chief Engineer Wood and John Ericsson were placed in charge of the

250. Gibbons, *Warships*, 168.

251. Delgado, *Misadventures*, 65-70, 73-74.; Ragan, *Submarine Warfare*, 215-217.; Roberts, *Civil War Ironclads*, 124.

Casco-class monitors. Work on the seventeen semi-submersible ironclads that had not been launched was suspended until issues with the three launched vessels could be fixed. Wood also proposed raising the sides of the craft as a possible solution. Around the same time, Welles approved of an idea to remove the turrets from three of the ships altogether and convert the vessels to spar torpedo boats like the *Stromboli*. Removing the turrets would significantly lighten the craft and hopefully make them more seaworthy. By late June, Ericsson and Wood were working with First Assistant Engineer Isaac Newton to fix the problems. By the end of the month, it was decided that five of the semi-submersible ironclads, the *Casco*, the *Chimo*, the *Modoc*, the *Napa*, and the *Naubuc* would be converted to torpedo boats, while the remaining fifteen would keep their turrets. By this point, the light-draft monitors had resulted in a public scandal, as millions of dollars had been spent on a program that had so far amounted to nothing. The Department of the Navy was now under investigation, and Welles needed results. In the meantime, *Tunxis* was completed with its turret and commissioned on July 12, 1864. It soon underwent trials in mid-July, which ended with the ship nearly sinking. The hull was too weak to hold its own weight, and it could barely float at all. Despite its unseaworthiness, on July 28 Fox urged Ericsson to quickly fix it and send it to North Carolina to deal with the *Albermarle*. Stimers, now working for Ericsson, was sent with an assistant to investigate the problem, but no quick solution could be found. It was going nowhere. Fortunately, conversion of five of the others into torpedo boats was going well. Once the turret was removed, little modification was needed. In addition to the retractable spar torpedo, a single 11-inch Dahlgren was mounted on a pivot on the bow in front of where the turret would have been. The aft deck armor was also reduced, and the auxiliary engines had

been replaced with lighter, simpler ones. The remaining fifteen, including the completed *Tunxis*, would require extensive modification if they were to be used. The hull needed to be raised underneath the deck, with the sides raised twenty-two inches. Displacement was increased to 130 tons.²⁵²

On August 5, 1864, a letter was sent to Barnes, an associate of Professor Hortsford, informing him that the Navy had finally decided to reject the plans for his submarine. Although the reason is unknown, perhaps the Navy decided that it did not need any experimental, risky weapons now that the war was going in the Union's favor.²⁵³

Sometime in September 1864, after only around three months of construction, the *Stromboli* was launched. Later, on October 19, 1864, the torpedo boat *Casco*-class vessel USS *Naubuc* was launched and began fitting out with weapons. That same day, work began on making the *Tunxis* more seaworthy based on Ericsson's improvements.²⁵⁴

In mid-November 1864, General Grant's army was based at City Point, Virginia, and the siege of Petersburg was underway. General Benjamin Butler was pinned down by Confederate batteries at Trent's Reach but had managed in Richmond to sink obstructions in the James River to prevent the Confederate vessels from attacking Union vessels on the river. At nearby Dutch Gap, construction was underway of a canal that would allow

252. Gibbons, *Warships*, 168.; Ragan, *Submarine Warfare*, 208.; Roberts, *Civil War Ironclads*, 124.

253. Ragan, *Submarine Warfare*, 208.

254. Reynolds, "Yankee Supership," 85-86.; P. H. Silverstone, *Warships of the Civil War Navies*. (Annapolis, MA: Naval Institute Press, 1989): 12, *Naval History and Heritage Command*, August 12, 2015, www.history.navy.mil.

Union forces to bypass the batteries, remove sunken obstructions placed by the Confederates, and attack Richmond. Since this would also allow the Confederate warships to bypass the obstructions, some means of defense from enemy ironclads was needed for the attacking vessels. On November 19, Rear Admiral Porter wrote a letter to Gustavus Fox, Assistant Secretary of the Navy, asking for “large locomotive lanterns.” Rear Admiral Porter reported that he wanted to be prepared for torpedoes. He went on to say that “our fellows have all got ram fever up there and write doleful letters.” “Ram fever” was the term for fear that rebel rams would decimate the ships of the Union blockade. Assistant Secretary Fox decided that the newly built semi-submersible torpedo boat, which had just been renamed USS *Spuyten Duyvil* that same day, would be perfect for such a task, and quickly sent Porter a telegram that the torpedo boat would soon depart New York City for Virginia. Butler sent a telegram that same day stating he would wait to hear from Fox, but the next day, November 20, Porter sent a telegram from Fortress Monroe telling Fox that Butler should not “stop his explosion on our account. There are vessels enough at the gap to eat up all the rebel rams.” Nonetheless, the *Spuyten Duyvil* was to be sent to support the operations at Dutch Gap.²⁵⁵

Unfortunately, *Spuyten Duyvil* was not ready for combat. It was not until November 25 that it finally test-fired its torpedoes. Elsewhere, on November 26, 1864, the USS *Napa*, which had also been modified into a torpedo boat, was launched.

255. Silverstone, *Warships*, 12.; Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: North Atlantic Blockading Squadron from October 28, 1864, to February 1, 1865. Series 1 Vol. 11* (Washington, DC: Government Printing Office, 1894), 77-78.

Meanwhile, on November 29, Fox sent his congratulations to Wood on the success of the tests but revealed his concerns that they were not be able to achieve much success because the rebels “since the *Albemarle* affair, have anticipated such attacks in the James River.” Still, he encouraged work to continue, recommending more torpedo boats be constructed for the Navy Department.²⁵⁶

Spuyten Duyvil was towed south together with a torpedo launch by a chartered tug, reaching Baltimore on December 2. It was carrying eighty torpedoes. Once it arrived, it was placed under the command of Assistant Engineer Lay for the remainder of the tow to Hampton Roads.²⁵⁷

While the Union’s first semi-submersible torpedo boat was making its way to Hampton Roads, the monitor turned torpedo boat USS *Casco* was finally completed and commissioned on December 4, 1864. In order to make the vessel even lighter, its ballast tanks and pumps had been removed, and the same was done to the other members of its class.²⁵⁸

Spuyten Duyvil finally reached Hampton Roads on December 5, 1864. Upon its arrival, however, Porter immediately sent a telegram to Secretary Welles in Washington

256. United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: North Atlantic Blockading Squadron from October 28, 1864, to February 1, 1865. Series 1 Vol. 11* (Washington, DC: Government Printing Office, 1894), 105.

257. Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: North Atlantic Blockading Squadron from October 28, 1864, to February 1, 1865. Series 1 Vol. 11* (Washington, DC: Government Printing Office, 1894), 119.

