

A Strategic Analysis of Germany's 1917 Unrestricted Submarine Warfare Campaign

Was the German decision to implement unrestricted submarine warfare in January 1917 a good strategic course of action? If not, what better courses of action were available to German leadership?

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14. ABSTRACT This essay analyzes Germany's decision to employ unrestricted submarine warfare against British commerce in 1917. After three years of fighting, World War I was a stalemate. Germany's intent was to eliminate Great Britain, tip the balance in favor of the Central Powers, and bring a swift end to the war of attrition. Counterproductively, the campaign drew the United States into the war on the side of the Allies and ultimately led to Germany's defeat. Despite the eventual outcome, this essay will build the case that unrestricted submarine warfare was the best military strategy available to Germany at that time and that the campaign's failure was a product of shortcomings at levels above and out of the armed forces' control.						
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As 1916 drew to an end, both the Allies and the Central Powers had a good understanding of the apparent futility of World War I. The land war was a stalemate despite heavy losses, but both sides' aims were still too far apart to make peaceful resolution a realistic possibility. Germany and Great Britain each recognized the other as the central prop of the opposition, and both felt they were one strategic move from gaining a distinct advantage. The Germans, determined to eliminate the British and set up a head to head fight with the French that they were better suited to win, decided that the time was right to shift their focus from land to sea. In January 1917, they opted to unleash the full potential of unrestricted submarine warfare and suffocate British trade. There was no better alternative course of action available. To borrow from the words of German Admiral Henning von Holtzendorff, unrestricted submarine warfare was more than just "the right means for ending the war successfully. It (was) the only means to reach this goal."¹ The effort very nearly won them the war, and its failure to do so was not a shortcoming of military strategy.

The state of the war in December 1916 should have come as a surprise to no one. World War I had been a long, brutal, and slow march toward stalemate almost from its outset. In a December 1914 memo to Winston Churchill, Maurice Hankey described circumstances that would persist for most of the following years: "Days are required to capture a single line of trenches, the losses are very heavy, and as often as not the enemy recaptures his lost ground on the following day, or is able to render the captured ground untenable."² Days later, Churchill would write that "the war will be ended by exhaustion of nations rather than the victories of armies."³ In the two years of fighting since, neither side had achieved a decisive military victory. There were no doubt political and diplomatic factors at play in the failure to terminate the war, and new technologies

and tactics had made it near impossible for one side to gain a distinct advantage over the other, but the simple fact was that both sides had enormous reserves of population and industrial capacity, while Germany's operational efficiency offset its opponents' economic and financial edge.⁴ However, as 1916 came to a close, a sense of desperation developed for German leadership as the reality of a prolonged war set in. Already exhausted, they determined they would face certain defeat in a war of attrition because Germany had fewer resources.⁵ By whatever means, they needed to bring the war to a swift end.

It would have been most desirable at that point for the two sides to negotiate a peace, but territorial disputes and political differences made an agreeable middle ground impossible. Attempts at diplomacy failed, "essentially because the two sides' aims were too divergent."⁶ Furthermore, thanks to the stalemate, neither side was in a position to compel the other to surrender. Instead, both sides reasonably felt victory was still achievable and to stop pursuing it would make all prior losses in vain. Stevenson summarized the way of thinking best: "It was rather whether to approve the next offensive or explore the latest peace initiative, in the knowledge that the offensive might yield breakthrough and that to negotiate might mean renouncing gains that a relatively small additional effort could bring in reach."⁷ If anything, the Germans recognized that they were in the weaker position, and pursuing non-military means likely would have meant accepting concessions they did not care to make. For Germany to achieve her desired ends, more bloodshed would be necessary. And to tip the balance in her favor, Great Britain had to be eliminated from the war.

As a land power, Germany would be a clear favorite in a heads-up match with France. And despite the budding rivalry with Great Britain that preceded the war, it was France that Alfred von Schlieffen had long considered to be Germany's "bitterest and most dangerous enemy."⁸ But, as

Clausewitz advised, one of the most effective means of defeating an enemy is by delivering “an effective blow against his principal ally if that ally is more powerful than he.”⁹ Great Britain was the financier and armorer of the allies.¹⁰ Also, the British were solely responsible for the blockade that was restricting German trade and starving its people. Admiral von Holtzendorff, citing the need for a quick victory, since fighting to exhaustion would end “disastrously” for the Germans, rightfully zeroed in on Great Britain as the crutch keeping France and Italy in the war: “If we were to break England’s backbone, then the war would be immediately decided in our favor.”¹¹ The Germans had largely focused on each ally successively, marching deep into Russia in 1915 and concentrating most of 1916 in France at the Battle of Verdun, so turning their attention to Great Britain in 1917 was a logical and strategically valid progression.¹² But the island nation was not vulnerable to an attack by land, and the Germans lacked the resources to mount major campaigns on land and sea simultaneously.¹³ The Germans’ most viable military option was to focus the fight in a new arena: the sea.

