

Willis Joe Cato, II. UNDERSEA SAMURAI: IMPERIAL JAPANESE NAVY
SUBMARINE DOCTRINE AND OPERATIONS OF THE SECOND WORLD WAR.
(Under the direction of Dr. Michael Palmer) Department of History, April 2003.

The purpose of this thesis is to examine the development of doctrine and design of the Imperial Japanese Navy's submarine force and its operations during the Second World War. Despite arguably superior designs and demonstrably better weapons, Japanese submarines destroyed a far smaller tonnage of enemy shipping than those of the United States or Germany. The primary aim of this work is to examine the reason for this apparent inconsistency between possibilities and performance.

The key to understanding this disparity between capability and performance lies in the doctrine developed by the Imperial Navy for a conflict with the United States. Based on the experiences of the Imperial Navy in its wars with China and Russia, this doctrine reflected the correlation of forces between the Imperial Navy and its primary opponent. Japanese naval planning called for the destruction of American naval strength in a climactic gun duel between battleships – a belief firmly embraced by the other major navies of the day. Japanese strategy called for light forces, particularly submarines, to play a key role in detecting, tracking, and weakening the American fleet so that the battleships of the Imperial Fleet would be able to engage at the most favorable opportunity. The preservation of its battleships for the decisive battle was the primary goal of Japanese doctrine. Every other element of the Imperial Navy was secondary to this requirement.

The submarine force of the Imperial Navy fell far short of the hopes held out for it by the Imperial General Staff and the submariners themselves. The war never developed

along the lines presumed by Japanese planners and the efforts made to adjust doctrine to the reality of the situation were half-hearted and unsuccessful. Japanese submarines found themselves overwhelmed by the need to serve the over-riding demands of the battle fleet. Operating against an American force that had immense advantages in numbers, technology, and growing experience from defeating the U-boat menace in the Atlantic, the submarines of the Imperial Navy never achieved their potential.

UNDERSEA SAMURAI:
IMPERIAL JAPANESE NAVY SUBMARINE DOCTRINE AND OPERATIONS OF
THE SECOND WORLD WAR

A Thesis Presented to the Faculty of the Department of History

In Partial Fulfillment of the Requirements for the Degree
Master of Arts in Maritime History and Underwater Archaeology

by

Willis Joe Cato II

2003

Dedication

This paper is dedicated to my parents, Paul and Sally, for never quite giving up on me.

Table of Contents

Naming Conventions	iv
Introduction	1
Developing a Doctrine: Historical Influences on Japanese Submarine Doctrine	5
Between the Wars: Disarmament, Submarines and War Planning	16
Imperial Japanese Navy Submarine Design and Doctrine Between the Wars	29
Testing the Doctrine: Developments in the Japanese Submarine Arm, 1937-1941	35
Japanese Submarine Operations in the First Phase of the	40
Japanese Submarine Operations in the Second Phase of the War	60
Japanese Submarine Operations in the Solomon Islands Campaign	84
The Beginning of the End	101
Ultra and the Submarine War in the Pacific	114
Conclusion	123
Endnotes	134
References	140

Naming Conventions

Given the confusion often attached to the transliteration of Japanese proper names and military nomenclatures the following conventions are used:

Japanese proper names are given in their original order with the family name first and then the given name.

Military ranks are given as their United States Navy equivalent with standard abbreviations.

The term "Imperial Navy" in the text refers to the Imperial Japanese Navy in all cases.

By tradition all submarines (even today) are referred to as *boats* without regard to their tonnage or size. This is due to their original nomenclature as *submersible torpedo boats*.

The common term used by Allied sources for all Japanese submarines was *I-boat*; much like the U-boat title attached to German submarines. *I* is the romanization of the first letter of the traditional Japanese alphabet, *Ro* the romanization of the second, and *Ha* the romanization of the third. The Imperial Japanese Navy submarines used these designations to denote first, second, and third class submarines.

The Imperial Navy carried out a mass renumbering of its first class submarines on 20 May, 1942 by adding a "1" to the beginning of submarines *I-21* through *I-24* and *I-52* through *I-75* changing *-75* to *I-175*, etc.

The Japanese used the term "Special Attack Forces" to refer to their midget submarines during the war. Although this term was also used by the Japanese for the suicide forces used during the war's final phase, the midget submarines were not regarded as "suicide" units and considerable, though uniformly unsuccessful, efforts were made to retrieve the little boats after their missions.

Japan used its numbered fleets as type commands rather than tactical units. First Fleet was made up of the battleships of the Imperial Navy, Second Fleet (Scouting Fleet) was the heavy cruisers, Third Fleet contained the aircraft carriers, and Sixth Fleet was the submarine type command. The Fourth and Fifth Fleets were geographic commands tasked with defense of the South Pacific and North Pacific respectively. These individual fleets were subordinated to the Combined Fleet for wartime operations while the numbered fleet commands dealt primarily with training and logistics issues.

Introduction

The conventional wisdom of the naval community holds that the Imperial Japanese Navy was criminally negligent in its use of undersea forces during the Second World War. A cursory glance at the evidence validate this theory. At the beginning of the war, Japan's submarine arm was nearly the same size as the undersea forces that the United States deployed to the Pacific. The Japanese submarine force was far larger than Nazi Germany's *U-waffe* when it began its war more than two years earlier. Moreover the Imperial Navy had a far more lethal and reliable torpedo than either the American or German navies. Yet by the end of the war the Imperial Japanese submarine force had accounted for less than one million tons of Allied shipping. This number seems formidable until it is compared with the five million tons sunk by American submarine forces during the same period. It was an apparently lethargic performance when compared with the fourteen million tons of Allied shipping destroyed by the German *U-waffe* during the war.

Another damning indictment of the Japanese submarine force is that it failed in its chosen mission. The expected effectiveness of the submarine against large surface combatants had been grossly overestimated. The submarine force was on the losing side of the war and proved incapable of checking the tide of Allied victories in the Pacific. Respected historians such as Clay Blair in his work Silent Victory and Samuel Elliot

Morrison in his opus on United States Navy operations during the Second World War condemn the Imperial Japanese Navy's use of submarines as a failure.

But did the Japanese submarine force, in fact, fail? The clues to the answer lie in Japanese failures at the strategic rather than the operational level. The problem lay not with the Imperial Navy's submarines, tactics, or doctrine, but with overall Japanese strategy, namely a failure to have any concrete policy to terminate the war quickly on their own terms.

Japanese planning and doctrine were developed around the strategic concept of a short and decisive conflict. One look at the vastly expanded American naval building program proposed by the Vinson Naval Act* in the United States Congress demonstrated to even the most hardened samurai that war must be started before 1943 and that it could not be allowed to drag on interminably. Japan's decision to attack the United States was not a single roll of the dice but a series of gambles, each more daring than the last. The Japanese Imperial Navy has been castigated by historians, and even its own officers, for failing to ruthlessly prosecute its advantages early in the war and for its incredibly poor

* The American Naval Expansion Acts of 1940 pushed through Congress by Sen. Carl Vinson made the stakes of the upcoming conflict clear to Japanese leaders. The first Naval Expansion Act was passed on 14 June 1940 and provided for an increase in authorized naval construction by 167,000 tons of carriers, cruisers, and submarines. The second Act was passed little more than a month later on 19 July. It called for an increase of more than 1,325,000 tons of naval shipping in all categories and formed the basis of most US naval construction during the war. The end result of these programs would be more than 100 aircraft carriers, 8 battleships, 48 cruisers, 300 subs and nearly 1000 destroyers and escorts. When compared to Japanese production plans, the Japanese need for a short war was clear. See: [Naval Expansion Act, 14 June 1940](#) and [Naval Expansion Act, 19 July, 1940](#) online - Naval Historical Center, <http://www.history.navy.mil/faqs>.

record of cooperation with the Imperial Army.** However, it did recognize that any war with America and Britain had to be short or victory would quickly become unattainable. This fact must be considered when discussing any aspect of the Pacific War, particularly Japanese naval doctrine. All factors were subordinate to the pursuit of a rapid victory.

Admiral Yamamoto Isoroku, commander of the Imperial Navy's Combined Fleet, warned: "I will run wild for six months or a year, but after that I promise nothing."¹ If Japan did not win the war quickly it would not win at all. Indeed, the American 1st Marine Division landings at Guadalcanal on August 7, 1942, brought the period of Japan's offensive to a halt eight months to the day after the Japanese attack at Pearl Harbor.

This work will focus on Japanese planning and submarine doctrine development before the war and its implementation by the Imperial Navy during the critical first two years of the conflict. The perceived failure of the Japanese submarine arm must be examined with the understanding of the role it was expected to play in overall Japanese strategy. Only by knowing the historical basis of Japanese naval doctrine, the role of the London and Washington Naval Treaties, and by comparing the pre-war planning of the American and Japanese navies can the missions and doctrine of the Japanese submarine force be understood in its proper context.

** See Samuel Eliot Morison's The Rising Sun in the Pacific: 1931- April 1942, and Yokoi Toshiyuki's "Thoughts on Japan's Naval Defeat" and Fuchida Mitsuo "The Air Attack on Pearl Harbor" in The Japanese Navy in World War II: In the Words of Former Japanese Naval Officers.

An examination of the Japanese submarine force during the first two years of the war will show that, in fact, it performed the overall missions for which it was designed and that the Imperial Navy was no more overoptimistic about the performance of its submarine forces than the Allies were of theirs.

Developing a Doctrine: Historical Influences on Japanese Submarine Doctrine

Dr. James Tritten, formerly of the Naval Doctrine Command, posits that all naval doctrine is driven by a mixture of eleven influences: current policy, available resources, current strategy and campaigns, current doctrine, threats, history and lessons learned, strategic culture, fielded and/or emerging technology, geography and demographics, and types of government.² The impact of such influences on the formation of the Imperial Navy's submarine force is evident. The expansionist policy pursued by Imperial Japan in the inter-war years made conflict with the United States and Great Britain far more likely than it had been before the First World War. The emerging technologies of automotive torpedoes, aircraft, and submarines melded with the limitations imposed by geography, demographics, resources, and culture to force Japan away from a doctrine of employing submarines as commerce raiders and toward their use as elements of the battle fleet.

A requirement for understanding the Japanese submarine force during the Second World War is to acknowledge the pre-war influences on Japanese naval doctrine. A large part of the Japanese naval experience was built around its service before the Second World War. Two of the most vital factors were the influence of its Royal Navy heritage and Japanese acceptance of Alfred Thayer Mahan's writings as the basis of its battle doctrine. A final outside influence was the German *U-waffe* during and immediately following World War One. The Japanese submarine force developed its missions and war plans from these roots.

Japanese history led the Imperial Navy to base its doctrine around the concept of a single decisive battle. From its founding with the aid of Britain's Royal Navy to battle experience with China and Russia, the Japanese had drawn the lesson that battle was the deciding factor in naval war. The Imperial Navy was only lightly influenced by the French school of *guerre de course*, or commerce raiding. Commerce raiding and shipping defense were the tools required for long wars of attrition that could best be avoided by seeking a decisive battle and a favorable and rapid end to a conflict on Japanese terms.

The historical experience of the Japanese navy reinforced its preference for a single decisive naval battle to force a successful conclusion to a war. The lessons drawn from Japan's conflicts with China and Tsarist Russia seemed to show that the road to victory against a nominally superior foe was through decisive naval action. In each case, Japan's opponents had far larger military and naval resources, yet they were forced to the negotiating table by Japanese victories at sea.

The Sino-Japanese War was the first campaign waged by modern Japan and it set the pattern the Japanese hoped to emulate in later conflicts. Japan began operations in the manner that she would employ in following wars — a naval attack without bothering with the niceties of a declaration of war. In the case of China, the fighting began when an impetuous Japanese captain launched an attack against Chinese shipping and ended with smashing Japanese naval victories at the battles of the Yalu and Weihaiwei.³ Though the forces employed and losses suffered by the combatants were relatively small, the manner

Japanese history led the Imperial Navy to base its doctrine around the concept of a single decisive battle. From its founding with the aid of Britain's Royal Navy to battle experience with China and Russia, the Japanese had drawn the lesson that battle was the deciding factor in naval war. The Imperial Navy was only lightly influenced by the French school of *guerre de course*, or commerce raiding. Commerce raiding and shipping defense were the tools required for long wars of attrition that could best be avoided by seeking a decisive battle and a favorable and rapid end to a conflict on Japanese terms.

The historical experience of the Japanese navy reinforced its preference for a single decisive naval battle to force a successful conclusion to a war. The lessons drawn from Japan's conflicts with China and Tsarist Russia seemed to show that the road to victory against a nominally superior foe was through decisive naval action. In each case, Japan's opponents had far larger military and naval resources, yet they were forced to the negotiating table by Japanese victories at sea.

The Sino-Japanese War was the first campaign waged by modern Japan and it set the pattern the Japanese hoped to emulate in later conflicts. Japan began operations in the manner that she would employ in following wars — a naval attack without bothering with the niceties of a declaration of war. In the case of China, the fighting began when an impetuous Japanese captain launched an attack against Chinese shipping and ended with smashing Japanese naval victories at the battles of the Yalu and Weihaiwei.³ Though the forces employed and losses suffered by the combatants were relatively small, the manner

of Japanese victory was clear. Through bold naval moves, Japan forced a more powerful enemy to the bargaining table on Japanese terms.

The Russo-Japanese War seemed to prove the validity of Japan's strategic doctrine. Japan's resources and military power were only a fraction of those at the disposal of Tsarist Russia. To all appearances the Japanese were outmatched by Russia as greatly as they would be some forty years later by the United States and conventional wisdom would seem to argue that the outcome of the conflict was just as pre-ordained.

In the wake of its victory over China, the Japanese refined their war fighting doctrine. To the newly established tradition of an attack a declaration of war was added a new tool that many states and navies felt would prove the nemesis of capital ships and large navies — the automotive torpedo. The torpedo was a new and dangerously short-ranged weapon, but it proved to be the force multiplier needed by smaller navies to confront larger ones. The Japanese opened the war with Russia with a destroyer-launched torpedo attack on the Russian Pacific Fleet anchorage at Port Arthur. The Imperial Navy suffered heavy losses during its blockade of the Port Arthur, but the siege forced the Russians to attempt a relief expedition. In an epic voyage, The Russian Baltic Fleet steamed around the world in an attempt to relieve Port Arthur but was destroyed by the Japanese fleet at the battle of Tsushima.

The loss of Port Arthur and the destruction of two Russian fleets led the Tsar to seek terms from the Japanese. Unrest at home and the inability to exert decisive pressure

to defeat Japan led Russia to seek an armistice.⁴ The fact that Russia sought terms disguised the fact that Japan was very near the end of her endurance both financially and in terms of manpower. Japan secured her wartime objectives by seizing Korea, but had no way to force Russia to terms. The capture of Korea and parts of Manchuria stretched Japanese resources to the breaking point and it was patently obvious that the Japanese would be unable to march on St. Petersburg or even capture Siberia. It was only domestic problems and the specter of revolution that led to the Russian request for peace talks.

The euphoria over its unexpected victory led Japan to ignore the peculiar circumstances that led to success. Both China and Russia sought an end to the fighting because domestic problems were more dangerous than an unfavorable peace. The young Imperial Navy officers in the post-Tsushima era magnified the narrow Japanese victories in 1905 into an irresistible and inevitable outcome rather than close-run results that nearly bankrupted the nation. Tsushima became a legend in the lore of the Imperial Navy and "proof" that material differences between combatants were less important than the spiritual superiority of the Imperial Army and Navy. Japanese leaders would later apply the same formula to a potential war with America only to discover that their plans and reasoning were fatally flawed.