258. Silverstone, *Warships*, 12.

that he had to put the semi-submersible in dock. Though he said that he could have it combat ready within a day, he sent another telegram to New York requesting sixty shells and wires for the torpedoes. In addition to these issues, plans were changing. The Navy was now tasked with focusing its attention on Fort Fisher in North Carolina, which protected Wilmington, the South's sole remaining port open to Blockade Runners. Admiral Porter and the vast majority of the naval forces in the James River area, were going to be transferred south to lead the Union naval forces in a joint Army-Navy operation to seize the fortification. The USS *Spuyten Duyvil* would remain with the greatly reduced naval forces on the James River. On December 11, 1864, Porter ordered Lay to take the torpedo boat upriver to report to Commander William A. Parker, who would take charge of the remaining ships. The vessel arrived on December 15, and Parker was eager to put the semi-submersible to use. He sent a report to Admiral Porter in North Carolina stating that "I shall endeavor to set it to attack the rebel rams as soon as the commanding officer is ready for work." Despite his eagerness, however, problems continued. Lay, still in command of the vessel, left Virginia for New York on December 26 in order to get shells and other supplies, leaving the *Spuyten Duyvil* without a commanding officer. Twenty-three of the torpedoes on the boat had to be left on the deck of the semi-submersible for lack of space in the vessel, and eventually had to be moved to a cave near the shore.²⁵⁹

The end of the year saw the USS *Squando* another *Casco*-class, this time one of the fifteen that remained a monitor, launched on December 31. Back on the James River,

259. Reynolds, "Yankee Supership," 85-86.

when the canal at Dutch Gap was finally opened on January 1, 1865, it was not large enough for ships to pass through. Further work on the canal would now have to be done under fire from Confederate batteries. The naval forces in the area were down to a few ships and they were short on men. The attack on Fort Fisher had failed, so Admiral Porter was going to remain in North Carolina for another attack on the fort scheduled for mid-January. On top of that, when Lay returned on January 5, he informed Parker that he would have to leave again the next day to oversee the production of powerful newly invented shells, and that he would be gone for two weeks. All of this information and more was sent to Admiral Porter by Parker in a report on January 6. Parker also reported that Lay had talked with Grant, and the general wanted the Navy to wait until the Army was ready to act, as he believed that a joint Army and Navy action would be more effective than one acting without the other. Any naval action, however, would be hampered by the enemy batteries. Deserters had reported that the naval bombardments had done little damage to the defenses, and the Confederates were in the process of sinking even more obstructions in the river to halt any attempt to advance. In light of all this Parker kept his force where it was. Despite Grant's hopes of a joint Army and Navy assault, Parker felt it would be futile if all he could rely on to engage the enemy ironclads were the guns of the sole remaining monitor, the USS *Onondaga*, and only the *Spuyten Duyvil* to remove the obstructions. In the meantime, Parker ordered both the semi-submersible and the smaller torpedo launch to be kept at a constant state of readiness and rendered "as formidable as possible." Lay finally reached New York on January 8 and sent a request to Rear Admiral F. H. Gregory for supplies for the torpedo boat. Meanwhile, back on the James River, Second Engineer Stone had been assigned

command of the *Spuyten Duyvil* soon after the departure of Lay. The torpedoes were moved from the cave to a small canal boat nearby for ease of access, but this exposed the powder to moisture. Despite this, there were still torpedoes on the vessel itself, and Stone kept the vessel ready for action, though it was not expected to be needed anytime soon. Events elsewhere would prove this assumption wrong. Elsewhere, as things continued to look bad on the James River for the Union and frustrations mounted, back in Boston, the USS *Chimo*, now a torpedo boat, was completed and commissioned on January 20.²⁶⁰

In Virginia, things were about to heat up. The second attack on Fort Fisher had been successful, cutting off the last port of the Confederacy from the sea. This was also the last source of supply from overseas for General Lee's army defending Pittsburgh. Now deprived of a critical source of supplies, Lee desperately needed the Confederate naval forces on the James River to take action. Time was of the essence, as any chance of success would disappear once Admiral Porter returned with his ships from North Carolina. He met with Flag Officer Mitchell, and a plan was made to send the Confederate ships to attack Grant's headquarters at City Point, Virginia. It was hoped that an attack there would split Grant's forces into three parts. The Union pontoon bridges would be destroyed, the obstructions would be cleared, and one of the ironclads would patrol the river to prevent enemy communication. The Army would then attack and defeat the divided Union forces. Union intelligence got wind of this plan and alerted General Grant on January 21. Parker was alerted the following day, and in a report on January 23, Parker desperately requested monitors from Porter's force at North Carolina. Other than

260. Silverstone, *Warships*, 12.

the *Onondaga* and the *Spuyten Duyvil*, he only had two gunboats, the USS *Massasoit* and the USS *Hunchback*, and the tiny torpedo launch. There were ten vessels at Norfolk, but all of them were in the Navy Yard undergoing repairs. Some of them had been there for months with no progress on repairs. They were even short on tugs, with only the USS *Alpha* and the USS *Epsilon* present, with the latter also in need of repairs. Parker knew that the rebels were aware the state of his force, as the flag of truce vessel carrying Confederate prisoners for release landed them at Aiken's Landing in full view of his vessels. Worse still, the winter rains had washed away some of the obstructions blocking the river. Parker initially sent a telegram to the Army officer in charge of the forces in the area, John Gibbon, informing him that it would be impossible to replace them "unless Howlett's battery be first captured," but he later stated it might be possible to replace them at night. Grant ordered torpedoes sunk at the obstructions. Regardless, the obstructions could be bypassed at high water, and Parker felt his force was insufficient to defend against Confederate attack.²⁶¹

Parker's request for help went unanswered, and in any case, it was too late. The previous night, Confederate naval Lieutenant C. W. Read had sent three men in a dugout to take soundings of the water near the Union obstructions. The report was favorable. Lee sent Reed to Richmond to request for the Secretary of the Navy to order the attack. The order was given and delivered to Mitchell at 3:00 a.m. on January 23, 1865. The attack

261. Reynolds, "Yankee Supership," 85-86.

would begin that evening. The very night after Parker had sent his report, the Battle of Trent's Reach began.²⁶²

Earlier that afternoon, Engineer Stone had requested that he be able to move his boat upriver to a new position, and Parker gave him permission to do so at 4:00 p.m. The vessel lacked a pilot, however, despite repeated requests for one. Unknown to them, the Confederate ships set off at 6:30 that evening. All three Confederate ironclad rams on the James River, the *Richmond*, the *Fredericksburg*, and the *Virginia II*, would participate in the attack. They were accompanied by the gunboats *Torpedo*, *Drewry*, *Beaufort*, *Hampton*, and *Nansemond*, as well as the torpedo boats *Scorpion*, *Hornet*, and *Wasp*, which were little more than small launches equipped with spar torpedoes. It was a dark night, with visibility further hindered by unfavorable weather. While this made it difficult for the Confederate warships to navigate the river, it also made it difficult for the lookouts at the Union fortifications on shore to spot them. As the attackers moved on the Union forces, the chief engineer of the *Onondaga* left the ironclad to aid in the planting of the torpedoes Grant had requested, and the *Spuyten Duyvil* was still without a pilot. Despite the problems, the ship was ordered to prepare for battle at 8:00 that evening. It was not until 8:35 p.m. that the rebel vessels were spotted, by which point they had already reached the upper edge of the canal at Dutch Gap. The Union fortifications on shore opened fire, and the Battle of Trent's Reach was under way. By this point, the engineer of the *Onondaga* had yet to lay down the torpedoes at the obstructions, and when he heard the news, he moved upriver in a picket to confirm the sighting. He spotted