A naval clash between Germany and Great Britain was, seemingly, an inevitable end to a decade long arms race between the two nations. The Kaiser’s insistence on building up the German High Seas Fleet had led to a rivalry that dominated Anglo-German relations between 1908 and 1912.¹⁴ But a major fleet battle was not the Germans’ intention, even from the outset of the war. They had hoped their fleet would compel Great Britain to take them seriously, whether as a friend or foe, and afford them additional leverage at peace negotiations.¹⁵ When the war began, despite their years long ship-building campaign, Germany was at an 18 to 29 capital ship disadvantage to Great Britain.¹⁶ In short, in a fleet vs. fleet battle, Germany would lose. Instead, their strategy was to avoid major action close to the British coast or in waters beyond the range the High Seas Fleet could steam overnight.¹⁷ The British were no more inclined to risk their fleet in waters that

would have suited the Germans, and were instead content to maintain their distant blockade by closing off the exits from the North Sea.¹⁸ The strategic folly of risking the fleet was proven at the Battle of Jutland. Despite the higher losses inflicted by the Germans, their own losses represented a much higher percentage of their fleet. Immediately after the battle, Great Britain could have sent 24 capital ships to sea while the Germans only had 10 left.¹⁹ As a result, German Admiral Reinhard Scheer rightfully declared that “even the most successful result from a high sea battle will not compel England to make peace,” going on to astutely conclude that victory could “only be looked for by the crushing of English economic life through U-boat action against English commerce.”²⁰

Scheer had correctly identified Great Britain’s greatest vulnerability: her lifeblood, and therefore center of gravity, was foreign trade. Between 1870 and 1913, the volume of world trade doubled and then doubled again.²¹ Great Britain had enjoyed the lion’s share of this growth. Despite having only 2% of the world’s population, Britain represented a fifth of the world’s commerce, two-fifths of manufacturing, and one third of global merchant shipping.²² While the British economy shifted from an agricultural to a more industrial focus, free trade and imported food products became a necessity to meet the basic needs of the population.²³ By 1914, 60% of all food consumed in England came from overseas.²⁴ Urban centers were especially vulnerable, requiring a steady supply of food due to having no local stockpiles in reserve.²⁵ In August 1915, Dr. Hermann Levy keyed in on a commodity that could be particularly problematic for the British economy. Rising grain prices in England were indicative of existing supply difficulties; if the Germans could attack and cut off wheat imports when domestic stocks were already depleted, the economic fallout, panic, and shortage would be enough to knock Great Britain out of the war.²⁶ Summer 1916 presented the perfect opportunity for the Germans to exploit this dependence, as global harvests were poor and imports would have to come from increased distances to meet

British needs—but the campaign would have to begin no later than February 1917 in order to ensure British collapse before the new year's harvest could save them.²⁷ They just needed to identify the right means to carry out such a campaign. With the High Seas Fleet confined to port, U-boats remained the best, and only, option to inflict the damage on British trade that would be required to bring her to her knees.

Similar to their surface fleet, the German U-boat inventory entered World War I at a number disadvantage. In 1914, they only had 28 U-boats compared to 55 submarines for Great Britain and 77 for France.²⁸ By the end of January 1915, only 21 U-boats were still available, and eight were obsolete.²⁹ Despite being small in numbers, earlier submarine warfare campaigns had proven the feasibility of Scheer's proposed strategy. For instance, from June to September 1915, German U-boats had inflicted damage on British trade "so high that but for the spreading of risks through the State Insurance Scheme, the losses would have been so onerous to the individual owners and merchants that trade might have been paralyzed."³⁰ British vulnerability was by no means limited to their merchant fleet. Prior to the war, they had recognized the threat of submarines as an offensive weapon, but took no consequential countermeasures. Conventional wisdom in both Great Britain and Germany had pigeonholed submarines as mere coastal defense vessels.³¹ Germany took advantage of this shortcoming and proved the validity of the threat when a single U-boat sank three British armored cruisers in September 1914.³² U-boats had also demonstrated their capacity as a force multiplier. During one week in September 1916, three U-boats were known to be operating off the British coast. 572 British anti-submarine vessels plus aircraft combed the waters in that area, but the three U-boats still left unscathed after sinking 30 ships and causing immeasurable disruption.³³ Aside from diplomatic concerns, the only thing holding back Germany's success in prior submarine warfare campaigns was the number of boats at their