During the Russo-Japanese War, the Russian armored cruiser squadron based at Vladivostok carried out a bold and generally successful commerce raiding campaign against Japanese shipping, but their efforts were nullified by the outcome of the battle of

Tsushima and the destruction of the remaining major Russian naval forces. The Imperial Navy felt that losses to marauding cruisers must be endured without distracting the main fleet forces, though damage caused by commerce raiding was painful and caused a great outcry in Japan. Indeed, the commanding officer of the Japanese forces tasked with preventing such raids, ADM Kamimura Hikonojo, was vilified, his house stoned by a mob and deliveries of short swords presented to him with suggestions that he commit suicide to atone for his incompetence.⁵ The problems caused by a mere four Russian armored cruisers were rapidly forgotten in the general celebration at the end of the war. Even in the Imperial Navy the lesson taken from the Russian commerce raiding efforts was that losses to commerce raiders should be borne in the short term to ensure destruction of the opposing fleet elements.

Though destroyers delivered the torpedoes at Port Arthur and Tsushima rather than aircraft and submarines, the similarity to the Japanese planning for war with America to that of its war with Russia is not coincidental. Indeed, the entire Japanese plan for a war with America was a re-write of the most famous victory of the Japanese navy. A surprise torpedo attack would destroy American naval forces in the western Pacific. The seizure of the American possessions of Guam and the Philippines would force the American Pacific Fleet to rush to their rescue. This scenario would lead to a second "Tsushima" with the US fleet standing in for the Russians and lead to an American request for peace terms.

The Japanese victory at Tsushima left five lasting legacies for Imperial Japanese Navy's battle doctrine. Each seemed self-evident, but collectively the lessons were dangerously deceptive. First, was the need to preserve the battle fleet for the decisive battle. This centered on the Japanese realization that they would be unable to replace losses during a war with Russia or America. Therefore, the battle fleet must remain concentrated and preserved for the climactic confrontation with the opposing battleline.

The second legacy was the concept of decisive battle fought by battleships. Though the combatants had used and suffered from mines, torpedoes, and commerce raiding, the engagement between the two opposing battlelines determined the outcome of Japan's wars with China and Russia. Other elements of naval warfare were seen as subordinate to the need to bring about a rapid and crushing defeat of the opposing fleet. This belief was certainly not limited to the Japanese, but as it was their annihilating victory over Russia that seemed to prove the effectiveness of a war-ending naval victory, it is no surprise that the Japanese became the leading proponents of a decisive battle.

The third legacy of the Russo-Japanese War was the seeming validity of the concept of an attrition phase before the decisive battle against a numerically superior enemy. Weakening of the Russian Baltic Fleet in its epic cruise around the globe to Tsushima showed the dangers faced by a fleet committed to a long approach before battle. The Russian ships and sailors were literally worn out, without time for training or maintenance. They were totally outclassed by their Japanese opponents, who not only

were operating near their own bases, but who also had the opportunity to rest crews and refit ships prior to the appearance of the Russian fleet.

The fourth lesson from the Russo-Japanese War was a preference for quality over quantity, particularly in ordinance. The Imperial Japanese Navy could only afford so many hulls and was almost certain to be outnumbered in terms of capital ships in any conflict with a major naval power. The Japanese answer to this dilemma was to build units that were individually superior to their opponents. Though the Russian fleet had a numerical superiority, their battleships were, on average, ten years older than their Japanese counterparts with a commensurate reduction in capabilities. The Russian fleet at Tsushima had more than twice the number of heavy guns possessed by the Japanese fleet and, despite their defective training, scored a substantial number of hits on Japanese warships. But the Japanese vessels were faster, armed with more modern, faster firing guns and more effective armor rendering the Russian superiority in heavy guns moot. The superior speed of their ships was a vital factor in the ability of the Japanese to exploit opportunities presented by their better training and articulation.

The final key to victory that the Japanese took from Tsushima was the importance of night torpedo attacks delivered at close range by light units. Despite the insignificant results achieved by torpedo attacks against moving vessels during the conflict, the Japanese understood the potential force multiplier that a surprise torpedo attack represented. Though the submarine did not exist as an effective weapon during the

Russo-Japanese War, the Japanese were not slow to realize the potential of fast, long range submarines substituting for night torpedo attacks by destroyers. It should be pointed out that the Japanese expected the availability of submarines to complement rather than replace the attacks by other light forces on the enemy battle force.

It is a great irony of history that a vital outside influence on the Imperial Navy was the American naval theorist Alfred Thayer Mahan. Around the turn of the twentieth century, Mahan's writings on sea power were a vital weapon in the arsenal of the world's navies in their battles for higher military budgets. The central thesis of Mahan's writings was that naval power was a decisive influence on history and that great powers achieved their status through sea power and the expansion of trade.

Mahan preached the concept of decisive battle as being the only path to true victory. Commerce raiding and fleets in being might force an enemy to spend effort and money to counter them, but could never lead to victory. According to Mahan, only the destruction of the opposing navy or driving it from the sea would allow a nation to use sea power to influence the outcome of a war.⁶

Mahan found willing disciples in the Japanese. The Japanese would remain acolytes of Mahan until the end of the Second World War. The Imperial Navy refused to be diverted into what it perceived as a meaningless war against American commerce when the American fleet had yet to be brought to decisive battle.

The final pre-war influence on Japanese submarine doctrine was the experience of the German *U-waffe* in the First World War. As a British ally, the Japanese were in an excellent position to observe the German U-boat war and judge its effect. They were also influenced by the British Admiralty's dread of the Royal Navy's Grand Fleet running into a U-boat trap and the caution that fear imposed on British admirals during the First World War.

The Japanese did not overlook the fact that the U-boat offensive against commerce failed to bring about an English surrender. The Japanese noted the continual British fleet's fear of steaming into a submarine ambush, though no true dreadnought was lost to a submarine torpedo by any power during the war. It could be said that the Japanese were victims of British success and propaganda. The Japanese saw that both Germany and Britain believed that the submarine was an effective tool for coast defense and was a force multiplier in support of a weaker battleline seeking to redress an unfavorable correlation of forces. The German failure to use submarines consistently as commerce raiders and the British propaganda to disguise the success of the unrestricted warfare campaign led the Japanese to draw the wrong conclusions on the use of submarines during the First World War. In the Japanese view, the Germans had no choice but to use submarines as commerce raiders due to the German surface fleet's inability to challenge the allied fleets for superiority.⁷

Japan's spoils from the First World War increased the German influence on submarine warfare and design. Japan received six German U-boats, including a mine-laying submarine. Japan brought German technicians and builders to the Home Islands under lucrative contracts to help design and build the Imperial Navy's submarine arm.⁸ These boats and technicians brought a wealth of technical knowledge to Japan.

However, it is important not to overestimate German influence on the Japanese submarine arm. The Germans brought to Japan to advise the Imperial Navy were predominantly engineers and naval architects, not submarine commanders or strategists. The Japanese were looking for technical and building expertise, not doctrinal advice. The fact that the Germans tried to use commerce raiding to win the war and failed simply validated Mahan's thesis to the Japanese.

Even the German technical expertise was fast disappearing in the 1920s as the Japanese concluded that the German experience was of limited utility as a model. German submarines had attempted to starve a resource poor island into submission from bases within a few hundred miles of their patrol zones. Japanese submarines would have to operate thousands of miles into the Pacific against their presumed main enemy — the United States. This meant the small, maneuverable coastal boats favored by the Germans would be of little use to Japan. The fact that the United States was largely self-sufficient in resources was another factor that argued against the German commerce raiding model.

There was no prospect of starving the United States into submission as Germany hoped to do to England during the First World War.

The German submarine arm's influence on the Japanese navy was engineering rather than doctrinal. The doctrine that the Japanese took from the German First World War experience was what the British Admiralty had feared rather than what the Germans had done. The Japanese were more impressed by German plans to use submarines as scouts for the battleline and as a force multiplier than by the commerce raiding role eventually assigned them by the German High Seas Fleet.

Between the Wars: Disarmament, Submarines and War Planning

The immediate aftermath of the First World War saw an incredible expansion of world naval power, particularly that of the United States. The American building program begun in 1916 created the most powerful navy in the world. Many capital ships funded under the plan were delayed during the war by the pressing need to produce escort vessels to counter the German submarine campaign. After the war ended, the United States was positioned to complete the numerous battleships and battlecruisers then building and surpass the might of Britain's Royal Navy.

This American power was potential rather than actual, as most of the capital ships were still on the building ways. A vast naval competition loomed as the United Kingdom was not willing to see its traditional dominance of the seas obliterated by burgeoning American production. Japan was preparing to increase its fleet to try to match the American building plan in the vain hope of maintaining parity. The great irony was that the potentially ruinous cost of these building programs would be borne by three nations recently allied in war and with little prospect of fighting a major naval war in the immediate future.

The ruinous cost of the potential arms race led to an American proposal to limit capital ship strength by the means of arms control. In 1922, the major maritime nations signed an arms control treaty in Washington, limiting the number of capital ships each was allowed. While many aspects of the treaty lie outside the scope of this study, some

elements are vital to understanding development of the "Decisive Battle Doctrine" of the Imperial Japanese Navy and the role Japan saw for its submarines.

The most famous aspect of the treaty was the 5:5:3 ratio of capital ships to be maintained among the United States, Britain, and Japan. The treaty allowed Britain to retain twenty-two capital ships equaling 604,450 tons, America retained eighteen capital ships equaling 500,650 tons, and Japan ten ships with a total displacement of 299,700 tons. Individual units could not be replaced for twenty years, at which time the British and American fleets would be at a treaty level of 500,000 tons and the Japanese fleet would be at 300,000.⁹ While it seemed to leave Japan in a position of inferiority, the worldwide responsibilities of the United States Navy and the Royal Navy ensured that Japan's fleet would actually be locally superior in the western Pacific.

The other key measure of the 1922 Washington Treaty was a prohibition on fortifying many Pacific islands. Japan demanded this compromise in return for accepting building limits. The essential point was that the United States could not fortify Guam, Wake, or the Philippines. The Hawaiian Islands were specifically excluded as were Australia, New Zealand, and Singapore.¹⁰ This clause ensured that, in the event of war with Japan, the United States Navy would face a wearing journey from its East Coast bases to the presumed war zone in the western Pacific and would have no secure refuge on its arrival. The combination of building limits and clauses forbidding any fortification

of American or British Pacific bases other than Singapore and Hawaii served Japanese security interests very well.

The Washington Naval Treaty applied only to capital ships, i.e. battleships and battlecruisers. Smaller warships such as cruisers, destroyers, and submarines could be built in any numbers. It was on these smaller combatants that Japan based its plans for the key first phase of its Decisive Battle Doctrine. The Imperial Navy intended that these light units would reduce the strength of the American fleet through constant harassment as it crossed the Pacific before its final climactic battle with the Japanese battleline.

An additional treaty signed in Washington at the same time as the 1922 Naval Treaty addressed submarine warfare. Its first article specifically forbade unrestricted submarine warfare of the type exercised by Germany in the First World War and required submarines to obey the prize laws, disallowing attacks on merchant vessels unless a vessel refused to stop. The treaty's fourth article clearly recognized that this ruling would severely limit the ability of submarines to operate in a commerce-raiding role and would force them to operate as fleet support units. Indeed, the British desired to have submarines abolished completely, a move foiled by other naval powers that saw submarines as an efficient coast defense weapon and tool to limit British naval superiority.¹¹ The treaty demonstrated international revulsion against unrestricted

submarine warfare by dealing with both submarine warfare and "noxious gases," essentially forbidding both and putting them on equal footing in the public eye.

Many naval officers of the signatory nations roundly condemned Washington, but nowhere was the condemnation more vehement than in the Japan. Many in the Imperial Navy considered the imposition of the 5:5:3 formula for capital ships a slap in the face of their naval tradition. Imperial Navy doctrine held that Japan needed a fleet at least 70 percent as strong as that of the United States to be able to defend the western Pacific against an American attack. This was the basis for the famous "eight-eight" building program for the Imperial Navy — the ideal of laying down eight battleships and eight battlecruisers to maintain at least a 70 percent ratio with respect to the United States Navy, which by the 1920s had become the hypothetical enemy for the Japanese Navy.¹² The Washington Treaty destroyed the ability of the Japanese to maintain that ratio with the United States Navy.

Opponents of the Washington Treaty, the so called "Fleet Faction," argued that with the greater building capacity of the United States it was vital Japan maintain as large a fleet as possible to win an early decisive victory before the effect of American industrial advantages could be felt. The Treaty Faction, those officers who supported the Washington Treaty, held that the size of the Japanese fleet was irrelevant, as it was impossible for Japan to maintain even 60 percent of the United States Navy's strength in an unrestricted building race, much less the magic 70 percent figure.¹³

While limitations on capital ships did stabilize the building frenzy on the numbers of battleships and battlecruisers under construction, a new arms race appeared to be gearing up over cruisers and submarines. The major naval powers convened another naval disarmament conference in 1930, this time in London. While in many respects the London Naval Treaty only continued the restrictions imposed by the previous treaty, it did set limits on cruiser and submarine tonnage, as well as limiting the displacement and armament of individual cruiser designs.

The London Treaty had two important effects on potential submarine warfare in the Pacific. It committed an entire article to the employment of submarines as commerce raiders. Part IV, Article 22, of the treaty required submarines to adhere to the same rules of commerce raiding as surface ships. In particular, it required submarines to account for the safety of the crew and passengers and forbade attacks on merchant vessels except in the case of "persistent refusal to stop on being duly summoned."¹⁴

The second feature was American and British acquiescence to a Japanese demand that the Japanese navy be permitted equal tonnage in submarines to that of the Anglo-American navies. Japan's insistence on this condition shows the regard that the Imperial Navy held for the submarine as a force multiplier in any confrontation with the United States. However, the agreement that all three navies would be limited to 52,700 tons infuriated the Imperial Navy General Staff. According to Imperial Navy plans, the treaty tonnage limit would leave the Imperial Fleet two full submarine squadrons, a total of

sixteen boats, short of the level felt necessary for victory in the vital attrition phase of any American offensive.¹⁵

The limitations on cruiser and submarine tonnage were the death knell of Japanese participation in the naval disarmament treaties. For the Japanese Decisive Battle Doctrine, it was the so-called "auxiliary forces," such as cruisers and submarines, that would enable the Imperial Fleet to meet the United States Navy on equal terms. The Imperial Navy quickly built up to its treaty limits and wasted no time in refusing to renew the limitations when the treaties expired in the 1930s.

Nonetheless, the treaty system served Japanese interests well and placed them in a powerful position in the western Pacific. Rather than the 60 percent ratio set by treaty between the Imperial Navy and the American Navy, the Japanese fleet stood at nearly 80 percent of the American fleet in tonnage and numbers. This was due to the simple fact that the Japanese assiduously built up to the treaty maximums while the United States did not.* When the treaty limitations were removed, the United States became far more aware of the dangerous state of its naval strength compared to the Imperial Navy and took steps to build up to, and then surpass the treaty levels. Despite criticisms by many isolationists and some domestic opponents in the wake of the failure the naval treaty system, the United States began to rapidly rebuild its naval strength. The American

* As a quick example of the state of American naval construction between the wars, in the eight year period between 1922 and 1930 Japan laid down 125 naval vessels, France 119, Italy 82, Great Britain 74 and the United States a mere 11, exclusive of river gunboats. For more information see: Congressional Record of July 19, 1930.

Congress appropriated money to expand the navy by 23 percent in 1938 and by 70 percent in 1940 under the Vinson-Walsh Act (the so-called Two Ocean Navy Act).¹⁶ The limitations treaties also forced the Japanese to refine their traditional reliance on quality over quantity and continue to enhance the "Interceptive Operations" proposed as the key to defeating the American Fleet in open battle.