262. Reynolds, "Yankee Supership," 85-86.

the vessels, went ashore, and signaled Parker from an Army signal tower at one of the batteries. At 9:30 p.m., the USS *Spuyten Duyvil* received the order for the crew to go to general quarters. Meanwhile, the Confederate squadron was easily able to avoid the fire from Union positions on the shore and reached the obstructions at Trent's Reach. Anchoring half a mile above them, Flag Officer Mitchell transferred to the CSS *Scorpion* and proceeded to the obstructions, where they made soundings which confirmed their initial intelligence. The Union batteries on the shore spotted them and proceeded to open fire, but the cover of darkness prevented them from firing accurately on the enemy ships. Mitchell and the crew of the *Scorpion* were able to remain safely at the obstructions while they worked to remove the only remaining spar blocking their path across the obstructions. Engineer Henderson continued to observe them unnoticed from a small picket boat. Meanwhile, back with the Union vessels, there was another call to quarters at 11:30 p.m. Soon afterwards, all vessels except for the *Spuyten Duyvil* moved upriver, further away from the obstructions. Parker ordered this move because he feared that his vessels would not have room to maneuver at the narrow bend at Trent's Reach. He planned to wait for the rebel vessels to pass the obstructions and come to him. Though the order proved controversial, visibility was too poor for an effective attack. *Spuyten Duyvil* maintained its position, prepared to use its torpedoes on any vessel that got through the obstructions. Back at the obstructions, the Confederates successfully managed to remove the spar blocking their path. Mitchell then returned to the *Fredericksburg*, and at 1:00 a.m. on January 24, the ironclad with the gunboat *Hampton* secured to its side, cleared the obstructions. Mitchell transferred back to the *Scorpion* to be taken back to his flagship, the *Virginia II*. At this point, however, the Confederate

Navy's attack, which had so far gone smoothly, began to fall apart. It was discovered that the pilots of the ship had let it drag at anchor aground. Meanwhile, the Union vessels, alerted of the Confederate attack, still believed the enemy ships were advancing unchecked. At 2:30 a.m., Parker ordered *Torpedo Launch No. 4* to meet up with *Spuyten Duyvil* and proceed to the obstructions to attack any ship that made it through. Second Engineer W. F. Fort of the *Onondaga* was put in charge of the launch due to the fact that the captain was missing. Though Stone, still in charge of the semi-submersible, was unable to understand their instructions as the launch passed by. At 3:00 a.m. the confusion was cleared up and the two vessels began to make their way to the obstructions. During this offense, Parker received a telegram from D. Lynch, the Commander and Inspector of Ordinance, who was stationed aboard the USS *St. Lawrence*. Unaware of the situation, he informed Parker that "the Bureau of Ordinance cannot furnish the torpedoes required, and desired to be informed whether those on board the *Stromboli* or those captured from the rebels will not answer." Clearly this was no longer an option, as *Spuyten Duyvil* would need all of its torpedoes during the battle, and in any case, it was too late for torpedoes to be placed in the river. In the meantime, after traveling only a mile, both torpedo vessels ran aground. Unlike the Confederates, however, their crews were able to quickly free them, and they were soon underway again. In the meantime, the Confederates were still having trouble. All efforts to free the *Fredericksburg* had failed. Worse, the *Richmond*, the *Drewry*, and the *Scorpion* were also aground by 3:30 a.m. The tide had lowered, and despite desperate attempts to free the vessels, it was now impossible to get them loose. They would have to wait for the water level to rise again. At 4:00 a.m. Mitchell ordered Lieutenant C. W. Read to relay orders

to the *Fredericksburg* and *Hampton* to withdraw back across the obstructions. *Fredericksburg* was to position itself above the *Richmond* to cover the stranded ships. The remaining vessels that were not grounded would withdraw further upriver to a position beneath the guns of Confederate Battery Dantzler for better protection. Around the same time, *Spuyten Duyvil* passed a picket boat from the USS *Massasoit* which reported that a vessel had been spotted moving up and down the river near the obstructions. By the time they reached the obstructions, though, they found no Confederate vessels moving near them. The vessel and the accompanying launch opted to remain at the obstructions. They remained there until 5:30 a.m., when they withdrew a short distance downriver. Uncertain of the situation and with dawn approaching, at 6:00 Stone sent a boat with a reconnaissance party ashore under the command of Acting Third Engineer B. S. Heath. He quickly returned and reported that they had spotted two enemy gunboats and steam from an unknown number of others “all lying under the guns of rebel batteries.”²⁶³

From this point onward, the situation was only going to get worse for the Confederates. Their ships had been under constant fire from Union batteries on the shore since arriving at the obstructions, though up to this point the fire had been inaccurate thanks to the poor visibility that night. Unfortunately for them, that was about to change, for as the sun rose that day, the positions of the rebel vessels were plainly visible to all. The grounded vessels were now sitting ducks. The Union batteries concentrated their fire

263. Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II* (Washington, DC: Government Printing Office, 1897), 781.

on the grounded *Richmond* and *Drewry*. While the *Richmond* was afforded some protection by its armor, the crew of the *Drewry* was sent scrambling for cover. At some point, either at or between 6:30 a.m. and 7:10 a.m. (Stone and Mitchell give conflicting times), one of the shots from Battery Parsons hit the powder magazine of the *Drewry*, causing a massive explosion that could be seen for miles. The crew of the gunboat were barely able to abandon ship before the fatal blow, and two were still killed in the blast after boarding the nearby *Scorpion*, which was grounded close to the *Drewry*. The small torpedo boat was caught in the blast. Taking the full force of the explosion, it appeared a total loss. Further downriver, the crew of the *Spuyten Duyvil* spotted the explosion, which Stone correctly assumed meant that one of the enemy vessels had been destroyed. At 7:00 a.m. it moved further upriver to Aiken's Landing.²⁶⁴

Meanwhile, General Grant, informed of the attack but unsure of the situation, was in a panic. He heard that the ironclads had reached the obstructions and then withdrew near the Confederate Howlett's Battery. He saw the explosion of the *Drewry* and feared that the obstructions had been obliterated. He sent a telegram to the Assistant Secretary of the Navy at 9:25 a.m. requesting that the gunboats near Fort Monroe be ordered to the James River. He desperately tried to contact Parker but was unable to do so.²⁶⁵

Unbeknownst to Grant, Parker was finally preparing to move his vessels to engage. By 9:50 a.m. all of Parker's vessels were underway. At 10:15 a.m., they reached the *Spuyten Duyvil*'s position, and the torpedo vessel got into position astern of the

264. Reynolds, "Yankee Supership," 85-86.

265. Reynolds, "Yankee Supership," 85-86.

Onondaga as they all headed for the obstruction. By 10:30 a.m. they were within site of the Confederate ships, and five minutes later they got into position and opened fire on both the enemy ships and the nearby Confederate battery. Because of the angle at which the ships had grounded, none of the Mitchell's vessels could bring their guns to bear on the Union warships. They had to rely on the Confederate battery to cover them as they desperately tried to get loose to attack. The *Virginia II* suffered relentless fire. Finally, at 11:00 a.m. the tide rose enough that the rebel ships were able to free themselves. What was left of the *Scorpion* was also freed, drifting down river a short distance before grounding near the obstructions. The Confederate squadron were now able to bring their guns to bear on the attacking Union vessels. The *Onondaga* was damaged, but its armor prevented anyone from being hurt. The *Massasoit* took damage from one of the Confederate batteries, which injured five of its crew. Then, at 11:10 a.m., Mitchell began to withdraw his forces further upstream. With the Confederate ships moving out of range, the *Massasoit* also withdrew, heading further downriver around 11:55 a.m. By 12:10 or 12:15 p.m. (sources on both sides are again contradictory), Mitchell's vessels had withdrawn completely out of range. Rather than pursue them, Parker chose to withdraw the rest of his boats further downstream with the *Massasoit* at 1:30 p.m. The *Spuyten Duyvil* assisted the tug *Epsilon* in towing the *Onondaga* to a position below Dutch Gap. Throughout the entire exchange of fire, the other ships had blocked its path to the enemy, preventing it from using any torpedoes.²⁶⁶