disposal. They had been the last of the major powers to develop submarines, but this delay allowed them to benefit from the trial and error of their counterparts and eventually build better ships at a faster rate.³⁴ By March 1916, their submarine fleet was up to 52 operational U-boats³⁵, a number that would nearly double in time for their final submarine warfare campaign commencing in January 1917, when 103 U-boats were available out of 148 total.³⁶ Numbers would no longer be a limiting factor for the German U-boat strategy, but tactical limitations could be unless they made a commitment to unrestricted submarine warfare.

It is obvious to navies of today that a submarine's greatest asset is its stealth. In the World War I era, though, the element of surprise was not so much a strength as a necessity. Submarines of that era were easily evaded if warships exercised basic precautions such as steering a zig-zag course and maintaining a reasonable speed; submarines had to submerge to attack, which limited their speed to no more than half what a warship could do.³⁷ Against merchant shipping, the laws of war classified submarines no differently than conventional surface ships. They were expected to surface, announce their intention to sink a vessel, and then allow the crew time to abandon ship before firing.³⁸ These operational restrictions were not conducive to the quick victory that Germany required. Despite the success from 1915-1916 of a U-boat fleet that had grown nearly fourfold since the beginning of the war, the British merchant fleet was still 94% of its original size. Even if the Germans doubled the size of their U-boat fleet again and the British exercised no new countermeasures, it still would have taken at least two years to achieve victory through restricted submarine warfare alone.³⁹ And an assumption that Great Britain would not adapt was unfounded, as they had already employed several deceptive tactics to take advantage of submarine restrictions. Merchant ships were increasingly armed, making a surface approach hazardous to the submarine crew.⁴⁰ The British also set to sea flying neutral flags to deter attacks, or with heavily armed Q-

ships disguised to look like merchants and bait an approaching U-boat to its demise.⁴¹ If nothing else, a pivot to unrestricted submarine warfare was a necessary adaptation for self-preservation. Conveniently, the timing was also ideal to make the change from a strategic perspective. Admiral von Holtzendorff declared that “from a military standpoint it is irresponsible not to use the submarine weapon even now,” adding that the war could be won within five months, but only if real unrestricted warfare was employed, not cruiser warfare.⁴²

Germany and her allies could not stomach another year of war. Multiple factors played into their time constraints. In addition to their own exhaustion, depleted resources, and racing the new year’s wheat harvest, declaring unrestricted submarine warfare was sure to draw the Americans into the war. Victory had to be achieved before the US could make a decisive contribution. The Admiralty assured that unrestricted submarine warfare could deliver the quick victory they desperately needed, and the strategy appeared to start off on track. The first 6 months of the campaign matched forecasts, averaging 643,000 tons sunk per month⁴³, including a staggering 860,334 tons in April.⁴⁴ U-boat losses were also fairly minimal. They only lost nine submarines from February through April, and two had hit their own mines rather than British countermeasures.⁴⁵ The campaign’s effect on shipping traffic was astounding. 1,149 ships had entered British ports in February and March 1916. In the same period of 1917, fewer than 300 entered.⁴⁶ Furthermore, prior to the summer harvest, Great Britain, France, and Italy only had 3-4 weeks of wheat left in reserve.⁴⁷ British Admiralty felt the tide turning, and had no solution in sight. Although von Holtzendorff’s initial 5 months to victory promise was proven false, by April 1917 both German and British high commands were projecting that Britain would be unable to continue the fight past October.⁴⁸ To defeat the Germans and protect shipping, the British had to enact a more effective convoy system, but half of their destroyer force was already employed in

defense of the Grand Fleet.⁴⁹ The British absolutely would have had to submit as a result of the 1917 unrestricted submarine warfare campaign, thus tipping the balance of the war, were it not for American intervention, most immediately in support of convoy operations.