American war plans were coded by colors denoting the nation that was the hypothesized enemy. Orange was the color code for Japan and the Orange Plans became the basis for the American campaign in the Pacific. While they differed from year to year in details and even on major points they all had an element in common. American strategists did not believe the American public would stand for a long, drawn out war. Therefore, the American fleet would seek out and destroy Japanese naval forces in a decisive surface action somewhere in the western Pacific. This American Jutland would occur after a longer or shorter campaign and would lead to a Japanese surrender after a blockade was imposed. This blockade was meant to be imposed by surface forces rather than submarines.¹⁷

Through much of the 1920s and 1930s, submarines did not have the range to operate over the distances that an effective blockade of Japan required. The moral dilemma of a submarine blockade was also in the minds of American strategists. The use of submarines as commerce raiders was severely limited by international law. American planning did not officially allow for the use of submarines as commerce raiders. Indeed

the 1922 Orange Plan noted that submarines would only be used as commerce raiders in retaliation for Orange (Japanese) submarine attacks against American commerce.¹⁸ This remained official policy even after the operational range of submarines increased to allow effective war operations against Japanese SLOCs (sea lines of communication) from American bases in the Eastern Pacific.

Given the stringent restrictions in the naval treaties, official American planning called for using submarines in many of the same roles the Japanese intended for their own boats. American naval doctrine saw reconnaissance for the battle line and hunting enemy fleet elements as the primary roles for submarines. The ability of the submarine to operate in enemy controlled waters seemed to particularly suit them for those tasks. Coast defense was seen as another vital mission submarines could undertake. A combination of submarines and mines caused the British many difficulties during amphibious operations at the Dardenelles during the First World War, sinking or damaging several battleships and transports. American strategists expected the large Asiatic Fleet submarine force to neutralize the threat of Japanese landings in the Philippines because of the apparent impossibility of a major amphibious landing opposed by submarines.¹⁹

Though arguments have been made that the United States always intended to use its submarines in an offensive manner against Japanese merchant shipping, the woeful performance of the American submarine force in the first eighteen months of the war indicated otherwise. The rather dismal showing of the American submarine force shows

that American captains fought the first months of the war in the manner that they had trained – hunting for surface combatants and trying to defend the Philippine coasts. The operations practiced by American submariners in exercises and war games were against fleet targets or in fleet support, including reconnaissance. The fleet problems held by the American navy seemed to echo the dangers that the Japanese detected in their own exercises. Aircraft seemed a great danger even to submerged submarines operating at periscope depth. Early American torpedo attacks were made from depths of up to 100 feet by sound bearing without periscope observation.²⁰ These attacks were safe but incredibly inaccurate. Such tactics seemed prudent from pre-war exercises held by American submariners hunting well-escorted surface task forces but were inefficient methods to hunt merchant ships.

American submarine design between the world wars reflected the uncertainty ascribed by the United States Navy to the role the submarine arm would fill. The term "Fleet boat" given to American submarine designs in the 1930s implied operations with the battle fleet were still the primary purpose of the American undersea arm. The exceptional and effective compromises of American submarine designs showed that boats designed in the late 1930s and serving throughout the Pacific War were incredibly efficient patrol submarines.

As early as 1928, American submariners were campaigning against trying to build submarines with the speed to operate with the battlefleet. CMDR Thomas Winters,

commander of SUBDIV 4, openly challenged the need for submarines to have high surface speed to operate with the fleet. He stated that "preoccupation with this characteristic might adversely impact the habitability and submerged performance of future American submarines" and "more than any other vessel, the submarine's restricted internal spaces ensured that any attempt to increase speed with larger engines would have a profound impact upon other ship characteristics."²¹ American submarine designs sacrificed several knots of surface speed in relation to their Japanese counterparts and carried a lighter gun armament, but gained both agility and a smaller size. This compromise meant that American submarines lacked the speed to operate directly with the battle fleet but became outstanding commerce raiders. After 1928, fewer American naval planners tied the submarine's mission to the surface fleet. Operations against enemy warships and reconnaissance missions began to replace the direct fleet-support role in American submarine doctrine.²²

American strategic planning focused on the need to quickly defeat Japan before war weariness made itself felt in the American public. Though the speed of advance of the American fleet to the western Pacific varied among the different plans, they all called for a final confrontation between the American and Japanese fleets somewhere in the western Pacific. Eventually fifteen American battleships would face their ten Japanese counterparts and destroy them in a classic gun action. According to the commonly accepted "N-Squared Law" the power of a battleline was calculated as the square of the

number of ships and heavy guns that it possessed.* Given the battleship strengths of the two sides, American fleet superiority was apparently insurmountable.

The Imperial Navy could count gun tubes with the same ease as the United States Navy and declined to offer itself up for destruction in the manner called for in the American script. The difficulty faced by the Imperial Navy was how to reduce American superiority to a point where the Japanese fleet could destroy the American fleet in a single decisive battle. The Imperial Navy looked at a variety of passive and active measures it could take to lessen the American advantage in ships and gun power.

The first and most basic element that both the Imperial and American fleets tried to factor into their planning was the extreme distance at which the American fleet would operate to prosecute a war against Japan. Conventional wisdom of naval strategy held that an operating fleet lost 10 percent of its effectiveness for every thousand miles from its base. Both the Japanese and American naval staffs accepted this figure. Though American planning used various measures to reduce the difficulty of operating at such extreme ranges, including pioneering underway replenishment and planning to seize

* This theory was developed by Frederick Lanchester, a distinguished British engineer. Lanchester produced a series of equations which have retrospectively come to be associated with him, but their basic principle may have been known much more widely and much earlier. Lanchester's equations concern the concentration of aimed firepower in ranged combat. His thesis was that any difference in firepower, assuming no difference between the offensive and defensive character of units on either side, would have an ever increasing detrimental effect on the numerically weaker force, resulting in its annihilation with far fewer casualties to the numerically stronger side. This was contrary to what previous linear theory predicted. Linear theory held that 100 units would annihilate 75 similar units at a cost of 75 of their own, leaving 25 survivors. Lanchester's exponential theory predicted the annihilation of the 75 for a cost of 34, leaving 66. See CAPT Wayne Hughes' Fleet Tactics and Edward Miller's War Plan Orange.

Japanese possessions in the mid-Pacific as forward bases, the fact remained that distance was a Japanese advantage.

Distance alone would not reduce the American advantage in numbers to a manageable level. Japanese planning foresaw a phased assault upon the advancing American fleet. The first phase called for rapid destruction of the American Asiatic Fleet to prevent interference with Japanese landings in the Philippines or its joining the advancing American Pacific Fleet. The second stage was based on *Yogeki Sakusen* ("Interceptive Operations") in which the American fleet would be detected as it crossed a series of patrol lines made up of trawlers, submarines, and later, aircraft. Once Japanese forces detected the American fleet, it would be tracked and the next phase would begin the *zengen sakusen* (literally "Progressive Reduction Operations").²³ Harassing attacks and night torpedo actions by Japanese light forces during these operations would reduce the strength and morale of the American battleline. When these attacks had sufficiently weakened the American fleet, the Imperial Combined Fleet would complete its destruction in a classic daylight gunnery duel.

The American navy was as aware of the general nature of the Japanese plans as the Japanese were of the basics of American planning. To counter the threat posed by night torpedo attacks by Japanese light forces, the United States adopted the "ring formation." Officially termed US Fleet Cruising Disposition Number Two, it consisted of four concentric rings of ships ranged 6, 11, 16, and 21 miles from fleet center to protect

the vulnerable battleships and fleet train from torpedo attack. The outermost ring was made up of submarines to warn of an approaching enemy and the inner rings consisted of patrolling destroyers and cruisers to destroy any Japanese light forces before they could launch torpedoes at the battleline.²⁴

The new American formation posed problems for Japanese plans to damage the American battle fleet. It threatened to tie down Japanese light forces and prevent them from accomplishing the vital role assigned them under the Imperial Navy's decisive battle doctrine. It no longer appeared that the Imperial Navy would be able to count on a single night torpedo attack as an immediate prelude to a dawn surface battle. Instead the process of attrition would have to begin earlier in the voyage of the American fleet and be prosecuted over a longer period. Worse, the light surface forces that the Japanese needed to carry out such an attack would be threatened by the new limitations on cruisers contained in the London Naval treaty. These threats set the stage for a dramatic change in the roles envisioned for the Japanese submarine force.

Imperial Japanese Navy Submarine Design and Doctrine Between the Wars

The Imperial Navy created its submarine force during the Russo-Japanese War. The Japanese saw submarines as an early force multiplier in its contest with the forces of Tsarist Russia. The United States Navy commissioned its first *Holland* type submarine only four years previously and the Japanese Navy acquired five of the *Holland* type in 1904. These boats were brought in sections to Yokohama Naval Yard and assembled; the first was completed in August 1905. In 1904, the Kawasaki Dockyard Company purchased blueprints for an improved *Holland* type submarine from John P. Holland and hired two American engineers to help them build the first submarines constructed in Japan.²⁵ Japanese yards completed these two submarines, *Boat #6* and *Boat #7*, in 1906, and these seven submarines provided the foundation of the Imperial Navy's submarine force. These boats formed the first submarine squadron at Kure Naval Base and in 1909 the Imperial Navy assigned its first submarine tender, *Toyorasi*, to the squadron. The *Holland* boats were short-ranged and their extremely poor sea-keeping qualities restricted them to inland waters, but it was with these boats that the Imperial Navy began feeling its way toward a submarine doctrine.

Throughout the early 1920s, the Japanese submarine force had strictly limited and primarily defensive missions. The state of submarine technology and training of Japanese submariners were not advanced enough to allow a more offensive role for the Imperial

Navy's undersea forces. Much like the aircraft of the 1920s, the submarine's ability to operate offensively against an enemy battle fleet war were potential rather than actual.

Three events in the middle of the 1920s changed the mission of the Japanese submarine force from a defensive to an offensive role. The first of these, the creation by the United States Navy of a new sailing formation to protect itself from torpedo attack, forced Japanese planners to reduce their reliance on destroyer torpedo attacks. The Imperial Navy searched for other means to reduce American naval power as it advanced across the Pacific. The other two events involved changes in the Imperial Navy itself.

The first of these involved creation of a permanent submarine school for Imperial Navy officers and sailors. The Japanese navy formed a submarine school based on an old cruiser used as a hulk, but it lacked size and prestige. In July 1924, the submarine school moved to permanent quarters at the Kure Naval Yard.²⁶ This allowed far more continuity in training and the development of a submarine community inside the Imperial Navy, an arrangement that raised the force's professionalism and morale. Creating the submarine school also provided a clearinghouse for new ideas on the missions of the submarine force. Advocates of the submarine force pressed for a much more aggressive doctrine than passively patrolling the expected path of the American fleet to provide early warning of its approach.

The second change was the promotion of RADM Suetsugu Nobumosa as the commanding officer of First Submarine Division. Suetsugu had no experience or training

as a submarine officer but he had studied the World War One German U-boat campaign from his post as a naval observer in London.²⁷ Suetsugu devised a series of new missions for the Imperial Navy's submarine arm that required it to change from defensive to offensive operations, especially reconnaissance, blockading enemy ports, using submarines in fleet actions, and cooperation between aircraft and submarine forces.²⁸

The Imperial Navy set goals for its submarine forces in its 1934 General Battle Instructions. The Imperial Navy's submarines would make repeated "surprise attacks on the enemy main force."²⁹ Except for a few boats attached directly to the Combined Fleet, the boats would be an independent force and operate as squadrons. The battle regulations called for coordinated, close range attacks on the American battle line. The regulations also explicitly ordered submarine commanders not to fire at long range simply to avoid escorting destroyers.

The new missions envisioned for the Imperial Navy's submarine arm required submarines of unprecedented range, speed, and armament. It was long accepted within the Imperial Navy that the American fleet would depart from Pearl Harbor to begin its journey to the western Pacific. A submarine with a range of more than 10,000 miles would be able to reach the Hawaiian Islands and return without refueling. Such range on a boat with a surface speed of twenty knots would easily enable it to shadow the American fleet as it headed toward Japanese waters. These requirements, combined with a heavy

gun and torpedo armament, led the Japanese to design and develop much larger submarines than those of most other navies.

The United States Navy developed two basic types of submarines. The early American "S" boats were small, short-ranged boats intended primarily for coastal defense built in the 1920s and 1930s. The new "Fleet Type" or patrol submarines were introduced to the fleet in the 1930s. American fleet submarines were designed and intended for long patrols and operations in Japanese waters. They sacrificed high surface speed to gain endurance and maneuverability. Though the United States built several different classes of submarines in the years immediately preceding and during World War Two, they all fit the basic pattern of the fleet type patrol submarine.

The Japanese built two basic types of long-range submarine to support their fleet and operate against the American battleline, as well as several types of short-range boats designed primarily for coastal defense. The two types of ocean going submarines were the *Junsen* (*Junyo sensuikan* — large ocean cruising type) and *Kaidai* (*Kaigun-dai* — large fleet type). Both were large submarines, often greater than 2100 tons surface displacement, with extremely long range and high surface speeds.

The first type of submarine was the *junyo sensuikan* type.³⁰ The Imperial Navy intended the *junsen*, or "cruiser," submarines to operate as scouts and perform long-range reconnaissance. For most of the 1930s, maritime search aircraft lacked the range to reach many areas in American controlled waters that were of vital interest to Japanese naval

planners. The *Junsen* submarines were designed to fill that gap in Japanese reconnaissance capability. They combined high speed with great range and carried a reconnaissance aircraft in an internal hanger. However, those very requirements required large size. Their good surface performance was offset by extremely poor underwater maneuverability and long diving times – two things that would make these boats very vulnerable to attack if caught on the surface.³¹

The second element of the Imperial Navy's long-range submarine force was the *Kaidai* or "attack" submarines.³² These were similar in size to the *Junsen* boats but carried a heavier torpedo and gun armament and lacked the floatplane. These were the boats that would operate directly against the American fleet, coordinated by command submarines and guided by the reconnaissance data gathered by the *Junsen* boats. Like the *Junsen* type boats, their surface performance and armament were outstanding. They possessed excellent range, speed and habitability but submerged performance was mediocre.³³ There were several succeeding designs among the *Junsen* and *Kaidai* submarines with marginal changes but the basic design doctrines remained intact.

A third type of long-range submarine was the specially built squadron flag submarine. The Naval Staff considered coordination and timely warning of American naval movements an essential element of Japanese submarine interception operations. This need for coordination was the genesis of the command submarines. These submarines were designed as flagships for submarine squadrons and were intended to

coordinate submarine operations against the advancing American fleet. The Japanese modified some *Jinsen* type submarines with more communications equipment and room for a squadron commander and his staff, as well as a catapult and floatplane for reconnaissance.

For various reasons, the Imperial Navy never put its long-range interception strategy into practice and never launched large scale cooperative attacks in the manner of German or American wolfpacks. The Japanese command submarines were unable to operate in their intended role coordinating massive submarine attacks on the American fleet before the decisive battle. Instead, they performed the same roles as any *Jinsen* type submarine nominally under their command.

Testing the Doctrine: Developments in the Japanese Submarine Arm, 1937-1941

Before the outbreak of war, the Imperial Navy dedicated great efforts to train in the most realistic manner possible, even at the cost of casualties in the rough winter seas of the north Pacific. Nevertheless, it held no major tests of the strategies worked out for the submarine force until the late 1930s. The use of submarines for long range surveillance and attacks against naval forces remained an article of faith in the Imperial Navy. These missions were not tested until a series of exercises held in 1938 examined the ability of submarines to operate in the face of alerted enemy formations.³⁴ It was only then that the submarine arm of the Imperial Navy began to recognize potential flaws in its doctrine.