266. Reynolds, "Yankee Supership," 85-86.

While this was going on, Washington and Grant were both in a panic. Parker had yet to contact either of them. Grant sent another telegram to Washington informing them that as long as “the rebel rams do not come down to-night I think everything will be safe before to-morrow night. I expect but little assistance, however, in case of an attack, from the Navy under Captain Parker. I have been compelled to take the matter in my own hands to get vessels to the front, ordering by direction of the Secretary of the Navy. I know no reason why the torpedo boat did not attack.” Grant had not heard of Parker’s actions that day, only that he had initially positioned his vessels near the pontoon bridge downstream before withdrawing downriver. Thus, he believed that the Confederates “leisurely removed” the obstacles placed in the river” opposed only by a little infantry from the shore.” Grant sent out a special order to all gunboat commanders in the area to proceed to the front near the obstructions. Parker did not report his actions for the day until 3:00 p.m. Neither Washington nor the general were satisfied. At 6:00 p.m. Grant reported that he was not able to convince to Parker return to the obstructions, stating “he seems helpless.” He sent another telegram to Parker asking him what vessels he had at the front and demanding that he keep all of them at the front. Grant further explained that he would be sending ships to him to sink at the obstructions, and that should the Confederates head to his position, he should do everything in his power to stop them, even if it meant ramming them and losing some of his ships. As Parker explained the position of his vessels to Grant, he received another telegram from the Secretary of the Navy, demanding information. Complaining that he was not sending reports to the Department of the Navy, Welles asked a number of questions. “What force have you at the front? Where is the *Spuyten Duyvil* torpedo boat? Have the enemy’s boats come down

so you can attack them?” He demanded Parker put himself in touch with Grant and send daily reports. At this point, President Lincoln himself became involved. He suggested that Admiral Farragut be placed in charge at the James River. The Assistant Secretary of the Navy informed Grant that the Admiral would leave soon for Annapolis, Maryland. More vessels were on the way, and he would remove Captain Parker from command should Grant deem it necessary. Soon afterwards, a telegram was sent, ordering Parker removed from command and replaced with Commander E. T. Nicholas of the USS *Mendota*. Secretary Welles also sent telegrams to Captain J. M. Berrian at Norfolk Navy Yard asking him to send any gunboats and ironclads available up the James River. In one of the telegrams to the Navy Yard, Welles again asked, “Where is the torpedo boat *Spuyten Duyvil*?” At 8:00 p.m., Commodore William Radford of the USS *New Ironsides* was ordered to assume command of the naval forces on the James River. During all of this confusion, Admiral Porter, unaware of what was going on at Trent’s Reach, sent orders for the *Spuyten Duyvil* to be prepared for sea so that it could be sent to New Bern, North Carolina, to defend Union positions there from possible attack by Confederate naval forces.²⁶⁷

Meanwhile, back at Trent’s Reach, the Confederate warships had regrouped and were preparing to sail past the obstructions again. Despite the extensive damage suffered by most of his vessels, Mitchell was determined to continue the battle. Soon after sundown he had sent a small party to see if there was any conceivable way to salvage the

267. Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II* (Washington, DC: Government Printing Office, 1897), 781.

Scorpion, but they claimed they saw a gunboat guarding the remains, and the attempt was abandoned. *Scorpion* would eventually be salvaged and taken over by Union forces after the battle. At 9:00 p.m., Mitchell's warships were again heading for the obstructions, with *Virginia II* in the lead. It was soon discovered, however, that earlier that night Union forces had installed a huge Drummond Light to illuminate the river, depriving the Confederates of the cover of darkness. To make matters worse, the *Virginia II* was severely damaged. It had been hit by nearly seventy shells while grounded, leaving at least one crewman dead and seven others wounded. The smokestack and exhaust pipe had been severely damaged, resulting in steam escaping onto the deck. A pilot was forced to stand on the open deck at the bow to direct the vessel, but as soon as they were spotted by Union forces in the batteries, he was forced to seek shelter from fire in the steam filled pilot house. The steam, combined with the brightness of the Drummond Light, made it impossible to see. The Confederate vessels swiftly withdrew back under the protection of the batteries to regroup. Parker's ships remained anchored where they had been since that morning²⁶⁸.

At the same time that the Confederate ships made a second attempt at the obstructions, Welles received a response from Commodore Lanman at Fort Monroe regarding the location of the Union's semi-submersible. "Torpedo Boat *Spuyten Duyvil* is, I believe, in James River. Admiral Porter has ordered it to be ready to go to sea."

Secretary of War Edwin M. Stanton repeated orders for Farragut to head to City Point

268. Reynolds, "Yankee Supership," 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II* (Washington, DC: Government Printing Office, 1897), 781.

and Parker to be removed from command. At 9:40 p.m. Grant replied to Fox that he was happy to hear that Farragut and Redford were on their way, “but they would be of no use in the present emergency.” The Assistant Secretary of the Navy replied by informing him that the *Atlanta* and the *New Ironsides* were on their way, someone had sent for the *Saugus*, and the *Rhode Island* would be at Hampton Roads early Thursday morning, but “I do not understand where our torpedo boat is. It ought to dispose of all the rams if they come below the obstructions.” He was eagerly awaiting Grant’s response, according to the telegraph operator. At around the same time, Parker received word he was relieved of command, and sent a telegram to Grant.²⁶⁹

Back at Trent’s Reach, Mitchell’s vessels had once again regrouped, and he was meeting with his officers to discuss what their next move should be. With the *Virginia II* in such terrible shape, the loss of both the *Drewry* and the *Scorpion*, the disabling of the *Hampton* and one of the two remaining torpedo boats, the Drummond light, and the loss of the element of surprise, Mitchell made the reluctant decision to retreat. At 2:45 a.m. his vessels made their way back upriver, taking fire from the Union fortifications on the shore. By 4:30 a.m., the Confederates were out of range of the Union cannon, and the Battle of Trent’s Reach ended. Parker had made no attempt to attack or pursue the

269. United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II* (Washington, DC: Government Printing Office, 1897), 781.

Confederate vessels since withdrawing from the obstructions after his initial attack, and the *Spuyten Duyvil* never got to fire a single torpedo.²⁷⁰

Parker reported to the headquarters of the Army of the James that morning and, unaware of the dissatisfaction with his command during the battle, sent Welles a report at 7:00 a.m. stating “We attacked the enemy’s gunboats yesterday and drove them back, two ironclads and Howlett’s battery.” He also sent a telegram to Nichols informing him that he was relieved of command and Nichols should head to Aikens’s Landing to assume command if he was the senior officer on duty, unaware that Nichols was already on his way. In Parker’s absence, Lieutenant Commander Homer C. Blake of the USS *Eutaw* assumed temporary command until Nichols could arrive. At 11:00 a.m. Grant sent a telegram to the Assistant Secretary of the Navy, informing him that the Confederate ships had retreated, “thus showing present danger to be at an end.” Blake, meanwhile, was inspecting the status of the ships. He eventually turned his attention to the torpedo boats, and what he found was disappointing. It was discovered that “not a single torpedo on board of them could be exploded; the powder was renewed and on trial, we found them in working order.” Even if the *Spuyten Duyvil* had been able to use its torpedoes during the battle, they may not have even detonated. He also noted that despite Parker sending a telegram requesting their presence, the officers in charge of both vessels were still absent. The coal barges sent by Grant were sunk at the obstructions, and new torpedoes were sunk in the water above Fort Brady. Nichols arrived that evening. By dawn on January

270. United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 45, Part II* (Washington, DC: Government Printing Office, 1897), 781.