The United States joining the war, of course, had been Germany's greatest risk. Chancellor Bethmann Hollweg worried war weariness on both sides was the only hope for peace, which would be impossible if the United States joined the Allies to stiffen their resistance.⁵⁰ The US already had an enormous monetary incentive to join the Entente—financial markets and even average American investors could have faced bankruptcy with an Allied defeat.⁵¹ Another unrestricted submarine warfare campaign was sure to prompt their entry, especially considering Germany had been pressured to restrict attacks on neutral shipping during its first U-boat campaign after the United States threatened “strict accountability” if any American ships or lives were lost.⁵² As predicted, as a result of the 1917 U-boat campaign, the United States ended diplomatic relations with Germany in February, President Woodrow Wilson announced his decision to enter the war in April, and the US Navy began providing convoy support in May.⁵³ High shipping losses continued, but never to the level of April 1917 when both sides were projecting a British collapse.⁵⁴ Convoys' effectiveness was without debate. Of the 95,000 ships convoyed during the war, only 393 were lost.⁵⁵

American intervention undoubtedly caused the unrestricted submarine warfare strategy to fail and turned what was shaping to be a sure German victory into their eventual downfall. So why would the Germans knowingly pursue such an apparently self-defeating strategy? Stevenson goes so far as to contend that, had Germany not launched unrestricted submarine warfare, “the US would have stayed out of the war, the Russian Revolution would have happened anyway, and a bankrupt and demoralized Britain and France would have had little alternative to accepting very

unfavourable terms indeed.”⁵⁶ But recommending such a passive course of action ignores the suffering that the German people were experiencing and their desperate need to bring the war to a swift end. British economic pressure on Germany had reached its maximum effect by 1917. Altogether, the official British history of the war attributed 772,736 German civilian deaths to the Royal Navy’s blockade, a sum comparable to Great Britain’s total military losses.⁵⁷ Lambert states that “Britain’s plan for economic warfare may well have been the first in history to seek victory by deliberately targeting the enemy society rather than the enemy state.”⁵⁸

Furthermore, German leadership deserves some credit for taking a calculated risk regarding American and other neutral nations’ participation, especially after many of their presumptions were proven to be correct. There was some expectation that Holland and Denmark could enter the fray if their shipping was attacked, but a successful conclusion to the Romanian campaign had freed enough German troops and resources to counter this threat.⁵⁹ As for the United States, General Erich Ludendorff projected that they could not place a major army on the continent of Europe until 1919, which matched America’s own assumption.⁶⁰ As it happened, it took more than a year for American troops to begin arriving in France en masse, so Ludendorff largely got that right. President Wilson’s insistence on neutrality had prevented the military from developing detailed plans to enter the war, and what little they did have was centered on fleet engagement and surface control rather than a U-boat threat.⁶¹ America’s lack of preparation to respond quickly gave the Germans the window they thought they needed to eliminate Great Britain from the war, after which the United States would represent little, if any, threat.

However, the campaign’s failure demonstrates that there were obviously some calculations that the Germans got wrong as well. For starters, they had assumed that neutral freight would be scared away by the U-boat campaign. But despite the fact that chances of a safe round trip from

the British Isles to a port beyond Gibraltar were only 1 in 4,⁶² London's control of the insurance market ensured that trade continued to Great Britain.⁶³ Instead, shipping declined to neutral nations where it could be re-exported to Germany and the Central Powers. In effect, the Germans had only served to tighten the British blockade.⁶⁴ It could also be argued that German leadership was overly optimistic about the impact sinking 4 million out of Great Britain's 20-million-ton merchant fleet could have on the British economy and general public.⁶⁵ Without question, some inflated numbers and fuzzy math were involved in that conclusion. By July 1917, German politician Matthias Erzberger declared during a debate on war strategy that "all our calculations as regards the submarine war are false."⁶⁶ But the simple fact remains that, three months prior to Erzberger's comment, unrestricted submarine warfare was delivering as promised and victory would have been Germany's within the year if the United States had not come to the rescue.