The use of aircraft as ASW platforms began to make it increasingly difficult for the I-boats to reach their attack positions against alerted task forces. In a series of simulated attacks on fleet units, the submarine force found it far more difficult to gain a close firing position against alerted warships than had been anticipated by Imperial Navy planners. Worse, from a doctrinal standpoint, capital ships of the late 1930s were no longer the lumbering behemoths of World War I that the long-range attack strategy had envisioned. World War I dreadnoughts averaged a maximum speed around twenty knots and a fleet speed closer to twelve knots, a pace submarines could easily surpass. Their speed edge would have allowed submarines to track an American formation and race ahead to lie in ambush. However, the speed edge of the submarine disappeared by the late

1930s. American aircraft carriers were a full ten knots faster than the old battleships and even the new fast battleships of the *North Carolina* class could steam at twenty-nine knots — too fast for the submarines to trail.

Efforts to practice surveillance of alerted forces of surface vessels met with no better success. Referees ruled many submarines sighted by aircraft or sunk by destroyers when they made periscope observations or raised their radio masts during exercises. Other boats remained submerged and undetected but missed critical radio instructions. Attempts to practice close blockade and surveillance of ports by submarines gave no better results.³⁵ The unforeseen difficulties involved in these exercises demonstrated the potential flaws in Imperial Navy submarine doctrine. The Navy General Staff and, more importantly, Japanese submariners began to question their tactics and missions.

The Imperial Navy held further exercises in 1939 and 1940 to test the concept of long-range interceptions against an American fleet. The exercises involved one Imperial fleet attacking Micronesia from Japan while a second fleet was to defend Micronesia and acquire, pursue and destroy the attacking "A" fleet.³⁶ As in the earlier exercises, Japanese submarine commanders found that, even with their submarines' high surface speed, it was difficult to maintain contact or gain a firing position. Once again the danger posed by patrolling aircraft was made abundantly clear and the importance of stealth to survival was demonstrated to Japanese submarine commanders. In a separate exercise to test the vulnerability of Japanese shipping to submarine attacks, several Imperial submarines were

assigned to carry out simulated war patrols in the shipping lanes around the Japan. In a five-day exercise, the judges ruled that attacking submarines sank 133 merchant ships.³⁷ The lesson drawn from these exercises was not that Japanese shipping was horribly vulnerable to an aggressive commerce raiding strategy or that Japanese submarines should be used against merchant ships but that submarines were extremely vulnerable to radio direction finders tracking their radio transmissions.

In late 1940, the Naval General Staff reorganized the Imperial Navy into several different fleets, including a fleet command for submarines. The new Sixth Fleet commanded the submarines of the Imperial Navy and continued training for impending hostilities with the United States and Britain. However, the Sixth Fleet had only three of the Imperial Navy's seven submarine squadrons under its direct command. The remaining submarines were attached directly to the Combined, Third, and Fourth Fleets.³⁸ Submarines under the command of these fleets did not train with one another or with the submarines of Sixth Fleet. Instead they carried out separate training preparing for the missions of their parent fleets.

The three submarine squadrons commanded by Sixth Fleet carried out additional exercises to test long-range interception doctrine. The tests confirmed the difficulty of submarines to detect, track, and then gain firing position on fast moving combat fleets. Given the difficulty of maintaining surveillance of distant enemy bases and spotting

warships as they sortied, the officers of the Sixth Fleet pressed for a return to the concept of using submarines in patrol lines to detect and ambush enemy fleets.³⁹

The Sixth Fleet identified a critical problem faced by the Imperial Navy's submarine force in the last major submarine exercise held before the outbreak of war. The Second Submarine Flotilla participated in a series of exercises from February to April 1941 and its report highlighted several unresolved weaknesses and uncovered one previously unrecognized flaw. The report pointed out the continuing risk of discovery by enemy ASW forces and the inadequate speed of submarines to maintain contact with faster surface ships. But the greatest flaw identified in the report was a microcosm of the problems faced by the Imperial Navy as a whole. There were simply too few submarines available to carry out the missions assigned to the Imperial Navy's submarine force. With only three squadrons of submarines available to Sixth Fleet at the beginning of the war, there were insufficient submarines available to carry out patrols off the American West Coast, isolate Hawaii and the Philippines, carry out long-range reconnaissance and the multitude of other tasks assigned to Imperial Navy submarines.

The exercises had also shaken the faith of the Imperial Navy's submarine force in its doctrine of close-range torpedo attacks. The ease with which ASW forces detected the submarines came as a rude shock to the commanders of the Imperial Navy's boats. While the Imperial Navy's submarine captains were still officially wedded to the idea of close range torpedo attacks, the danger involved led some submarine commanders to advocate

longer range attacks to take advantage of the superior range of Japanese torpedoes.⁴⁰ It also explained the reluctance of Imperial Navy submarine commanders to reveal their location by attacking such mundane targets as merchant ships if there was the prospect of finding bigger game.

The Imperial Navy neglected to test many of its submarine doctrines in the decades before the war. Only in the last few years of peace did the Japanese carry out a concerted effort to determine the efficacy of their submarines in their assigned roles as combat units attached to the Imperial Navy's battle fleet. The Imperial Navy showed considerable innovation in its exercises and attempts to coordinate submarines and long-range maritime patrol aircraft, utilize submarines as a strategic reconnaissance platform, and incorporate submarines into their battle fleet. However, the submarine force of the Imperial Navy would enter the war questioning many of the doctrines and tactics that formed the heart of its interception and attrition strategy.

The Imperial Navy's submarine commanders would also have to begin the war much like their American counterparts, without a resolution to the relative value of the mutually exclusive traits of aggressiveness and concealment. The need for concealment over close-range attack seemed clearly demonstrated by the exercises held in the years before the war. Yet close range torpedo attacks remained the official doctrine of the Imperial Navy's submarines. The result was a submarine force constrained by passive tactics emphasizing stealth and aggressive doctrine emphasizing combat effectiveness.

Japanese Submarine Operations in the First Phase of the War

The submarine force of the Imperial Navy was deployed to support Japanese operations from the beginning of the war. Japanese strategy relied on a massive series of initial stunning blows to paralyze its enemies and give Imperial forces the time they needed to seize their objectives without serious resistance. To strike targets across the breadth of the Pacific required a dangerous degree of economy of force inviting defeat in detail; nearly the entire Japanese navy participated in the opening operations. Submarines of the Imperial fleet provided support for most of these operations.

The Japanese saw three powerful elements that could disrupt their timetable. The first was the growing presence of American air power in the Philippines; a force that could only be neutralized by Japanese aircraft operating from Formosa, and later, airfields secured in the Philippines. The second was the presence of Britain's Force Z at Singapore. Though Force Z consisted of only two capital ships, the battleship HMS *Prince of Wales* and battlecruiser HMS *Repulse*, it was a threat to the Combined Fleet's plan to preserve its battlefleet for the decisive battle with the American Pacific Fleet. The third problem for Japanese planning was the United States Navy, in particular the powerful Pacific Fleet. The two groups of surface combatants, Force Z and the American Pacific Fleet, were the targets of the Japanese submarine forces in the early stages of the war. Japanese planning did not envision risking the Combined Fleet's battleships until the decisive battle with the American Fleet. It was expected that local forces, assisted by air

and submarine units, would deal with early offensive efforts by American and British naval units.

By November 1941, the Imperial Navy's submarine force consisted of forty-eight modern first and second class submarines and twelve obsolescent submarines suited only for coastal defense and training. Another eighteen boats were under construction, due to commission during 1942 with eleven more to be finished in 1943. A total of 38 more boats were approved to begin construction after 1942.⁴¹ On December 8, 1941, the Imperial Navy possessed a total of sixty-five commissioned submarines with a combined surface displacement 97,900 tons.⁴²

The role that the Imperial Navy saw for its submarine forces is perhaps best expressed in the Japanese Monograph Series work on Japanese submarines in the early war:

*The United States Fleet in the eastern Pacific was the principal target of submarine operations and the United States, British, and Netherlands Fleet in the Far East were classified as secondary targets. Disruption of enemy commerce on the key sea routes by submarine warfare was to be conducted against the United States, Britain, and the Netherlands. These operations were to be conducted only in such a manner so as not to interfere with the objectives of the main operations.....*⁴³

The allocation of submarines to the squadrons of the Sixth Fleet reflected their capabilities and roles. The 1st, 2nd, and 3rd Submarine Squadrons were the cream of the Imperial Navy's submarine force. They possessed the newest boats and Sixth Fleet directly commanded them. Their mission was the destruction of the United States Pacific Fleet. These submarines would position themselves around Pearl Harbor and the Hawaiian Islands with the objective of destroying the remnants of the American vessels fleeing air attacks on Pearl Harbor by the Carrier Striking Force. After the air attacks, they were to reconnoiter the American West Coast and Hawaii and interdict lines of communication between Hawaii and the American mainland; as well as prepare to launch surprise attacks on American bases. In the event of a counterattack by the American Fleet against the carriers or Japanese positions in the Mandates, Sixth Fleet tasked its submarines with tracking the American forces while the Imperial Fleet prepared for the decisive battle.⁴⁴

Slightly older boats made up the 4th, 5th and 6th Submarine Squadrons. The Combined Fleet commanded the 4th and 5th Squadrons for operations in the Southern Area around British Malaya. The boats of the 6th Submarine Squadron, which included submarines equipped for minelaying, operated around the Philippines and Dutch East Indies. These boats would join the three squadrons attached to Sixth Fleet for interceptive operations in the case of an American naval sortie in the western Pacific.

The Japanese Fourth Fleet had the 7th Submarine Squadron under its command. The Fourth Fleet's mission was homeland defense and patrolling of the South Seas Area in the South Pacific. The 7th had most of the Imperial Navy's remaining submarine strength. Those boats too old to be assigned to active duty squadrons were attached directly to the Kure Naval District and were tasked with training new submarine crews.

The Imperial Navy's submarine force had a series of critical missions to support the carrier strike against the American Pacific Fleet at Pearl Harbor. Its first task would be reconnaissance of the Lahaina anchorage outside Pearl Harbor.⁴⁵ Lahaina Roads was much deeper than Pearl Harbor and was occasionally used by capital ships of the American fleet. Like most open anchorages, it was extremely vulnerable to torpedo and submarine attack and many Japanese planners hoped to find at least some American units anchored there. During the air attacks, submarines were to stand by to retrieve downed aircrews and the submarines of the Special Attack Unit were to launch midget submarines to slip into the harbor and launch additional attacks covered by the confusion of the air raid.

The Hawaiian Operation plans called for the submarines stationed around Hawaii to patrol around Pearl Harbor for an extended period of time if no counter-attacks were launched against the carrier force. Some Imperial Navy officers felt that the submarine attacks would cause more damage than the air strikes given their longer duration and the unproven nature of mass carrier attacks.⁴⁶ The submarines were to reconnoiter Pearl in

the aftermath of the attack and cut communications between the islands and the American mainland.⁴⁷

VADM Mitsuyoshi Shimizu, who flew his flag on the light cruiser *Katori*, had overall command of the Sixth Fleet for the Hawaiian Operation.⁴⁸ Under his command was the majority of the Imperial Navy's frontline submarine force. Combined Fleet tasked a total of twenty-nine submarines with supporting the Pearl Harbor Operation in several different task groups. Two more boats, *I-10* and *I-26*, indirectly supported the operation by performing reconnaissance of the Aleutians and South Pacific islands respectively.

Three boats, *I-19*, *I-21*, and *I-23*, were attached as a Patrol Unit directly to the Carrier Force. They would operate as scouts and plane guards to rescue crews of downed aircraft. These submarines were under the command of ADM Nagumo Chuichi, commander of the carrier strike force. If there was no threat of an American counter-attack, these three boats would be released to the Sixth Fleet and continue operations around Hawaii after the carrier force retired.

The Special Attack Unit consisted of five boats, *I-16*, *I-18*, *I-20*, *I-22*, and *I-24*, carrying midget submarines. The mother ships were to launch their midget submarines the night before the air raid and the midgets would try to slip into the harbor. Many of those associated with the mission were concerned that the small submarines would give away the upcoming attack if they were detected before the air strikes were launched.

Submarine commanders thought that in the confusion of the air attacks the midget submarines stood a good chance to cause additional damage.

The remaining submarines in the Pearl Harbor Operation were disposed in three patrol groups around the Hawaiian Islands. Their mission was to intercept American naval movements and cut communications with the American mainland. A submarine squadron commander onboard a special flag submarine commanded each of the three patrol groups. If the reconnaissance of Lahaina Roads by *I-72* and *I-73* revealed any American fleet elements, the focus of the submarine patrol areas would be shifted from a point centered on Oahu to Lahaina. Additionally, submarines would penetrate the anchorage after the air attacks were concluded and conduct further attacks on surviving American forces.

By December 3rd (Tokyo Time), all submarines attached to the Hawaiian Operation had reached their positions undetected and were gradually closing on Oahu. The two boats reconnoitering the Aleutians and the South Pacific islands reported no heavy American fleet elements except for an *Astoria*-class cruiser spotted by *I-10* off Pago-Pago on 4 December.⁴⁹ By the outbreak of the war, both reconnaissance boats were on station about halfway between Oahu and the American mainland. The submarine reconnaissance of Lahaina revealed no major American units so carriers and submarine forces prepared to carry out their assigned missions.

The Special Attack Unit submarines were in position by 2300 on December 7 (Tokyo time) and released the attached midgets to begin their planned penetration of the harbor. The Japanese credited the midgets with scoring at least some damage and the mother submarines lingered for three days trying to recover survivors. In reality, the midgets achieved no success and nearly forfeited the element of surprise when the American destroyer *USS Ward* engaged and sank one outside the entrance to Pearl Harbor only a few hours before the attack. The other midgets had no better luck and caused no damage.

With completion of the air attack, the Carrier Strike Force withdrew from Hawaiian waters and released its three accompanying submarines to the command of the 1st Submarine Force. On December 9 (Tokyo time), all submarines in the Hawaiian area were placed under command of the Submarine Force.⁵⁰ The 3rd Submarine Force, the patrol line south of Oahu, was moved further south to escape increasingly active American ASW forces. The only warship sighting made in the aftermath of the attack was by *I-6*; which sighted what she reported as a *Lexington* class aircraft carrier and two heavy cruisers proceeding northeast from the Kauai Channel.

Sighting this group offered the Japanese a first chance to test their doctrine of controlled intercepts of American warships by groups of submarines. The 1st Submarine Group and two additional submarines, *I-26* and *I-10*, pursued the American carrier and its escorts.⁵¹ Japanese planning anticipated surviving elements of the American fleet would

withdraw to the presumed safety of the American West Coast and the course of the spotted American carrier seemed to confirm this. In reality, the spotted carrier was *USS Enterprise* on an ASW patrol and no withdrawal of American fleet elements ever took place.⁵²

Sixth Fleet ordered the 1st Submarine Group to pursue the American carrier toward the American West Coast. When contact with the carrier was lost, the boats were ordered to proceed to the American coastline and commence a war patrol along the California coast. Sixth Fleet also instructed the Special Attack Force submarines to abandon the search for their missing midget submarines and return to the base at Kwajalein by December 18th (Tokyo time) to be refitted and prepared for new missions. The 2nd and 3rd Submarine groups were to continue patrolling around Oahu for any further sorties of the American fleet. Sixth Fleet ordered that 3rd Submarine Group return to Kwajalein on 18 December. 2nd Submarine Group patrolled Hawaiian waters until January 1942, when it was replaced by the five boats of the Special Attack Unit which had launched the midget submarines into Pearl Harbor. Though the name was unchanged, the boats of the Special Attack Unit would perform normal war patrols unencumbered by their midgets. These boats patrolled until 20 January, when Sixth Fleet ordered them to return to Japan for refitting.⁵³

On 9 January 1942, while enroute to relieve 2nd Submarine Group, one of the Special Attack Unit boats spotted what was reported as a *Lexington*-class American

carrier near Johnston Island, west of Hawaii. VADM Shimizu Mitsumi, the commander of Sixth Fleet, ordered the 2nd Submarine Group to abandon patrol areas around Hawaii and throw a north-south patrol line around Johnston Island and begin to sweep westward. At 1740 on 11 January, CMDR Inaba Michimune aboard *I-6* spotted an aircraft carrier he identified as *USS Lexington* and fired two torpedoes at her from 4,700 yards away. Explosions were heard and *I-6* was subjected to a heavy depth charging by American destroyers. When *I-6* was finally able to surface five hours later there were no signs of American ships and the carrier was assumed destroyed.⁵⁴ *I-6*'s victim was *USS Saratoga*. She was severely damaged and had to return to the United States for repairs at a crucial time for the United States Navy.* This was the first, and only, time an Imperial Navy submarine patrol line successfully intercepted a target acquired by a submarine sighting although another American carrier would fall prey to an established patrol line later in 1942.