26, Porter, having started to receive word of the events of Trent's Reach but unaware of Parker being relieved of command, sent him a letter stating that the orders for ship movements were revoked, "and the torpedo boat will be detained at the Gap." He further stated that "I should certainly expect a report that they had all been destroyed if that torpedo boat is what it professes to be, and not a humbug, as I have found all such contrivances. You should be able to whip the whole rebel Navy. Your little torpedo boats should be able to whip a ram apiece, and if my instructions are carried out, they will always be in readiness." He also sent an order to the senior naval officer at Hampton Roads to send the *Spuyten Duyvil* to Parker on the James River if it was not already there. Another order was sent to Parker explaining that Porter had heard the obstruction had washed away, and that the semi-submersible was to be kept at the obstructions. As word was spreading of the Battle of Trent's Reach, the *Chimo* arrived in New York to receive torpedoes in preparation for action. Yet another torpedo boat was about to be ready for deployment.²⁷¹

Back on the James River, Nichols relieved Blake of command at 9:00 a.m. on January 27. That same day, Parker, now aware that he had upset his superiors, wrote to the Secretary of the Navy to explain his actions. Around noon that day, Commodore Radford sent a telegram to Secretary Welles informing him of his arrival at City Point, and at 5:00 p.m., Nichols sent his own telegram to Welles informing him *Torpedo Launch No. 4* and the *Onondaga* were now anchored just below the improved obstructions. He also reported that the enemy ironclads had been sighted at their pre-

271. Reynolds, "Yankee Supership," 85-86.

battle anchorage point at Fort Darling, and both the USS *Atlanta* and *New Ironsides* were on their way up the James. He closed the telegram by noting that “The engineers in charge of the *Spuyten Duyvil* and launch are both absent; their presence is needed immediately.” Over a day after the battle, the semi-submersible and the launch were still missing crew members. That afternoon, Vice Admiral Farragut arrived, and swiftly sent a brief telegram to Welles: “Sir: Your telegram of the 25th. All appears to be right. Radford is at his post with ample force. Things do not look well for Parker.” Having found his presence unnecessary, Farragut left on the USS *Don* for Annapolis shortly after midnight on January 27. Later that day, Welles informed Radford that he had “investigated the absence of engineer from *Spuyten Duyvil* and launch and report.” Radford also sent a report to Admiral Porter stating that “in view of the difficulties here it is absolutely necessary that the *Hunchback*, *Massasoit*, and *Spuyten Duyvil* should be retained in the division for the present.”²⁷²

February 1 would see the USS *Suncook*, one of the Casco-class monitors, launched. Work on fitting it out began immediately. Soon afterwards, frustrations abounded over the situation of the Union vessels on the James. On February 6, 1865, Admiral Porter, still off the coast of North Carolina and unaware of Lay’s return, ordered Commodore Radford to “Have an investigation made with regard to the absence of the engineer in charge of the *Spuyten Duyvil*,” as well as the absence of the engineer of *Torpedo Launch No. 4*. He also ordered all the vessels undergoing maintenance at Norfolk to be sent to their stations, and for “each of them to have a spar fitted on the bow

272. Reynolds, “Yankee Supership,” 85-86.

to carry a torpedo like our torpedo boats.” This shows how popular the spar torpedo had become by this point in the war. While Porter may have expressed skepticism of the *Spuyten Duyvil* earlier, he was clearly extremely confident in the capabilities of spar torpedo equipped craft. At the same time, Secretary Welles ordered Commodore Bell, who was in charge of the Norfolk Navy Yard, to proceed up the James to interview officers there regarding the conduct of Parker during the Battle of Trent’s Reach:

It is important for the honor of the Navy that a full and impartial enquiry should be made, especially as to the absence of officers and the commander of the *Spuyten Duyvil*, its condition for service, and all other vessels; whether the senior officer sent for the commander of the *Spuyten Duyvil* after he learned that the rebel vessels were coming...whether he dropped down in the *Onondaga* on the approach of the rebel vessels...after Lieutenant General Grant notified the senior officer of that the rebels were expected...and all other information ending to elucidate the subject.²⁷³

Then, that very evening, the vessels on the James received disturbing news. Word reached them that the gunners at Fort Brady had spotted the enemy ships moving down the river once again. The *Spuyten Duyvil* was still missing a pilot. Lay immediately took a small launch, both to ask Captain Nichols for a pilot and to procure the rest of the torpedoes from the canal boat. Upon his arrival at the canal boat, however, he was

273. Silverstone, *Warships*, 12.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865 – 31 January 1866; Naval Forces on Western Waters 8 May 1861 – 11 April 1862* (Washington, DC: Government Printing Office, 1897), 41.

confronted with a new problem: the torpedoes were all gone. The man in charge of the boat informed him that earlier that afternoon an Army tugboat had removed the torpedoes and taken them somewhere downriver. Lay quickly confronted the tugboat captain asking for an explanation. The tugboat captain proved less than cooperative, explaining that he had simply carried them downriver to be stored in a magazine, and when asked why he had not informed Lay or any other naval personnel of the move, he simply told the First Assistant Engineer that “his orders were to remove them and not hunt the whole river for us.” The torpedoes may have been moved because the Army was still frustrated about the powder testing on January 31. The matter was immediately reported to Nichols, who was just as shocked as Lay. He informed him that he would enquire about it in the morning but in the meantime, they would have to make do. Lay was worried that he did not have enough torpedoes. If more than a dozen torpedoes were necessary in the coming battle, Lay would have to withdraw. Fortunately, it proved to be just a false alarm. Nichols kept his word and investigated the torpedo incident the following morning. Still, Lay felt the need to express his frustrations with what had transpired over the past month in an unofficial report to Chief Engineer Wood in New York on February 8. Things could not look worse for Parker. On February 14, Porter sent his response to Parker’s January 31 letter. In it, he explained that “although I can well feel for you and regret the position in which you have been placed, I do not feel that I can do anything in the matter until a court of enquiry decides in relation to the motives or necessity which induced you to leave the station assigned the *Onondaga*.” In response to his request for another chance to prove himself, Porter stated that “No man ever had a better chance than you had to make yourself known to the world, and the enemy presented you with the opportunity I have

been so long desirous of meeting... We now know that all those reams were at our mercy, and if we had lost the *Onondaga* in the struggle, we would have been amply repaid by the result, if we had destroyed them.” It is clear that Parker would receive no support from Porter.²⁷⁴

In March 1865, the USS *Casco* joined the other Union vessels at Hampton Roads. Long after they were supposed to be ready, the first of the light draft Monitors was now on the front lines, albeit now a torpedo boat. Unfortunately, it was so slow that it was virtually useless for attacking enemy ships. The *Casco*-class continued to be a source of embarrassment for the Union Navy. On March 13, one of its sister ships, the turreted *Casco*-class monitor USS *Shawnee*, was launched, and began fitting out.²⁷⁵

Days later, Admiral Porter had Parker arrested. On March 18, 1865, Parker was given a court-martial. During the hearing, Parker pleaded that he had only followed Porter’s orders to keep the *Onondaga* and the other vessels out of range of enemy fire until the enemy ironclads closed in to engage. Porter, however, saw it differently. He accused him of disobeying his orders to destroy the enemy vessels. In the end, the court found him guilty of disobeying orders. Secretary Welles, however, was not satisfied with the rulings of the court and reviewed the case himself. He found the charges made against Parker shaky at best. “The action of the court in this case has somewhat embarrassed the

274. Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865 – 31 January 1866; Naval Forces on Western Waters 8 May 1861 – 11 April 1862* (Washington, DC: Government Printing Office, 1897), 41.