Offer faults the "intuitive reasoning" and "excessive confidence...in their own prospects and judgement" of German military leaders, who he claims are "especially prone to this kind of delusion", for the strategy's failure.⁶⁷ He also blames military men for defaulting to a military strategy. While there may be some truth to the former, there should be no culpability for the latter. Even when the unrestricted submarine warfare campaign was meeting projections, it was still not on track to achieve victory within the timeline promised at its outset. As a result, even a delayed American response became more likely to derail the plan. When recommending the unrestricted submarine warfare strategy, von Holtzendorff noted that "war with America is such a serious matter that everything must be done to avoid it," but cautioned that "aversion to this break must not lead us to shrink from using, in the decisive moment, the weapon that promises us victory."⁶⁸ In hindsight, this statement captures a key point. The German's fatal flaw was diplomatic, not military. Unrestricted submarine warfare was the best military strategy available to them at the

time, but they failed to adequately pursue diplomatic measures that could have increased its probability of success by delaying or minimizing the effects of war with the United States. In short, they failed to secure a reliable ally.

The idea of Germany striking an alliance to hinder the American response is not a novel one. In fact, it is something they pursued, but poorly executed. In early 1917, the Zimmermann Telegram revealed Germany's hopes of partnering with Mexico in the event of war with the United States.⁶⁹ They tried to entice Mexico with the opportunity to invade and reclaim Texas. But even if Mexico had agreed to the alliance, it would not have benefited the Germans in the way they needed. While a conflict at the Mexican border could have occupied American army resources, the US Navy would have been virtually unimpeded in its ability to provide convoy support in the Atlantic. The Germans needed an ally with a strong navy to tie up American arms at sea, and their answer was also hinted at in the Zimmermann Telegram. Striking an alliance with Japan could have won them the war.

Japan and Germany would have been a perfect marriage if not for the clear complication that Japan had declared war on Germany in August 1914 and promptly seized from them Tsingtao and several other Pacific islands north of the equator.⁷⁰ Tokyo and London had also struck an Anglo-Japanese alliance in 1911, although the relationship had grown increasingly tenuous as Great Britain realized their Far East and Pacific interests were almost solely at the discretion of Japan, and Japanese imperial aims had become more and more apparent.⁷¹ As for those immediate aims, Japan had entered the war with no intentions of joining the fight in Europe, and instead intended to pursue claims to new territories in China.⁷² China would eventually declare war on Germany as well to ensure themselves a seat at the peace conference, putting them on the same side of the fray as Japan, their more apparent enemy.⁷³ Meanwhile, Japan's greatest real threat

was a coming struggle with the United States.⁷⁴ The US had first aroused Japanese concern when they annexed the Hawaiian Islands in 1898 and then even more the following year after defeating Spain and taking possession of the Philippines.⁷⁵ With a new hypothetical enemy in mind, Japan embarked on an aggressive naval construction campaign following the Russo-Japanese War in an effort to keep pace with the United States.⁷⁶

Although the war in Europe had been gridlocked for years, the landscape in the Pacific had changed enough since Japan's initial war declaration that timing was perfect to make amends with Germany and take advantage of each other's support. Although their ongoing Revolution surely played a role in Russia's decision to sign the Treaty of Brest-Litovsk in March 1918,⁷⁷ it demonstrates that negotiation between the Central Powers and individual enemy states was not beyond the pale. German diplomats should have pursued alliance with Japan more directly and aggressively prior to and in the early stages of the unrestricted submarine warfare campaign in order to ensure the victory its military leadership said they could deliver. If Germany had anything else left to lose in the Pacific, those concessions would be small compared to what they faced in Europe (and certainly compared to those eventually imposed by the Treaty of Versailles), so there was no military reason for Japan and Germany to remain in opposition. The prospect of engaging the United States in a two-ocean conflict would have been mutually beneficial to both nation's strategic aims. As it happened, having no concern in the Pacific, the United States sent a portion of its fleet to the Atlantic to support the British effort.⁷⁸ Just having a threat of Japanese belligerence would have kept the Pacific fleet home and increased the probability of success from the unrestricted submarine warfare campaign. Had they switched sides to ensure the 1917 U-boat campaign was successful, Japan still would have come out of the war on the winning side, but this time without the Old European order dictating the terms of peace and impeding their post-war

plans in China or throughout the Pacific. And on the other side of the world, Germany would have had control of almost the entire continent.