Immediate results of the Hawaiian Operation were highly disappointing to the Japanese submarine community. American carriers sighted by submarine forces proved as elusive as pre-war planning suggested. Postwar Japanese monographs relate that the

* Interestingly, VADM Ugaki remarks on the attack with satisfaction, noting that the submarines have been overshadowed by the successes of the aviation forces. However, in his entry for the next day he expresses his dismay that the carrier was assumed to be sunk since submarines scouting the area did not report any flotsam or destroyers involved in picking up survivors. Only one day after praising the bravery of the submarine officers, Ugaki begins to wonder if perhaps they could be "cooler" in the face of aircraft and depth charges. It is interesting as this attack took place in January 1942; in only the second month of the war, a senior IJN admiral is already expressing fears for the operations of Japan's submarines. This is not the last time that Ugaki berates the IJN's submarine commanders for their apparent lack of bravery or success. See Ugaki's FADING VICTORY.

anti-submarine measures taken by the United States became "very severe" and forced the submarines to spend most of their time submerged.⁵⁵ Imperial Navy submarines attacked no major American fleet units in the waters near Pearl Harbor and the Japanese had little to show for their major effort around Hawaii except for sinking a few scattered merchant ships. Hundreds of American warships, including all four carriers assigned to the Pacific in 1941 and early 1942, sailed into and out of Pearl Harbor without incident.

Perhaps the most effective submarine operations around Hawaii were the completely successful reconnaissance overflights of Pearl Harbor by submarine floatplanes on 17 December and 4 January. These missions gave the Imperial Fleet an excellent idea of the damage caused by the air raid. Before departing their patrol areas, submarines of the 2nd and 3rd Submarine groups conducted bombardments of some Hawaiian Islands. These bombardments caused no damage but gave American analysts a valuable clue to Japanese tactical deployments. The Americans quickly recognized the bombardments as a sign that submarines were leaving a patrol area and this clue aided ASW operations and ship routings.

The Hawaiian Operation cost the Imperial Fleet one submarine when dive-bombers from the aircraft carrier *Enterprise* sank the *I-70* on 10 December. American destroyers damaged another boat in a depth charge attack. Sixth Fleet considered these losses to be light, but they seemed a poor exchange for the handful of small freighters that were sunk and some successful reconnaissance missions. Worst of all, the greatest

weakness of the Imperial Navy's submarine force became apparent almost immediately — the limited number of platforms that it possessed. Twenty-eight boats were deployed for the beginning of the Hawaiian Operation, nearly half of the Imperial Navy's frontline submarine force. It was an impressive number of vessels, but the Imperial Navy was never again able to deploy that many boats with a similar level of training for any single operation. By late January 1942, Sixth Fleet detached the 2nd Submarine Group, the Special Attack Unit, and the two submarines that conducted long-range reconnaissance before the war, *I-10* and *I-21*. These boats returned to Japan to refit and prepare for new missions. This left only the 1st and 3rd Submarine Groups with less than twenty submarines to patrol Hawaii, the American West Coast, the Central Pacific and to keep an eye on the American Pacific Fleet. There were so few boats available for missions that after February 1942 the Japanese were unable to maintain more than an occasional patrol off of Hawaii.

Japanese submarine operations in the central Pacific showed a similar ingenuity of planning and the same miniscule returns. Japanese plans called for the three *RO*-type coastal submarines (*RO-65*, *RO-66*, and *RO-67*) comprising Submarine Division 27 to reconnoiter American defenses on Wake Island. The three boats departed on 6 December (local time) and patrolled the waters around Wake to prevent its reinforcement and conduct reconnaissance.⁵⁶ The first Japanese attempt to storm the island failed in the face of intense US Marine 5-inch gunfire and the Imperial Navy recalled the invasion

force, including the submarines. Two submarines answered the recall, but *RO-66* missed the radio signal ordering its return and remained on station with tragic consequences.

The diversion of two heavy carriers returning from the Pearl Harbor strike and a squadron of four heavy cruisers, as well as the *RO* boats of Submarine Division 26, reinforced the Wake invasion force. The three boats of Submarine Division 26 (*RO-60*, *RO-61*, and *RO-62*) were to maintain the blockade of Wake Island and departed from their base at Kwajalein on 12 December.⁵⁷ Wake Island fell to the second Japanese invasion attempt on 23 December 1941, but the operation cost the Imperial submarine force for little reward. On December 17, the wayward *RO-66* collided with *RO-62* and sank. During the return to Kwajalein after concluding the operation, *RO-60* ran hard aground on a reef outside the harbor and was also lost. The Wake Island operation cost the Imperial Navy two submarines for no compensating gain. The submarines inflicted no damage on American forces and no useful information was gained by their presence.

A similar situation occurred in the operations around the Bismarck Islands. The Japanese moved quickly to seize the fine harbor at Rabaul, New Britain. Five coastal type *RO* boats of Submarine Division 27, made up of the two boats recalled from the first Wake Island invasion, and Submarine Division 33 (*RO-63*, *RO-64*, and *RO-67*), sortied to conduct reconnaissance and patrols in the area in late January 1942. *RO-63* and *RO-68* conducted bombardments of Howland and Baker islands to "destroy the ground

installations."⁵⁸ The boats concluded their patrols and returned to base without incident, suffering and inflicting no losses.

Sixth Fleet released the submarines of the 1st Submarine Group from their patrol lines north of Hawaii and ordered them to pursue an American carrier spotted northeast of Hawaii. The three submarines of the Patrol Unit that accompanied the Japanese carriers and the two submarines that had conducted the reconnaissance of the South Pacific and Aleutians joined them for the pursuit. When contact with the American carrier was lost, Sixth Fleet ordered these nine I-boats to proceed to the West Coast of the United States to patrol for American naval units that might be fleeing Pearl Harbor or moving to reinforce it.

Sixth Fleet assigned all nine boats specific hunting grounds. The zones stretched from Cape Flattery in the north to San Diego, covering the major ports and navigation lanes. Sixth Fleet changed patrol zones of some northern boats when Japanese Naval Intelligence reported an American battleship group transiting the Panama Canal.* Assuming that the American dreadnoughts were heading for ports in Southern California, the submarine squadron commander onboard *I-9* ordered three I-boats south to provide better coverage off Los Angeles, San Diego, and San Francisco.⁵⁹ The new patrol zones brought no better luck for the I-boats and they never spotted the reported American battleships. Sixth Fleet instructed the submarines to return to Kwajalein Atoll by mid-

* This report was accurate. The battleships Idaho and Mississippi were returning to the Pacific fleet.

January. Most boats left the American West Coast in the first few days of 1942 and arrived at Kwajalein between 11 and 15 January.

ADM Misuyoshi, commander of the Sixth Fleet, was determined to strike a blow against American morale. He conceived a grandiose plan for a "general surface bombardment" of key radio stations and naval stations but the boats were recalled before his plan could be put into effect.⁶⁰ The only attack carried out was that of *I-17*. In a bold move, she surfaced and fired around twenty-five shells from her deck gun at the Bankline Oil Company's fields near Santa Barbara in February 1942. Though she only damaged an oil derrick and a pier, the attack caused a brief panic on the American West Coast with widespread reports of signaling between the submarine and flashing lights on shore.⁶¹ RADM Takata Toshitane argued after the war that the attack on the Santa Barbara oil fields was meant to be an attack on a strategic oil facility rather than a terror attack.⁶²

The results of this patrol were meager at best. Although no Japanese submarines were lost and anxiety on the American West Coast reached a fever pitch as a result of the reports of Japanese submarines, little actual damage was inflicted on American shipping. The Japanese official record claims five cargo ships were sunk totaling 34,299 tons with another five ships damaged. Jürgen Rowher's careful examination of records to determine submarine successes for the Axis submarines leads to an even less impressive total. After comparing Japanese claims with American losses, he credits the Japanese with only 40,664 tons sunk throughout the entire Pacific theater in December 1941 with another

47,488 damaged. January and February were even less successful with only three confirmed sinkings for both months, totaling a mere 12,426 tons.

The rapid drop in the rate of sinkings between December 1941 and February 1942 provides another clue to the weakness of the Japanese submarine forces. The decline in successes for Japanese submarines matched the recall and redeployment of a majority of the Imperial fleet's submarines. By February 1942, only a handful of Japanese submarines were at sea as most boats returned to Japan or Kwajalein to refit and prepare for their next mission. The boats deployed on missions were predominantly operating as adjuncts to the fleet to assist the South Seas and Central Pacific Operations with little opportunity to attack Allied shipping.

Japanese plans assigned the 4th, 5th and 6th Submarine Squadrons to forces operating against the newly formed ABDA Command* in the Netherlands East Indies, British Malaya, and the Philippines. These forces had eighteen boats assigned to complete their missions and were divided between the three geographically related but distant objectives. The 4th and 5th Squadrons, with one division of boats from the 6th Submarine Squadron, would operate against the Malay Peninsula while the remaining boats of the 6th Squadron would cover the Philippine invasion. In both cases, the submarines' primary mission was to support landing operations and fleet activities.

* ABDA Command was the short-lived combined American, British, Dutch, Australian headquarters.

Rather than hunting commerce, the submarines were to patrol the invasion areas, lay mines off navigational chokepoints, and act to protect the invasion force.⁶³

I-23 and *I-24*, minelaying submarines of the 9th Submarine Division, operated with the Philippines force. By 8 December 1941, the two boats had laid 40 mines around the entrance to Manila Bay and the Balabac Channel. After seeding the minefields, *I-24* remained near Manila Bay as a weather station and rescue boat for the downed aircrews flying from Formosa. *I-23* successfully laid her mines but returned to base on 10 December due to hull defects.* Only *I-24* had any success, sinking a small cargo ship on 10 December 1941.

The two submarine squadrons attached to the Malaya Invasion Force had more success. The boats included twelve older fleet submarines, two coastal submarines and two minelaying submarines.⁶⁴ These boats were to support the landings in Malaya and lay mines, but their most important mission was to establish picket lines to detect any sortie by the two British capital ships at Singapore that might threaten invasion convoys.⁶⁵ Nine submarines attached to the invasion established two picket lines off the east coast of Malaya. *I-53*, *I-54*, and *I-55* formed a one hundred-mile east-west line off central Malaya while *I-57*, *I-58*, *I-62*, *I-64*, *I-65*, and *I-66* made a two hundred-mile line

* This was a common condition for many Japanese warships. In their efforts to maximize firepower and speed, Imperial Navy ships were lightly built, top heavy, and often poorly welded. The torpedo boat *Tomozuru* capsized in a storm in 1934 with a heavy loss of life. Only a year later, fifty-eight ships temporarily formed as "Fourth Fleet" for the annual Combined Fleet exercises were caught in a typhoon. Nearly every ship was damaged, the cruisers *Myoko* and *Mogami* so badly that they were taken in hand for refits to strengthen their amidships joints. Two destroyers lost their bows and several others had ruptured

one hundred miles north of the first three boats. *I-56* was deployed to conduct weather reconnaissance of the landing areas for the Imperial Army's invasion.⁶⁶

The picket lines proved vital to the success of the Imperial Navy's ability to track and destroy the British capital ships at Singapore. On 9 December 1941 (local time), *I-65* spotted the British battleship *Prince of Wales* and battlecruiser *Repulse* steaming north toward the invasion convoys. Though she lost track of the two ships three hours later, the submarine sounded the alarm. RADM Yoshitomi, commander of Submarine Squadron 4, ordered all submarines in the area to converge and reacquire the British vessels. *I-58* spotted the two ships a few hours later and fired five torpedoes at them. The torpedoes failed to connect but *I-58* surfaced to radio her sighting and gave chase.⁶⁷ Again contact was lost a few hours later, but Japanese air search crews had been given vital clues to focus their searches, as Japanese naval intelligence had placed both ships in Singapore harbor. The next day Japanese land based naval aircraft attacked and sank both British capital ships.

The Japanese boats continued to patrol the waters off Malaya until late December but claimed few sinkings. *I-56* sank a small cargo steamer, *I-66* sank a Dutch submarine, and *I-21* and *I-22* laid mines near Singapore but scored no other successes during the Malaya operation. Despite the lack of success in sinking enemy shipping, the Imperial Navy's submarines performed well in their reconnaissance role. Though they failed to

hull joints and sprung plates. Many Japanese heavy cruisers were taken in hand for refits to increase their

sink any capital ships on their own, submarine warnings enabled the Japanese naval air forces to destroy the British fleet in the Pacific.

The focus of the Pacific War now fell on the East Indies. Japanese planners believed that seizing the abundant Dutch colonial natural resources colonies would make Japan self-sufficient and free her from reliance on American resources. The swift conclusion of the naval portions of the Malaya and Philippines operations led to the organization of the Dutch East Indies Invasion Force. The Imperial Navy recalled submarines from as far away as Pearl Harbor to participate in the invasion. To the Japanese, this area and its resources were the focus of the war. Other attacks launched by Imperial forces early in the war, including the attack on Pearl Harbor and the seizure of the Philippines, would screen the operation to seize these islands.

The submarine portion of the Dutch East Indies Invasion Force included twenty-five boats divided into three groups. Submarine Group "A" included six fleet boats, two coastal boats, and the four minelaying submarines from Submarine Squadrons 4 and 6. Group "B" had the six older fleet submarines of Submarine Squadron 5. Group "C" consisted of Submarine Squadron 2's seven boats. All three groups were to conduct patrols around the East Indies to prevent reinforcements from reaching the area and attack any Allied force that attempted to flee. Group "A" was to patrol the Java Sea and Sunda Strait; Group "B" was to hunt in the Bay of Bengal; and Group "C" was assigned to

longitudinal strength. See Evans and Peattie KAIGUN and Worth's Fleets of World War Two.

patrol the Celebes, but was soon shifted to richer hunting grounds between Java and Australia.

The Indian Ocean and Java Sea operations were the Japanese equivalent of the German *U-waffe's* "Happy Time." From January to March 1942, Japanese submarines operating in the Dutch East Indies and Indian Ocean claimed more than forty ships. The actual results were impressive enough. Jürgen Rohwer's analysis of sinking records and Allied confirmations reveals thirty-eight ships sunk totaling 140,562 tons. The tonnage sunk in this three-month span represented nearly 20 percent of all sinkings claimed by the Imperial Navy's submarine forces for the entire war. At the conclusion of these operations, the Japanese had lost only two boats. Imperial Navy submarines in this theater had a far higher rate of success than operations off Hawaii or the American west coast with lower losses.