275. Ragan, *Submarine Warfare*, 225-226.

Department,” he wrote. He concluded that “the allegations in the specification, against which the accused was warned to defend himself, are either disproved or are insufficient to prove guilt, and he is found guilty upon allegations of which he was not informed, and which are not even stated in the finding of the court for the information of revising power. The legality of such a finding too questionable to be lightly admitted to establish a precedent.” Welles felt that he had simply made an honest mistake in his judgement and freed him from his house arrest. He also refused Porter’s other request that the other officers on duty at the time of the battle be removed from the Navy. Despite being cleared of charges; however, Parker would not be allowed to serve on the front again. He was placed on the retired list by Porter. The admiral further had the engineers placed in charge of the torpedo launch and the *Spuyten Duyvil* replaced with officers. Sometime in late March 1865, Lay handed over command of the semi-submersible to Acting Ensign J. Brennon. As the handling of the *Spuyten Duyvil* was costing Parker his career, two more of the embarrassing *Casco*-class were taking shape. The *Modoc* was launched on March 21, and the *Naubuc* was completed and commissioned on March 27.²⁷⁶

By April 1865, Southern defeat was imminent in Virginia. At the same time, USS *Chimo* began its journey by tow to Hampton Roads on April 1. The following day, General Grant broke through Lee’s lines. The Confederate vessels on the James River were scuttled and Richmond was abandoned. The *Spuyten Duyvil* was quickly put to

276. Silverstone, *Warships*, 12.; Reynolds, “Yankee Supership,” 85-86.; United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 22, West Gulf Blockading Squadron 1 January 1865 – 31 January 1866; Naval Forces on Western Waters 8 May 1861 – 11 April 1862* (Washington, DC: Government Printing Office, 1897), 41.

work using its torpedoes to remove the obstructions in the path of the Union vessels as they made their way to Richmond. *Casco* joined *Spuyten Duyvil* in clearing away obstructions on the way to Richmond. President Lincoln joined Admiral Porter aboard the USS *Malvern* as it made its way to Richmond. On the way to the captured Confederate capital, however, the *Malvern* ran aground. The president was then transferred to the *Spuyten Duyvil*, which took him into the capital. It was from a boat launched from the torpedo boat that Lincoln disembarked on his historic visit to Richmond. After the historic visit, the vessel continued to clear obstructions from the James River for the remainder of the war.²⁷⁷

Chimo arrived in Hampton Roads on April 9 for guard duty. In mid-April, *Casco* left the James to join the Potomac Flotilla. On April 20, one of its sister ships, the USS *Klamath*, was launched, and on April 26 another, the USS *Nausett*, was launched. April 28 would see *Chimo* depart Hampton Roads so it could serve as a station ship at Point Lookout, North Carolina. On May 4, *Napa* was finished, but it was never commissioned, and its sister ship, USS *Waxsaw*, was launched. Two more, the USS *Yazoo* and *Koka*, were launched on May 8 and May 18, respectively. On May 28, *Chimo* was began its journey to report to the Navy Yard in Washington, DC. Its sister ship, USS *Yuma*, was launched on May 30. The following day another failed semi-submersible, the USS *Cohoes*, was launched, and *Casco* reported to the naval yard at Washington. On June 6,

277. Reynolds, "Yankee Supership," 85-86.

1865, their sister USS *Squando* was completed and commissioned. Four days later, the *Casco* was decommissioned also.²⁷⁸

278. Delgado, *Misadventures*, 164.

CONCLUSION

A few Civil War submarines enjoyed some notoriety and life after the war, while others faded into obscurity. In April 1866, the *Intelligent Whale* was finally finished. It was acquired by the Navy and underwent trials in 1872, but its trial was a disaster and nearly killed its crew. It ended up abandoned at the Brooklyn Navy Yard and displayed as a curiosity.²⁷⁹ The *Pioneer*, meanwhile, remained where it was abandoned by the Union forces that studied her, until February 15, 1868. On that day, it got its fifteen seconds of fame when the *New Orleans Picayune* announced it was sold for forty-three dollars as scrap metal.²⁸⁰ Julius Kroehl's submarine, the *Sub Marine Explorer*, was never adopted by the military. It was finished in November 1865.²⁸¹ It underwent trials in 1866 before

279. Delgado, *Misadventures*, 144-146, 164.

280. "Amusements This Evening," *The Daily Picayune: Morning Edition*, February 15, 1868. [http://infoweb.newsbank.com.libproxy.usouthal.edu/iw-search/we/HistArchive/?p_product=EANX&p_theme=ahnp&p_nbid=R5CH5DNYMTUyMjc5NzU1NS\\$3MzgwMDl6MToxOTluMjQ1LjlyMS4xMDU&p_docref=v2:1223BCE5B718A166@EANx-12261E6213CBA080@2403378-1224917304D57CE0@3.](http://infoweb.newsbank.com.libproxy.usouthal.edu/iw-search/we/HistArchive/?p_product=EANX&p_theme=ahnp&p_nbid=R5CH5DNYMTUyMjc5NzU1NS$3MzgwMDl6MToxOTluMjQ1LjlyMS4xMDU&p_docref=v2:1223BCE5B718A166@EANx-12261E6213CBA080@2403378-1224917304D57CE0@3.;); "Amusements This Evening," *The Daily Picayune: Afternoon Edition*, February 15, 1868. http://infoweb.newsbank.com/libproxy.usouthal.edu/iw-search/we/HistArchive/?p_product=EANX&p_theme=ahnp&p_nbid=R5CH5DNYMTUyMjc5NzU1NS43MzgwMDl6MToxNToxOTluMjQ1LjlyMS4xMDU&p_action=doc&p_queryname=5&D_viewref=browse&d_article_id=&d_pbi=1223BCE5B718A166&d_issue_id=12261E634679C2B8.

281. Delgado, *Misadventures*, 78.

being shipped off to Panama in September of that year.²⁸² There it was used to fish for pearls until it was abandoned on the shore of an uninhabited island in 1869, after it had dived too deep and Kroehl had died from the then-unknown decompression sickness and subsequent crews were incapacitated for the same reason.²⁸³ It remains there to this day.