Going into 1917, it was imperative that Germany bring World War I to a close by any means necessary. The land war was at a standstill, while at sea the British blockade was starving Germany's people and trapping the High Seas Fleet in port. Although victory was in reach for both sides, Germany, with her relative lack of resources, had less time to spare than the Allies. A military strategy that could deliver a quick victory by hitting their strongest opposition in her most vulnerable area was key. Great Britain was the best strategic target, and overseas trade was her most critical vulnerability. In 1917, all the stars had aligned for Germany to renew unrestricted submarine warfare operations. Their U-boat fleet had already shown proof of concept earlier in the war, and was finally built up to a scale that could deliver a decisive result. The only thing that could hold them back was operational restrictions. Although deviating from the established laws of war was a risk, it was a calculated one, and one that was on track to pay off until the United States—predictably—intervened. But American intervention did not represent a failure of German military strategy. It was a failure of German statesmanship, and, for that, unrestricted submarine warfare cannot be blamed. However, if Germany had taken diplomatic measures necessary to delay or prevent American involvement, their chosen military strategy could have changed the course of the war—and world history.

¹ “The Holtzendorff Memorandum on Unrestricted Submarine Warfare”, 4.

² “Lieutenant-Colonel Hankey: memorandum”, Gilbert, 337.

³ “Winston S. Churchill to H.H. Asquith”, Gilbert, 347.

⁴ Stevenson, “1918 Revisited”, 110

⁵ Offer, 359.

⁶ Stevenson, “1918 Revisited”, 110.

⁷ Stevenson, “The Failure of Peace by Negotiation 1917”, 66.

⁸ Kagan, 146.

⁹ Clausewitz, 596.

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- ¹⁰ Strachan, 201.
¹¹ “The Holtzendorff Memorandum on Unrestricted Submarine Warfare”, 1.
¹² Stevenson, “1918 Revisited”, 111.
¹³ Strachan, 292.
¹⁴ Kagan, 155.
¹⁵ Strachan, 203.
¹⁶ Strachan, 203.
¹⁷ Halpern, 287.
¹⁸ Halpern, 287.
¹⁹ Halpern, 327.
²⁰ Halpern, 329.
²¹ Lambert, 78.
²² Kagan, 90.
²³ Kagan, 91.
²⁴ Strachan, 214.
²⁵ Lambert, 80.
²⁶ Offer, 356-357.
²⁷ Offer, 359.
²⁸ Strachan, 209.
²⁹ Offer, 355.
³⁰ Halpern, 303.
³¹ Kennedy, 244.
³² Kennedy, 245.
³³ Baer, 68.
³⁴ Strachan, 209.
³⁵ Halpern, 306.
³⁶ Halpern, 336.
³⁷ Strachan, 209.
³⁸ Strachan, 222.
³⁹ Halpern, 336.
⁴⁰ Offer, 364.
⁴¹ Strachan, 222.
⁴² “The Holtzendorff Memorandum on Unrestricted Submarine Warfare”, 2.
⁴³ Offer, 358.
⁴⁴ Halpern, 341.
⁴⁵ Halpern, 341.
⁴⁶ Baer, 67.
⁴⁷ Baer, 67.
⁴⁸ Baer, 69.
⁴⁹ Baer, 69.
⁵⁰ Offer, 361.
⁵¹ Strachan, 228.
⁵² Halpern, 295.
⁵³ Strachan, 227.
⁵⁴ Baer, 77.
⁵⁵ Baer, 76.
⁵⁶ Stevenson, “1918 Revisited”, 130.
⁵⁷ Strachan, 215.
⁵⁸ Lambert, 77.
⁵⁹ Halpern, 337.
⁶⁰ Strachan, 228.
⁶¹ Baer, 66-67.
⁶² Halpern, 341.
⁶³ Strachan, 292.
⁶⁴ Strachan, 292.
⁶⁵ Offer, 359-360.

⁶⁶ Strachan, 273.

⁶⁷ Offer, 363.

⁶⁸ “The Holtzendorff Memorandum on Unrestricted Submarine Warfare”, 4.

⁶⁹ Strachan, 227.

⁷⁰ Strachan, 72-75.

⁷¹ Kennedy, 221 & 261.

⁷² Strachan, 74.

⁷³ Strachan, 75.

⁷⁴ Strachan, 75.

⁷⁵ Warner & Warner, 135.

⁷⁶ Evans & Peattie, 151.

⁷⁷ Strachan, 269.

⁷⁸ Baer, 76.

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