However, even these successes had ominous overtones for the Imperial Navy's submarine force. Despite numerous contacts, no Japanese submarine managed to torpedo an Allied warship. Though they claimed many cargo vessels, all successful attacks were launched against lone, unescorted merchantmen. The Imperial Navy's submarines had yet to prove that they could operate in their intended mission in support of the fleet or that they could operate against escorted convoys. Submarine successes against commerce in the Indian Ocean and around Australia led some Japanese submariners to push for a commerce raiding strategy. However, the rising demands of war and a continuing series of

crises prevented the Imperial Navy from ever committing itself to a sustained *guerre de course*.

Japanese Submarine Operations in the Second Phase of the War

By April 1942, Imperial Japanese forces had achieved almost all objectives established for the first phase of the Pacific War. The fall of the Dutch East Indies marked the end of the initial operations and a transition to the second phase. The basic role of the submarine fleet remained the destruction of Allied warships, but elimination of the American battle line and Britain's base at Singapore provided an opportunity for the boats to experiment with a *guerre de course*. Even with the acknowledgment of the possibilities offered by a strategy of commerce raiding, the needs of the Imperial Navy's Combined Fleet received the highest priority.

Imperial Navy submarine losses in the first phase were relatively light and therefore the makeup of the submarine squadrons remained largely unchanged. However, the Imperial General Staff shuffled squadrons between various fleet commands. Sixth Fleet (Submarines) still controlled the majority of the boats with 1st, 2nd, 3rd, and 5th Squadrons under its command, as well as the separate 13th Submarine Division. Fourth Fleet in the South Seas had 7th Submarine Squadron attached while Combined Fleet directly commanded 5th Submarine Squadron. The 8th Submarine Squadron was to prepare to launch a series of attacks with midget submarines on Allied harbors where warships might be found.

Japanese naval intelligence identified two Allied elements that could interfere with second phase operations. First was the reinforced British fleet presence in the Indian

Ocean. The Japanese placed it around Zanzibar, and about May 5, 1942 learned of the British occupation of the Vichy French harbor of Diego Suarez on Madagascar.⁶⁸ Reports of increasing British strength and construction of new bases at Mogadishu in the former Italian Somaliland and on Reunion Island fueled Japanese fears that the British would move against the Malay Barrier or attempt to reinforce Australia from the west. The other obstacle to successful conclusion of second phase operations was the continuing resistance of the United States Navy. Though the surprise attack at Pearl Harbor had smashed the American battleline, American aircraft carriers remained at large and launched damaging, if limited, raids on Japanese bases. American transport missions to Australia threatened Japanese acquisitions in the South Pacific and would require extending the Imperial perimeter to cut those supply lines.

The main effort of the Combined Fleet and the submarine forces of the Imperial Fleet remained focused on keeping American and British naval forces from interfering with ongoing operations. Japanese plans focused on striking Allied bases in the Aleutians, Midway Island in the central Pacific, and Port Moresby in New Guinea. Imperial Navy strategists hoped to force a showdown with the American fleet while tying down British forces with raids into the Indian Ocean. The Japanese based their naval operations on the premise that a decisive battle with the American Pacific Fleet would have to be fought before American industrial might made victory unattainable.

Though the Imperial Navy assigned commerce raiding a higher priority during second phase operations, the Combined Fleet's needs remained paramount. Japanese plans during the second phase assigned the submarines attached to the Sixth Fleet, all Combined Fleet boats, and some submarines working with the Fourth Fleet in the South Pacific to operations against Port Moresby, the Aleutians, and Midway Island.⁶⁹ Sixth Fleet submarines that were not directly allocated to the fleet operations would carry out midget submarine attacks on the Allied forces at Diego Suarez and Sydney. After completing their missions, the submarines would raid commerce lanes in the Indian Ocean and South Pacific respectively, to try to cut the lines of communication to Australia and India.

Sixth Fleet chose 8th Submarine Squadron to launch the midget attacks on Sydney and Diego Suarez and divided it into three detachments. The KO detachment consisted of five submarines and Sixth Fleet tasked it with operating off the African coast. The OTSU detachment and the HEI detachment, each with three boats, made up the other portion of the force, based at Truk for operations against Sydney.⁷⁰

The KO detachment was to leave Japan in mid-April and pick up their midget submarines at Penang on the Malay Peninsula. Two submarines, *I-10* and *I-30*, would not carry midgets and were instead tasked with reconnoitering harbors searching for suitable targets for the following midget submarines. *I-10* was to examine harbors in South Africa while *I-30* checked ports on the African east coast. If the boats discovered

any suitable targets, all would rendezvous and launch their midgets in a simultaneous attack on warships discovered in the target harbor. After the attack, the submarines were to refuel from their tenders and then, except for *I-30*, attack merchant traffic off the African coast. *I-30* was to proceed on a transport mission to Europe to exchange critical war materials with Germany.

The two detachments assigned to operations off Australia deployed to Truk during mid-April. Initially most boats of the two groups were to support the invasion of Port Moresby, New Guinea, while others scouted for targets. After the conclusion of the Port Moresby invasion, four boats would take on midget submarines to attack whatever targets the other two boats discovered in the harbors at Suva, Sydney, Auckland, and Noumea. The submarines would use their floatplanes for pre-strike and post-strike reconnaissance of the harbors chosen for the attack.

The KO detachment proceeded as planned, but the operations against Australia were delayed by news of the Doolittle Raid on Tokyo. Submarines of the OTSU and HEI detachments were diverted to the unsuccessful pursuit of VADM Halsey's carriers.⁷¹ After it became clear that the American carriers had made good their escape, Combined Fleet released the submarines to resume their assigned missions after a two-week delay.

Most 7th Submarine Squadron submarines were in Japan undergoing refits and repairs and this left only two Fourth Fleet submarines, *RO-33* and *RO-34*, to support the Port Moresby invasion. They were to search for suitable anchorages and convoy routes

as a preliminary for the invasion. When the operation commenced, the two RO-boats moved to patrol Moresby Harbor and attack any enemy shipping encountered. Meanwhile the four I-boats of the OTSU and HEI forces formed a patrol line on 5 May, 250 nautical miles southwest of Guadalcanal, to detect any Allied forces that might interfere with the invasion.

Increasing Japanese pressure in the South Pacific led ADM Chester Nimitz to dispatch two American carrier groups to Australia. The battle of Coral Sea was fought between the rival carrier forces and led the Japanese to postpone the invasion of Port Moresby indefinitely. The submarine patrol line of four I-boats was far too small and formed too late to detect the two American carriers that attacked the Japanese invasion forces. Efforts to track the American carriers with submarines came to naught and the Imperial Navy submarines contributed nothing to the outcome of the battle. As the American Naval War College analysis of the battle concluded, the number of submarines deployed by the Japanese for the operation was woefully inadequate for the scale of reconnaissance required.⁷²

Two coastal submarines of the 7th Submarine Squadron returned to Rabaul while the boats of the OTSU and HEI detachments continued their operations against Sydney. Three submarines, *I-22*, *I-27*, and *I-28*, returned to Truk to receive their midget submarines. The other boats proceeded with their reconnaissance missions, though *I-28* disappeared, victim of a torpedo attack by an American submarine. The reconnaissance

of Sydney and Suva harbors by *I-21* and *I-29* led to the report of battleships moored in Sydney Harbor. While I-boats carrying midget submarines moved to attack Sydney Harbor, *I-21* diverted from Suva to Sydney to conduct an aerial reconnaissance with its floatplane, which reported the presence of Allied battleships and cruisers in the harbor.⁷³

Reports of Allied shipping led to the decision to attack Sydney and the submarines of the detachment launched their midgets. Though the submarine attempted to retrieve them until 3 June, none of the midgets returned to rendezvous with their motherships. Damage to the floatplanes on *I-21* and *I-29* prevented further overflights to evaluate damage. The presence of searchlights and gunfire from the direction of Sydney led the detachment commander to report, despite the lack of any evidence, the presumed sinking of at least one enemy warship.⁷⁴

The fog of war prevented the Japanese from knowing the unfortunate results of the "Special Attack" midget submarine strikes. No Allied capital ships were in Sydney Harbor, despite repeated reports of an American battleship by the patrolling submarines and the reconnaissance floatplane. The only warship of any note in the harbor was the heavy cruiser *USS Chicago*. Australian records show that two of the three midget submarines penetrated the harbor and one fired two torpedoes at *Chicago*. One torpedo struck a ferry being used as an accommodation vessel and the other missed completely and ran aground. An anti-torpedo net entangled the third midget submarine when it

attempted to penetrate the harbor. When attempts to free themselves from the net failed, the crew scuttled their submarine, destroying it and themselves.⁷⁵

The KO detachment's operations off Africa met with more success. Two Japanese armed merchant cruisers, *Hokoku Maru* and *Aikoku Maru*, operated in support of the detachment's submarines. The floatplane from *I-10* made a reconnaissance flight over Durban and reported that there were no enemy warships in harbor. *I-30*'s patrol of Aden, Djibouti, Zanzibar, and Dar-es-Salaam turned up few targets.⁷⁶ The detachment commander decided that the British ships had concentrated at Diego Suarez on Madagascar, which the English had recently captured from Vichy France to forestall any Japanese attempt to seize it.

I-10's floatplane reconnoitered Diego Suarez on 30 May and reported a *Queen Elizabeth*-class battleship, a cruiser, and other targets. The I-boats launched two midget submarines to attack British shipping in the harbor. Efforts to recover the midget submarines again failed but the detachment assumed the attack had met with some success. The detachment commander supported his conclusion by reporting that *I-10*'s floatplane sighted nothing but destroyers and freighters during a post-attack reconnaissance flight. The submarines also spotted flames in the direction of Diego Suarez during the time the midget submarines were in action.⁷⁷ However, the detachment commander was forthright enough to admit that enemy warships might have escaped in the interval between the attack and the post-attack reconnaissance.

The midget submarines, in fact, had scored their only major success of the war. The midget submarine launched from *I-20* torpedoed the old battleship *HMS Ramillies* and *British Loyalty*, a 7,000 ton tanker.⁷⁸ The tanker sank and *HMS Ramillies* was out of action for a year. The Imperial Navy had no confirmation of the damage caused by its midgets. There was a great deal of discussion at Imperial Headquarters toward means to improve the success rate of the attacks and the crew recovery rates. Though Japanese midget submarines continued in use throughout the war, they proved incapable of duplicating the success they had at Diego Suarez.

With the conclusion of their Special Attack missions, all three groups of I-boats moved to attack merchant shipping. Efforts around Australia and in the Indian Ocean would be among the most successful operations the Japanese submarine force would undertake. Submarines operating in the Indian Ocean sank twenty-two merchant ships, while their supporting merchant cruisers sank another and captured two more. Submarines in Australian waters sank seven ships and damaged eight more. In total, eleven I-boats and two merchant cruisers destroyed thirty Allied merchant ships totaling 150,000 tons, captured two more merchant vessels and damaged many others. The Imperial Navy achieved this in less than two months against the loss of a single I-boat. The results were impressive and provide a hint of what the Japanese submarine force might have accomplished with more boats assigned to commerce raiding missions. However, the limited assets the Imperial Fleet had to counter the rising tide of American

naval power, ensuring that the submarine force's experimentation with commerce raiding would be brief.

As the boats of the Eastern Detachment returned to Japan during June and July 1942, they were replaced in South Pacific waters by five submarines of the 3rd Submarine Squadron. *I-11*, *I-174*, and *I-175* patrolled off Australia's east coast; *I-169* headed for New Caledonia; and *I-171* went to Fiji. Two other Squadron boats, *I-168* and *I-172*, under repair in Japan, were not available.⁷⁹ All three groups patrolled throughout July and early August. The hunting was less successful than the previous submarine effort with only five ships sunk during these patrols. This is hardly surprising given the low number of submarines patrolling large areas. Again, the weakness of the limited numbers of available boats was made clear to the Imperial Navy but it only intensified the belief that the boats must be reserved for critical missions. The Imperial Fleet simply did not possess enough boats to commit large numbers to fleet duty and maintain commerce raiding patrols in the rich hunting grounds of the Indian Ocean and South Pacific.

Increasingly audacious raids by American carrier task forces eliminated opposition within the Imperial Fleet to ADM Yamamoto Isoroku's plan to force a decisive fleet engagement with the American Pacific Fleet by attacking the Aleutians and Midway Island. Though Midway had no intrinsic value, it could serve as an air and submarine base to threaten the Hawaiian Islands and push Japan's air coverage hundreds of miles east. Japanese planning anticipated that the American fleet's surviving carriers would

have no choice but to respond, bringing them into combat at a time and place of the Imperial Fleet's choosing. It is interesting that this operation in no way matched the pre-war or traditional Japanese plan of waiting for the onset of an American counter-attack rather than initiating one of their own. Japanese planning called for the Combined Fleet's carriers to attack and neutralize Midway, which Japanese troops would seize the next day and turn into a Japanese bastion. The Japanese battleline would join ADM Nagumo's carriers to crush the American Pacific Fleet as it rushed to respond to the attack.

Japan's submarines had several vital missions to perform in the context of the overall plan for Midway and the Aleutians. Japanese planners anticipated that many of these roles would be the traditional ones of reconnaissance, early warning and attrition of the American fleet. A detachment of submarines would execute another "K" operation in cooperation with amphibious patrol aircraft to provide early reconnaissance of Pearl Harbor and pinpoint the location of any American naval forces. Another submarine detachment would reconnoiter Midway Island in late May and early June. The majority of the boats would form a patrol line between Midway and Hawaii to detect and attack American forces reacting to the invasion. Planning for the battle anticipated that the submarines would remain, using Midway as a base, even after surface forces withdrew.⁸⁰

The "K" operation was the first mission assigned the submarine force of the Imperial Navy for the Midway operation. This would be a repeat of the successful

reconnaissance and bombing mission launched by Japanese flying boats soon after the carrier raid on Pearl Harbor. The Kawanishi long-range flying boats had been refueled at French Frigate Shoals by specially equipped submarines. The second "K" operation was designed along the same lines without the gratuitous air raid. Its purpose was to ascertain the status of US naval forces around Hawaii and give Japanese commanders some warning of American deployments.

Sixth Fleet assigned six boats assigned to the mission. Three submarines, *I-121*, *I-122*, and *I-123*, were to refuel two Kawanishi H8K flying boats from the 24th Air Flotilla. The other three boats had supporting missions. *I-171* would act a radio beacon for the two flying boats to help them navigate to the refueling point. *I-174* was to cruise southwest of Hawaii and act as a plane guard to rescue any crews forced to ditch. *I-175* was to operate near Oahu to provide weather reports from the Pearl Harbor area. The reconnaissance mission was to be carried out on 30 May (Tokyo time). If conditions were unfavorable, then the operation could be postponed but the missions would be canceled if they could not be flown before 3 June (Tokyo time).⁸¹

Japanese planning for the "K" operation was very thorough and provided for many contingencies. The plan allowed for delays forced by weather or mechanical difficulties and included a submarine assigned to recover downed crews. Timely weather intelligence from the Pearl Harbor area would help ensure that the mission did not fail due to poor visibility over the harbor and that the reconnaissance would only be launched

when conditions were favorable. One thing the Japanese planners did not count on was the presence of American shipping.

When *I-123* reached the patrol area, she reported two prowling American warships. The squadron commander postponed the operation until 1 June (Tokyo time) hoping the American vessels would leave. By 31 May (Tokyo time), the three submarines reported that the Americans were not only still present at the refueling point but also appeared to be setting up a sea plane base of their own. Given the apparent impossibility of success, the flying boat commander canceled the mission.⁸² Sixth fleet ordered three boats to help form a submarine patrol line. The three remaining submarines intended for the "K" Operation were ordered to continue patrolling the waters around French Frigate Shoals and eventually moved to scout the waters around Hawaii.