The *Casco*-class monitors were one of the greatest embarrassments of the Navy during the war. Despite millions of dollars being spent on them, by the end of the war, only four torpedo boats and two monitors were finished, and four of them had not been launched yet. Despite the end of the war, however, work on them continued. *Modoc* was finally finished on June 23, 1865. It was never commissioned, and the following day its sister *Chimo* was decommissioned. The USS *Etah* was launched on July 3, 1865, the USS *Shiloh* on the July 14, the USS *Wassuc* on July 25, and the USS *Suncook* was finished on July 27. In August, the USS *Nausett* and the USS *Shawnee* were finished and commissioned on August 10 and 18, respectively, only to be decommissioned soon afterwards. The *Waxsaw* was finished on October 21, the *Wassuc* on October 28, and the *Koka* on November 28. On December 12, 1865, the final member of the class to be launched, the USS *Umpqua*, was launched, and the *Yazoo* was finished three days later. In 1866 the last of the failed semi-submersibles were finished, with *Cohoes* completed on January 19, followed by *Etah* and *Shiloh* on March 12. *Klamath* and *Yuma* were finished

282. Delgado, *Misadventures*, 78-89.

283. Delgado, *Misadventures*, 95-101, 183-184.

on May 6. The following day, the last of the embarrassments, the *Umpqua*, was completed, and *Tunxis* finished its refit on July 12.²⁸⁴

These failures rendered the vessels virtually useless, and with no war to fight, the U.S. Navy had no use for them. The ironclads remained laid up for years. Finally, in 1874, soon after money for the Stevens Battery had run out, the Navy began to scrap the ironclads, starting with the *Squando* on July 1. By the end of the month, *Cohoes* and *Suncook* had also been scrapped. *Yazoo* met its end at the breakers on September 5, with *Yuma*, *Umpqua*, *Klamoth* and *Etah* joining it on September 12. *Koka* was broken up on October 2, and by the end of the year, *Tunxis*, *Chimo*, and *Shiloh* were also disposed of, the latter of which had actually briefly been commissioned. In 1875, *Casco* was scrapped in April, *Waxsaw* on August 25, *Nausett* and *Modoc* by the end of that month. On September 9, *Wassuc* and *Shawnee* were scrapped, and by the end of the year the last of the class, *Napa* and *Naubec*, were also scrapped. Not a single one of them had ever been used for their intended purpose or seen action against an enemy ship.²⁸⁵

In 1866, the *Spuyten Duyvil*, the Union's only purpose-built torpedo boat was placed in ordinary. It was modified for experimentation in submarine warfare. Even in 1868, it was claimed by some to be the most formidable warship afloat, though it was

284. Silverstone, *Warships*, 12.

285. Silverstone, *Warships*, 12.

largely forgotten.²⁸⁶ In 1880, it was broken up for scrap, having never gotten the chance to use its torpedoes on an enemy warship.²⁸⁷

The Stevens Battery remained unfinished at the end of the war. Stevens's other semi-submersible, the *Naugatuck*, remained in New York until it was reassigned to patrol duty of New Bern, North Carolina. Departing New York on November 10, 1865, it arrived at its new home on November 28.²⁸⁸

Edwin Stevens never gave up on the Stevens Battery. He eventually hired former General George B. McClellan to serve as his agent in an attempt to get France or Russia interested in buying her.²⁸⁹

Stevens died in 1868. In his will, he left \$1,000,000 to be used for the completion of the Stevens Battery, which he requested be either given to the state of New Jersey or sold to benefit his estate once it was finished. A commission was set up with George B. McClellan serving as the engineer in charge. Soon afterwards, probably around 1869, the former general decided to completely redesign the Stevens Battery. Removing its semi-submersible abilities, he decided to turn it into a surface-going vessel. Inspired by the ironclads of the Civil War, he redesigned it as a giant, ocean-going, single-turreted monitor equipped with a naval ram. The turret armor would be eighteen inches thick

286. Reynolds, "Yankee Supership," 85-86.

287. Reynolds, "Yankee Supership," 85-86.

288. Thiesen, "Revenue Cutter," 152-153.

289. Tucker, "The Stevens Ironclad Battery," 20.

while the deck armor would be ten inches thick. On July 1, 1870, Congress authorized New Jersey to accept her, and work resumed.²⁹⁰

Ross and Thomas Winans would never resume their experiments with cigar ships in the United States. All subsequent craft they produced in Europe, specifically in Russia, France, and Britain. Though their creations attracted interest, they only had limited success in sparking interest in their designs, and the cigar design never caught on for surface ships. If the designs for submarines in the Civil War and afterwards are any indication, however, it did become a common design for submarines.²⁹¹ On this note, a fascinating article appeared in *Scientific American* after the war, in their March 24, 1866, issue. The article titled “Launch of Winans’s Fourth Cigar Steamer,” announces the launch of the latest of the Winans family’s signature vessels in Britain. It also briefly chronicles the history of the boats, from the 1858 boat to the present. The editors of *Scientific American* once again express their skepticism of the design, remarking that “we prophesied the failure of the vessel— a prophecy that was signally fulfilled.” They go on to make the usual comments of the inefficiency of the shape and the fact that there was no way it could overcome water resistance, but they then go on to make a new, interesting comment on the design: “If the vessel was to be wholly submerged the form would be excellent”.²⁹² It is clear from this comment that the editors were well aware of

290. Tucker, “The Stevens Ironclad Battery,” 20.

291. Crisafulli and Crisafulli, “The Winans Cigar Ship.”

292. “Launch of Winans Fourth Cigar Steamer,” *Scientific American* 14, no. 13 (March 24, 1866): 199, <https://babel.hathitrust.org/cgi/pt?id=coo.31924080787561&view=1up&seq=202&skin=2021>.

the potential for this “form” on a submarine, and if history tells us anything, they were not the only ones.

The *Winans* and the “water tank” remained moored in Baltimore for many years to come. Abandoned, they became a local curiosity and landmark. A number of people saw them as they toured the ports at Baltimore, and a few even got on the *Winans* and explored its inner workings. As late as 1869, both craft were still moored where they were abandoned, though the tank disappears after that, perhaps finally scrapped. The *Winans*, however, remained, and photographic evidence suggests that it may have still been there as late as 1890.²⁹³ After this date, its fate is unknown. Perhaps it was scrapped during some redevelopment work on the port. Whatever the case, and despite the fact that it was not a submarine, its place in the history of submarine vessels cannot be ignored.

American submarine development was largely propelled by military necessity. Periods of conflict or war scares created opportunities for inventors to offer their services and inventions to the government for use as vessels of war. When opportunities were not available in the United States, some, like Robert Fulton, traveled overseas to areas of conflict to sell their ideas to eager nations looking for a weapon that could give them an edge over their opponent. Government contracts often provided generous funding for projects that inventors may not have been able to complete on their own. Thus, most inventors were motivated by profit as much as patriotism, if not more so. Still, there were far fewer submarine projects in the period prior to the Civil War than during the war itself. Only two projects are known from the period of the American Revolution, only one

293. Crisafulli and Crisafulli, “The *Winans* Cigar Ship.”

of which was actually built as an Army project, while during the War of 1812 the few projects that were completed were the works of private inventors operating outside the military, effectively making them privateers. After these two wars, there were virtually no military projects related to submarines or semi-submersibles prior to the Civil War, with only a few exceptions like the Stevens Battery, which was never completed. This can likely be attributed to a number of factors. One reason may be the limits of technology, as well as the fact that the Civil War was a conflict unlike any other the nation had faced in terms of scope and destruction. Another may be the nature of conflict between the War of 1812 and the Civil War. During both the American Revolutionary War and the War of 1812, the United States was facing the British Navy, the best in the world, putting it at a huge disadvantage at sea. The United States could not directly compete with the much larger Royal Navy, so they looked for anything that had a chance, however small, of giving them an edge. It also made them more willing to turn to civilian inventors and ship owners, as reflected by the extensive use of privateers in both wars. Following the War of 1812, however, America did not face any conflicts that put the Navy at a disadvantage, or any major naval conflict for that matter. There was no need for something like a submarine. It was during that time that civilians began to develop and use submarines, primarily for diving and salvage operations. Thus, the submarine, once used exclusively for military purposes, was now developed almost entirely for civilian usage. The Civil War, on the other hand, was a war that had a lot of battles at sea or on the waterways of the nation's interior. Lincoln's strategy involved blockading the coast of the Confederacy, which was no small feat, while the Confederacy needed a means to lift or get around the blockade. Both sides attempted to employ new weapons of

war against the other to accomplish their goals. Civilian use of submarines virtually disappeared as all focus turned to the war effort.