The first stage of the elaborate Japanese plan and the Japanese submarine force had fallen afoul of American radio intelligence and cryptographic work. The story of the breaking of the Japanese naval codes before Midway is now well known and does not need repeating. However, it is here, at the opening act of the battle, that ADM Yamamoto's carefully crafted plan had already begun to unravel. The entire operation depended on surprising the American forces and gaining control of Midway before they could respond. Minimally, the plan required that the carrier force be warned of the presence of American naval forces, lest Kido Butai, the aircraft carrier striking force, be surprised while its aircraft were reducing Midway's defenses. With the cancellation of the

"K" operation, the Japanese fleet proceeded with no intelligence of what American naval forces in the Hawaiian area might be available to interfere with the Japanese attack.

The failure of the "K" operation troubled Yamamoto, but was not seen as a critical failure because of the second mission assigned to the Imperial Navy's submarines in the Midway operation. The plan called for boats to establish a patrol line between Hawaii and Midway to provide warning of American naval moves in response to the Japanese attack. The Japanese had created and trained their submarine force for this mission. All of Japan's "Interceptive Operations" planning was based on the idea that it was the submarine force that would first detect, track, and attrit the American fleet. For the Midway operation, eleven boats established the patrol line.

Three boats of the 3rd Submarine Group, originally tasked with Operation "K", joined one of their sisters and seven boats of the 5th Submarine Group to set up the patrols. The original plan called for the patrol line to be in place no later the 2 June (Tokyo time). However, the 5th Submarine Group was late deploying from Kwajalein due to vital repairs needed by many boats and the postponements and eventual cancellation of the "K" operation delayed 3rd Submarine Group. Ideally the submarine patrol lines would not be made up of boats tasked with other missions and subject to delays from refits or repairs but the lack of submarines made this inevitable.

The Japanese simply did not have enough submarines to fulfill all the missions assigned to them. They could not perform commerce raiding missions, fleet support,

strategic reconnaissance, and provide a patrol line with the available boats. The Imperial Fleet was forced to cancel some missions and assign boats to multiple roles in a single operation to try to fulfill the most critical needs.⁸³ In the early days of the war, the Japanese were able to do this successfully against scattered and surprised opposition, but at Midway it cost them dearly. Submarines intended to provide early warning of American task forces straggled into position in ones and twos from 1 June to 4 June. The two American carrier task forces that surprised the Japanese off Midway transited the submarine patrol area before the boats were in position to report their passage.

Japanese planning for the Midway operation assigned *I-168* a solo mission. Her role was to reconnoiter Midway Island and report on the island's defenses. She left Kure Naval Base on 23 May (Tokyo time) and by 1 June (Tokyo time) was patrolling off Midway. *I-168* sent a report on the conditions at Midway:

The enemy is conducting an incessant aerial patrol of the Midway area day and night and strict security measures are being taken. Aside from one patrol boat seen in the waters south of Sand Island, no ships have been sighted. Many cranes are installed on the island. An expansion of facilities is apparently under way. From the fact that a patrol plane was seen about 600 nautical miles southwest of Midway Island, it is surmised that the enemy is conducting extensive aerial patrols.⁸⁴

The outcome of the battle of Midway is well known. American dive-bombers sank all four Japanese carriers of the 1st and 2nd Carrier Divisions, the cutting edge of the *Kido Butai*. Yamamoto canceled the invasion of Midway Island and his hope for a decisive battle on Japanese terms died stillborn. With the loss of two-thirds of its pre-

war heavy carriers, ever-greater demands would be placed on Japan's submarine force to operate against American naval units rather than commerce.

In an almost pathetic display of what might have been, Sixth Fleet ordered *I-168* to conduct a bombardment of the airfields on Midway after the decision had been made to cancel the landing.⁸⁵ It remains arguable if the efforts of a lone submarine's deck guns would have had any effect on an island that had already taken everything four aircraft carriers could throw at it but the bombardment never took place. When *I-168* surfaced on the night of 4 June to conduct the bombardment she was immediately illuminated by searchlights and engaged by US Marine coastal defense guns.⁸⁶ After firing eight rounds from its single deck gun, which landed harmlessly in the lagoon, her captain decided that fragile submarines had no business exchanging fire with shore batteries and quickly submerged to resume its patrol.⁸⁷

On 5 June, Yamamoto ordered all forces to withdraw westward except for the submarines. The submarine patrol lines also moved westward to help cover the retreating Imperial Fleet (see Chart 2). Yamamoto still hoped to lure the American carriers across the submarine lines and into range of the Japanese aircraft based at Wake Island. If the American carriers could be damaged or sunk it would still be possible to carry out the decisive battle on terms favorable to Japan as a pure naval gunnery duel. However, the American carriers prudently stayed well outside the reach of Japanese land-based aircraft.

On 6 June the Imperial Navy's submarine force scored the only clear tactical success of the battle for the Japanese. The American aircraft carrier *USS Yorktown* had been badly damaged by Japanese naval strike aircraft during the battle. Ablaze and apparently in danger of capsizing her captain had ordered the crew to abandon the ship. The next day she was found still afloat and salvage efforts began. American hopes to save her continued to rise since the damage was less severe than it had seemed.

A Japanese reconnaissance aircraft had noted *Yorktown's* crippled condition. ADM Komatsu, commander of the Sixth Fleet, ordered *I-168*, which was still in the area of Midway Island, to locate and sink the damaged carrier.⁸⁸ On the morning of 6 June *I-168* spotted the drifting *Yorktown* and her escorting destroyers. By 1030 *I-168* closed to within 1,000 yards and fired four torpedoes.⁸⁹ American destroyers launched a vicious depth-charge attack and forced *I-168* to dive before she could witness the effect of her torpedoes but the crew heard four explosions as they dove. After seven hours of depth-charge attacks damage forced *I-168* to surface, she discovered that the American destroyers were some distance away and was able to escape. There was no sign of the American carrier. Three of *I-168's* torpedoes had slammed into *Yorktown*, with the fourth hitting the destroyer *Hammann* alongside providing power for the salvage effort. Both American vessels sank — the first American carrier sunk by Japanese submarines. The report on the battle completed after the war credits *I-168* with a clever and successful attack and full marks for successfully attacking a target defended by destroyers.⁹⁰ In view

of the general lack of success achieved by Japanese submarines and the capabilities of American ASW efforts, ADM Nimitz acidly commented that there was something wrong with American tactics if five or six destroyers were unable to protect *Yorktown** from a lone submarine.⁹¹

Overall, the Japanese submarine effort during the Midway operation returned very scanty results through a combination of bad luck and poor planning. The inability of the submarine patrol lines to detect the American carriers was a bitter blow to Imperial Navy submariners. Combined with the failure of the "K" operation to scout the waters around Pearl Harbor, it meant that Japanese commanders had to make completely unwarranted assumptions about American naval dispositions. The submarines making up the patrol lines shifted four times over the course of two days as American forces were spotted, burning precious fuel and forcing them to run on the surface to try to reach their new patrol zones.

A greater failure was the inability of the submarines to interdict the movement of the American task forces. American codebreaking efforts played a role in this failure as well. ADM Nimitz's insistence on the early sailing of *USS Yorktown* was at least partially based on the need for her to transit the area of the Japanese patrol lines before the submarines were in position.⁹² Of the Japanese submarines deployed for the

* *I-168*'s captain, CMDR Tanabe, had served in submarines since 1928 and was one of the few Imperial Navy "aces" to survive the war.

operation, only *I-168* engaged American naval forces. No other Japanese submarine fired a weapon during the battle.

Japanese operations in the North Pacific and Aleutian Islands fulfilled two objectives. They would seize a forward outpost to provide a *glacis* to protect the Home Islands from the threat of an American advance through the Aleutian chain and the Kuriles. Their second objective was to act as the opening bait for the decisive battle to be waged around Midway Island. The plan called for invading Adak, Kiska, and Attu Islands and for aircraft carriers of the invasion force to launch air strikes against the American military base at Dutch Harbor further up the Aleutian chain. If American naval forces opposed the operation, they would "be destroyed by the Carrier Task Force, the Submarine Group and other supporting units."⁹³

The forces allocated to the operations against the Aleutians were collectively grouped as the Northern Force. The Northern Force was divided into the invasion forces, the Main Force, 2nd Carrier Task Force, and the Submarine Group. This Submarine Group consisted of the six boats of the 1st Submarine Squadron, *I-9*, *I-15*, *I-17*, *I-19*, *I-25*, and *I-26*, and their tender. The Submarine Group mission was to reconnoiter "strategic areas" of the Aleutians and patrol the entrance to the port of Seattle, then drop back to protect the carrier force from interference and support the attack on Dutch Harbor. If the Americans were engaged in the decisive battle at Midway, then all submarines would revert to Sixth (Submarine) Fleet command.

On 10 May, the commander of the 1st Submarine Squadron sent two boats, *I-25* and *I-26*, to patrol the area around Kodiak Island in the Aleutians and scout for any American naval forces. *I-25*'s scout plane sighted a cruiser and two destroyers around Kodiak but detected no other forces. Near the end of May, both boats began sweeping the waters toward Seattle. *I-25* detected two vessels she reported as large cruisers but no other contacts were made and the two submarines took up positions off Seattle.

By mid-May, the remainder of the submarine force had finished preparations and sailed for the Aleutians; *I-19* for Dutch Harbor; *I-15* for Adak Island; *I-17* for Attu Island; and *I-9* for Kiska. The boats searched their areas for American naval forces that might threaten the approaching invasion forces. *I-19* sighted a few patrol boats near Dutch Harbor but the boats made no other contacts. The submarines reported this lack of naval activity to the commander of the Northern Force before the invasion forces departed Japan and he estimated that only light naval opposition would be encountered. The landing operations went off without mishap or the sort of disaster awaiting the forces around Midway. Opposition was non-existent and Japanese forces bypassed Adak and landed on Kiska and Attu Islands on 6 and 7 June respectively.

The Submarine Force, except for *I-25* and *I-26*, made a patrol sweep down the northern and southern sides of the Aleutian chain from Dutch Harbor to Adak. The patrol was to detect any American naval reinforcements rushing to the north but spotted no American naval forces. *I-25* and *I-26* continued their patrols off Seattle until the end

of June when they were ordered to rejoin their squadron as it prepared to return to Japan. The patrol of these two submarines around Seattle was suspiciously uneventful. After a month prowling the waters off Seattle, they only sank two small merchant ships and shelled Vancouver Island with their deck guns. However, their cruise was more successful than the other boats of the 1st Submarine Squadron, which did not detect, let alone sink, any American vessels.

The 2nd Submarine Squadron returned to Japan after its successful patrol in the Indian Ocean for maintenance and repairs and was unavailable for operations throughout May and early June 1942. On 10 June (Tokyo Time) Sixth Fleet assigned the seven boats of the squadron (*I-1*, *I-2*, *I-3*, *I-4*, *I-5*, *I-6*, and *I-7*) to the Northern Force along with the boats of the 1st Squadron. All of the boats except for *I-5* and *I-6*, which were still conducting repairs, reached Aleutian waters by 19 June and patrolled the waters between Adak and Amchitka.⁹⁴ The 1st Submarine Squadron was in desperate need of rest and refitting and its boats returned to Japan at the end of June.

The Japanese decision in late June to hold the Aleutian Islands as an outpost imposed additional strains on the slender resources of the Imperial Navy, especially its submarines. The seven long-range boats of the 2nd Submarine Squadron had been pulled from their lucrative hunting in the Indian Ocean to patrol the icy and fog-bound waters of the Aleutians. Four boats formed a patrol line south of the Unimac Pass to interdict traffic between the American base at Dutch Harbor and Seattle. Two more boats

patrolled the waters off Dutch Harbor and north of the Unimac Pass while one boat provided defense for the Japanese base at Kiska. On 20 July 1942, the boats of the 2nd Submarine Squadron, except *I-6*, returned to Japan for transfer to the Submarine Force of the Combined Fleet. *I-6* remained in the Aleutians to patrol around Kiska and defend it from American counter-attacks until August 1942.

As part of a major reorganization of the Imperial Fleet in July 1942, two submarine divisions of the 7th Submarine Squadron were detached and assigned to Fifth Fleet to operate in defense of Kiska. These two divisions consisted of seven *RO* type coastal boats and they were immediately placed under the command of the Kiska Defense Unit and arrived on station during August 1942, replacing the *I* boats of the 2nd Submarine Squadron.⁹⁵ The boats spent June and August patrolling the waters around Kiska to stop any American attempts to recover the island.

The experience of the submarines in the Northern Force is an interesting microcosm of the difficulties faced by the Japanese submarine force in the Pacific. Their inclusion in the planning for the operation provided vital long distance surveillance before other forces were committed to the theater. Their patrol patterns were intended to detect any American counter moves to the initial invasion and their use as a tripwire for the carrier and invasion forces in the Aleutians was not unreasonable. However, waters with little ship traffic, extremely poor visibility and lack of radar rendered Japanese submarines in the North Pacific nearly useless. During June and July 1942, nearly 20 percent of

Japan's submarine force were operating in the Aleutians. Thirteen long-range submarines of the 1st and 2nd Submarine Squadrons prowled Aleutian waters from late May until early August. The only successes achieved for all this effort was sinking two small merchant ships. During a three-month period in the Indian Ocean, a similar number of I-boats sank thirty-eight merchant vessels. The ever increasing demands being placed on the submarines of the Imperial Navy would not allow the use of so many boats for such a small reward.

On 10 July 1942, the Japanese Navy carried out a reorganization of the Combined Fleet — including restructuring its submarine forces. The heavy submarine and carrier losses suffered by the Imperial Navy required this reorganization. A change to the fleet's structure was also needed with the gradual acknowledgement that the time for rapid conquest was over. The reorganization created a new Fleet, the Eighth, to operate in the South Pacific in conjunction with the old Fourth Fleet; the two fleets split responsibility for the Solomon Islands and Australia. Among the forces attached to the new fleet were the boats of the 7th Submarine Squadron, which had recently exchanged some of its old *RO* style boats for the minelaying I-boats of the *I-121* (formerly *I-21*, but renumbered in May 1942) class.

The structure of the Imperial Navy's submarine squadrons was also changed. The reorganization increased the size of a submarine division from three to six boats. This change occurred for many reasons. Though many Japanese submariners questioned the

need for division commanders, the Naval Staff was adamant that the division structure be maintained for training and operational control. Six boats were considered the maximum that one division commander could control during commerce raiding operations and this formed the basis of the new organization.⁹⁶

Between 10 March and 20 August 1942, the Imperial Navy disbanded 2nd, 4th, 5th, and 6th Submarine Squadrons and formed 8th Squadron. The elimination of the squadrons was partly because of the new divisional structure, which did not require as many squadrons. It also removed a number of older submarines from war service to serve as training boats in the Kure Naval District to accommodate the increased number of submariners passing through the submarine schools. The primary reason for eliminating so many squadrons from the Japanese order of battle was the heavy losses suffered by the Japanese Navy's submarine arm.⁹⁷

Despite their losses, Japanese submarines filled critical roles for the Imperial Navy in the opening phases of the war. For this reason the Naval General Staff's Air Strength Expansion and Ship Replenishment Plan for Fiscal Year 1942 ranked submarine construction in priority behind only aircraft and aircraft carriers* and ahead of all other combatant vessels.⁹⁸ Losses suffered by the submarine force would be made up by new construction, but continued heavy attrition meant that the submarine strength of the

* For perspective, the Detailed Shipbuilding Plan for Imperial Navy's Fifth Naval Replenishment Program called for a total of 327,940 tons of aircraft carrier construction, 78,730 tons of destroyer construction, and a staggering 280,113 tons of new submarine construction, comprising 131 boats. Most of the vessels called for in this plan were never completed.