Based on the records, it is clear that both sides made use of submarines, but the Confederacy was far more willing to use them than the Union. Why is that? The answer is probably a simple one: The Confederacy was the underdog in the fight. The Union had more ships, more resources, more men, and a bigger war machine. Like the British Navy in the American Revolutionary War and the War of 1812, it had the advantage at sea. As such, the Confederacy was more open to new and risky technology that could potentially give it an edge over its opponent. As the war progressed, and the tide of war gradually began to turn against them, desperation would have only made them more willing to take risks, to make gambles. Submarines were a risky venture, but they were not necessarily suicide. It was a gamble many felt was worth the risk. If the Confederacy could not defeat its enemies on the surface, then it would strike from below. Similar reasoning may have been behind the use of the submarine in the United States during the American Revolution and the War of 1812. That line of reasoning would also be used by the Germans during World War I, albeit on a grander scale and to greater effect. The Union was also looking for something to give it an edge over its opponent, but they felt less of a need to use them, especially later in the war. For them, the submarine was more of a countermeasure against the Confederates' dirty underwater tricks, a means of removing the torpedoes and other obstacles placed in the way of their ships. Other submarine projects were largely reactionary, a result of news of a dreaded new enemy vessel, such as the *Virginia*, the *Albermarle*, the *Virginia II*, and other ironclads. In fact, other than the USS *Alligator*, the Navy never attempted to use a submarine in a direct combat role.

Another reason for the discrepancy between the number of Union and Confederate vessels lies in the means by which both sides obtained vessels. In the South, the Confederacy had little in the way of ships when the war began and limited industrial capacity. As such, private ventures were strongly encouraged, and privateers were commonplace. In this atmosphere of desperation, countless inventors motivated by profit and patriotism planned and built a variety of vessels for the Confederacy, including submarines. In fact, as can be seen by the information in this paper, the vast majority of the rebel submarines were the result of projects by citizens, including the *H. L. Hunley*. This fact allowed the vessels to be built free of government funding and oversight, which suited the government fine. The newly formed government could ill afford to fund the development of untested experimental weapons. It barely had the resources to build ships. If a submarine or other vessel could be built by the citizens of the Confederacy, then the Confederate government would generally be happy to accept them into service. Though a few submarines and semi-submersibles were the result of government projects, the construction of these vessels was limited by political support, government funding, and supply distribution. Private inventors working on their own had an easier time and less frustrations.

The Union submarine projects were a different story. While there was desperate need for ships for the blockade of Southern ports, the North had the industrial capacity and the resources to get them. Furthermore, Lincoln was strongly against the use of privateers. Though he had the authority to issue letters of marque, he never used it. As a result, all Northern submarine projects were government projects. Private projects that were not purchased by the government like the *Intelligent Whale* did not get anywhere as

a result. The government projects, on the other hand, had to deal with the frustration of bureaucracy. All construction, funding, resources, and decisions were overseen by the government. Since the Union was not as desperate as the Confederacy, the government felt less of a need to rely on risky, experimental new weapons, and most projects did not get approved. Those that did often did not make it past the planning or early construction phases. In addition, working with eccentric inventors like Brutus de Villeroi often proved to be more trouble than it was worth. Still, as described in this paper, a number of projects were approved, most notably the USS *Alligator*, which will forever hold the distinction of being the U.S. Navy's first submarine.

Overall, the submarines of the Civil War had more of a psychological effect than anything else. They did not turn the tide of the war, but they did capture the imagination. Vessels like the *H. L. Hunley*, the CSS *Saint Patrick*, and the CSS *David* filled their allies with hope and their enemies with dread. They also opened the minds of others to the possibilities of the submarine as a weapon of war. In addition, two innovations in the eighteen-sixties would propel submarine development to its next stage. In France in 1863, the French Navy launched the *Plongeur*, a submarine powered not by hand cranks, but a compressed air engine, one which was capable of working above and below the surface. Though the boat was not exactly the most stable of craft, its engine worked, and further development of engines capable of running underwater would follow, eventually rendering the hand-crank powered submarine obsolete. The second invention was the modern self-propelled torpedo. In 1867, Englishmen Robert Whitehead, working with Captain Giovanni Luppis of the Austro-Hungarian Navy, presented the Whitehead Torpedo, the world's first successful self-propelled torpedo, to the Austro-Hungarian

government. This weapon would ultimately become the weapon of choice for submarines.²⁹⁴ In the decades that followed, work continued on underwater technology, and new and more advanced submarines and underwater weapons were developed. Works of fiction inspired by submarines, like Jules Verne's *20,000 Leagues Under the Sea* would inspire even more innovation. So great was the progress made that an article in the September 1877 issue of *The Galaxy* was titled "Has the Day of Great Navies Passed?". Recalling the work of the Confederates to create underwater weapons and recent advancements, it stated that the "revolution in naval warfare thus foreshadowed is close at hand; indeed, it is not too much to say that...this revolution has already taken place, and that the days of ocean supremacy and of great navies has passed away."²⁹⁵ Though the article mainly focused on the then much more successful torpedo and dismisses the potential of submarines as "chimerical,"²⁹⁶ it is clear that underwater warfare had captured the imagination of the public.

Overall, the records of early submarine warfare and civilian usage are spotty. The number of details known about pre-civil war projects vary, ranging from only brief mention in the records to articles in major papers. The records available on Civil War submarines depend on the side that used them. Despite the fact that the Union had far

294. Harris and Boyne, *Navy Times Book of Submarines*, 97-98, 110.

295. Newton, Isaac. "Has the Day of the Great Navies Passed?" *The Galaxy* 24, no. 3 (September 1877): 293-304.

296. United States. Naval War Records Office. *The War of the Rebellion: a Compilation of the Official Records of the Union and Confederate Navies: Office Memoranda. Series 1 Vol. 6, Atlantic Blockading Squadron 16 July 1861 – 29 October 1861; North Atlantic Blockading Squadron 29 October 1861 – 8 March 1862* (Washington, DC: Government Printing Office, 1897), 392.; R. Hutchinson, *Jane's Submarines: War Beneath the Waves* (New York: Harper Collins Publishers, 2001).

fewer submarine projects, we know far more about them, though the records are fragmentary. The Confederacy had far more projects, but many records were destroyed when the Confederacy was defeated, so we know very little about many projects. It is clear that many records have been lost, but others may yet be found. This subject is an important one which cannot be ignored, and more research is required. Even if records are not available, information could be gleaned from the submarines themselves. The *H. L. Hunley* has already been found and is being thoroughly examined, but there are others still out there waiting to be found. Vessels like the *Marine Cigar*, USS *Alligator*, the James River submarine, the *American Diver*, the CSS *Saint Patrick*, and the Shreveport submarines all lie on the bottom where they sank, waiting to be found, raised, and studied. The wealth of knowledge these vessels could tell us would be invaluable. By recovering these craft, future researchers will be able to shed new light on the age-old mystery of the largely forgotten submarines of eighteenth and early-to-mid nineteenth century America.

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