Imperial Navy would barely hold steady. The boats being built were filling out depleted submarine squadrons rather than creating new ones.

Japanese Submarines in the Solomon Islands Campaign

The first half of 1942 was a period of mixed fortunes for Imperial Navy submarines. An increased emphasis on commerce destruction, sinking the aircraft carrier *Yorktown*, and damage inflicted on *Saratoga* highlighted a frustrating opening for the Imperial Navy's submarine force. The submarines suffered relatively heavy losses in the first six months of war. Nine submarines were lost in action without counting midget submarines expended in attacks on Allied bases, a loss of 15 percent of the Imperial Navy's submarine force.

While Imperial Navy submariners judged the submarine's use as a commerce raider a success, they would get little chance to build on that achievement. On 7 August 1942, elements of the American 1st Marine Division landed on the Japanese-held island of Guadalcanal and seized an airstrip the Imperial Navy planned to use to dominate the sea lanes to Australia. Guadalcanal would become the focus of the war in the Pacific for the next six months. The frequent battles and emergencies would not allow the Imperial Navy's submarines the luxury of experimenting with new tactics or doctrine. The Solomons campaign developed into a bloody attrition battle of the sort never envisaged by Japanese planners and it exacted a grim toll of the Imperial Fleet.

The American landings on Guadalcanal came as a complete strategic and tactical surprise to Imperial Headquarters. The Japanese expected American counter-attacks in

the Central Pacific and New Guinea, not the Solomons. The airfield being constructed on Guadalcanal was part of a routine operation that was not expected to face major opposition.⁹⁹ Reports of the American landings caused confusion at Imperial Headquarters but ADM Yamamoto ordered the Combined Fleet to move south to Truk to recover Guadalcanal. He also ordered the Eighth Fleet, based at Rabaul in the South Pacific, to counter-attack and directed that all available submarines be deployed to the Solomons.¹⁰⁰

Throughout August 1942, Japanese submarine strength concentrated around Guadalcanal. The commander of the Japanese Sixth (Submarine) Fleet, VADM Komatsu Terushia, moved his headquarters to Truk to ease coordination with ADM Yamamoto's Combined Fleet. Except for ten submarines operating in the Indian Ocean and boats deployed in home waters for training, the Imperial Navy deployed nearly all its submarine strength to the South Pacific.

The operations of Japanese submarines in August were an exercise in futility. Two boats patrolled waters near the American beachhead, two more operated off the American base at New Caledonia, and five operated east of Guadalcanal near the Indispensable Strait. These nine submarines represented all that were immediately available for operations in the South Pacific. Many other boats were undergoing refits or critical repairs.

The Japanese did not use their submarines to cut American supply lines to the island or to attack the American anchorage at Guadalcanal. Instead, they patrolled for the American carriers supporting the landings. The results were very disappointing. The submarines achieved no success against American forces in the Solomons throughout August 1942. Their failure was so notable that ADM Ugaki Matome, Chief of Staff of the Combined Fleet, noted in his diary entry for 31 August 1942: "So far our submarines have done nothing to enemy reinforcements."¹⁰¹

ADM Mikawa's success at the Battle of Savo Island only two days after the American landing seemed to show that the Imperial Navy had little to fear from the American invasion or the Allied fleet. Mikawa's scratch-built task force destroyed four Allied heavy cruisers with no Japanese losses. Only Mikawa's fear of attacks by carrier aircraft saved the American transport fleet from destruction. Air reconnaissance noted the withdrawal of the American shipping and many in the Japanese high command assumed that the marines in the beachhead were being abandoned to their fate. Therefore, destruction of the American carriers remained a higher priority than attempting to sever supply lines.

ADM Komatsu, commander of the Imperial Navy's submarine force, decided to use his boats to establish submarine patrol lines around Guadalcanal in hopes of catching the American carriers supporting the marine beachhead.¹⁰² Seven First Submarine Group submarines were used to set up picket line "A" east of Guadalcanal while three

submarines formed picket line "B" to the south. Three minelaying submarines independently patrolled east of Guadalcanal while two *RO* type coastal boats provided reconnaissance for the submarine force; one patrolling off Port Moresby and one in the Indispensable Strait between Guadalcanal and Malaita Islands.¹⁰³

These patrol lines were tested and found wanting during the battle of the Eastern Solomons, a relatively inconclusive affair between American and Japanese carrier forces attempting to support their own troops and convoys headed for Guadalcanal. As at Midway, the Japanese submarines failed to detect the American aircraft carriers before the battle or to alert the Imperial Fleet. Through the course of the engagement, Japanese submarines were continually shifted about as Japanese patrol planes sighted American forces. Sixth Fleet ordered the seven boats of the "A" picket line shifted one hundred miles southward but maintained their northeast to southwest orientation, while the boats of the "B" line moved east to join them.¹⁰⁴ During the move south, two boats spotted an American carrier. ADM Komatsu ordered all submarines to pursue but none regained contact. By the next day AMD Komatsu ordered all submarines to return to their original patrol lines, only to send them in pursuit of a carrier sighted south of Guadalcanal a day later.

The battle of the Eastern Solomons ended when VADM Jack Fletcher withdrew American carriers after trading air strikes with the Japanese carriers. The submarines of the Imperial Navy had again failed to contribute to the Imperial Navy's effort to achieve a

decisive victory. The boats had been forced to race from one area to another at high speeds on the surface in a vain attempt to catch the fast moving American carriers.

The operations of Japanese submarines around Guadalcanal during August 1942 were singularly unsuccessful. Japanese boats not only failed to sink any American warships, they failed to attack any, and American reinforcements to the marine beachhead at Guadalcanal were unimpeded. This lack of success came at a high price for Japanese submariners. An American destroyer-minesweeper sank *I-123*, one of the patrolling minelaying submarines, on 28 August.¹⁰⁵ An Australian destroyer attacked and sank *RO-33*, the boat patrolling Port Moresby, New Guinea, the next day. American ASW forces damaged two of the seven submarines patrolling the "A" picket line, forcing them to return to Japan for repairs.¹⁰⁶ These losses represented 16 percent (four of twenty-five) of the boats supporting operations in the Solomons in less than three weeks.

The heavy losses among his submarines led ADM Komatsu to consolidate the remaining boats into a single picket line running between Santa Cruz and San Cristobal Islands. This submarine patrol line would score heavily for the Japanese and achieve the greatest tactical successes of the war for the Imperial Navy's submarine force. On 31 August 1942, *I-26* launched six torpedoes at the aircraft carrier USS *Saratoga* east of San Cristobal Island. One of the six torpedoes struck home and although damage was limited, it forced *Saratoga* to return to the United States for repairs. She had been torpedoed eight months before by *I-6* and had only recently returned to action. Though *Saratoga*

was not sunk, she was kept out of the campaign at a time when American and Japanese carrier strength hung in a precarious balance. Japanese records noted with dismay that this was the first attack launched in fifteen sightings of American carrier forces since the American landings.¹⁰⁷

Only two weeks later, the Japanese submarine force scored another blow against the American carriers operating near Guadalcanal. Nine boats patrolled a picket line between San Cristobal and Santa Cruz searching for American carriers. On 13 September 1942, Japanese maritime patrol aircraft spotted an American carrier group near Santa Cruz Island and alerted the submarines on the patrol line. Around noon on 15 September, CMDR Kinashi Takaichi in *I-19* spotted an American carrier, cruiser and several destroyers at a range of 16,000 yards. Though the range was too great for an attack, the maneuvers of the carrier group enabled *I-19* to close to 1,000 yards. At 1345, CMDR Kinashi fired six Type 95 torpedoes at the carrier and dove to avoid a depth-charge attack from the carrier's escorts.¹⁰⁸ CMDR Kinashi reported four explosions though he could not confirm the results of the attack because of the oncoming destroyers.¹⁰⁹ However *I-15*, which was patrolling nearby, reported that the carrier sank around dusk.

CMDR Kinashi's salvo was more successful than the Imperial Navy knew. Two American carrier task forces were at sea supporting the landing of another regiment of marines reinforcing Guadalcanal. *I-19* had engaged one of these task forces. Three of her torpedoes slammed into the flank of the American carrier *Wasp*. *Wasp* was conducting

flight operations with loaded and fueled aircraft on her deck and in her hangers. The torpedo strikes sent a series of secondary explosions rippling through the ready aircraft and stored ammunition and fuel. The growing fires foiled damage control efforts and forced the crew to abandon *Wasp*. An American destroyer scuttled her at 2100 hours with torpedoes.¹¹⁰

Kinashi's torpedoes had not finished their work. The second American carrier group was twelve miles away and conducting flight operations of its own when it ran afoul of the remaining torpedoes of *I-19*'s salvo. One torpedo struck the destroyer *O'Brien* forward, causing little immediate damage, but a great deal of structural flexing. The destroyer sank almost a month later attempting to return to the United States for repairs. Another of Kinashi's torpedoes hit the new fast battleship *North Carolina*. The hit occurred on her port side abreast her Number One turret and tore a 32-foot by 18-foot hole 20 feet below the waterline.¹¹¹ The blast damaged the roller path of the turret and caused a 5-degree list from flooding. Though the tough new dreadnought was never in danger of sinking, she was forced to return to the United States for repairs in a major shipyard, effectively removing her from the American order of battle for the Solomons campaign.

The effect of this single torpedo salvo would be hard to overestimate. With *USS Enterprise* and *USS Saratoga* undergoing repairs, and *Lexington*, *Yorktown*, and *Wasp* sunk, *USS Hornet* was the only undamaged American carrier available in the South Pacific

to face up to six of her Japanese counterparts. This presented a priceless opportunity to the Imperial Navy to maintain a numerical superiority in carrier decks for 1942 and try once more for its decisive battle on Japanese terms.

Although the hits on *O'Brien* and *North Carolina* were purely fortuitous, they demonstrated the range and power of Japanese torpedoes. The hit on *North Carolina* took her out of the American order of battle for the remainder of the Guadalcanal campaign. This meant that only two American fast battleships were available to confront the four Japanese *Kongo*-class and the two massive *Yamato*-class battleships based at the Japanese stronghold of Truk. The submarines of the Imperial Navy had given Japan a potentially overwhelming, if temporary, edge in combat power in the South Pacific.

Unfortunately, the Japanese would prove unable or unwilling to exploit their advantage. The attacks on *Saratoga* and *Wasp* were the only highlights in an otherwise dismal performance by Imperial Navy undersea forces during the Solomons campaign. Throughout the rest of September 1942, Japanese submarines executed quiet patrols for little material gain. One boat, *I-31*, was sent on a nuisance bombardment of an American maritime patrol aircraft base at San Cristobal Island southwest of Guadalcanal and to reconnoiter the American base at Espiritu Santo. The only other success gained by Japanese submarines in the Solomons during September was the damage inflicted on an American cargo ship near Guadalcanal.

October 1942 saw the Japanese submarine force remain active yet frustrated. The focus of the Japanese high command was still on getting troops to the island and capturing the American airfield. The Combined Fleet sortied several times in October to provide support for the Japanese Army operations and bombard the American positions. The constant skirmishes and battles eroded the strength of the Imperial Navy's aircraft carrier wings and destroyer forces and led to continually greater demands being placed on its submarines.

By mid-October, Sixth Fleet had deployed no fewer than ten boats near Guadalcanal with orders to hunt American aircraft carriers and cut off supply lines to the island. Conflicting orders and spurious reports forced these boats to rush back and forth between various patrol lines in a vain effort to repeat the success they achieved against *Wasp*. As search aircraft spotted American carrier forces, the Japanese were forced to alter their dispositions, filling the air with radio chatter and burning precious time and fuel as they rushed to new patrol positions. Faulty intelligence placed them in the wrong position for battle of Santa Cruz on 26 October, 1942, and left them unable to intervene in the engagement. The only success achieved by Imperial Navy submarines in the Solomons in October came when *I-176* torpedoed and damaged the heavy cruiser *Chester*.¹¹²

Faulty Japanese strategic doctrine again played havoc with the deployment and use of the submarines of the Imperial Navy. Rather than concentrating on cutting the

tenuous American supply lines to Guadalcanal, the Imperial Navy's General Staff made destruction of the American carriers the top priority of submarine forces in the Solomons. Many in the Imperial Navy were still laboring under the Mahanian concept that destruction of the opposing fleet automatically transferred control of the sea to the victor, a doctrine that the presence of naval and land-based air power had greatly weakened.

American control of Guadalcanal was largely based on the airfield as possession of that airstrip allowed the Americans to control the seas around Guadalcanal in daylight without naval forces. The sinking of two American carriers did not lead to Japanese control of the waters around Guadalcanal. With the sinking of USS *Hornet* at the battle of Santa Cruz, only the damaged aircraft carrier *Enterprise* was available to face the full strength of the Imperial Navy. However, the inability of the Imperial Army and Navy to close the airfield at Guadalcanal rendered destruction of American naval units less critical than it would seem.

The operational American airfield on Guadalcanal ensured that the Japanese could not regularly resupply and reinforce their troops on the island without risking losses from American airpower. American aircraft based on Guadalcanal controlled the waters adjacent to Guadalcanal during daylight hours. With their surface forces unable to operate near Guadalcanal in daylight, only the Imperial Navy's submarine arm could intervene to sever the American supply lines. However, the Imperial Navy persisted in using its submarines in their traditional roles until November 1942. For three months, the

Americans maintained their supply lines to the marine garrison at Guadalcanal, however tenuously, without serious interference from the Imperial Navy's submarines.

With the damage to the carrier forces of American and Japanese navies, the two surface fleets moved to the forefront in the struggle to control the waters of the Solomons. In November 1942, Sixth Fleet ordered its submarines to operate strictly against American supply lines to Guadalcanal. Commander of the First Submarine Group, RADM Mito Hisashi, ordered a new effort against American shipping to Guadalcanal. Three submarines would launch midget submarine attacks on the American anchorage at Guadalcanal. Three more boats were to patrol southwest of San Cristobal Island and four boats patrolled to the northeast with the express purpose of halting American reinforcement convoys from reaching Guadalcanal.¹¹³ Another three boats operated in a reconnaissance role off the American base at Noumea, New Caledonia.

Through the first weeks of November 1942, these boats operated against American supply lines with little success. Japanese submarines launched eight midget submarine attacks against American shipping anchored near Guadalcanal. American ASW forces destroyed all eight midgets and only one launched a successful attack that resulted in a damaged American transport. The large submarines arrayed around Guadalcanal achieved little more. *I-26* achieved the only success by sinking the damaged light cruiser *Juneau* as she returned to Pearl Harbor to repair damage suffered in the naval battle of Guadalcanal.¹¹⁴

These modest gains came at a high price for the Imperial Navy's submarine force. Eight midget submarines lost in action near Guadalcanal, and two big I-boats were lost in early November to American ASW forces waters off San Cristobal Island. The efforts to cut off American supplies from Guadalcanal bore little fruit in the face of continuing misconceptions about the size of the American garrison on Guadalcanal and the scale of operation required to dislodge it. Submarines of the Imperial Navy concentrated on breaking supply lines to Guadalcanal for barely two weeks when they were faced with yet another change of mission, one that would foretell the destruction of the Imperial Navy's submarine forces.

Japanese Transport Operations, November 1942 to February 1943

On 24 November, 1942 ADM Yamamoto ordered the use of the Sixth Fleet's submarines as transports to carry troops and supplies to the Japanese garrison on Guadalcanal.¹¹⁵ This order came as a result of the heavy casualties among the Imperial Navy's destroyers and transports from efforts to run supplies through the gauntlet of American aircraft based at Guadalcanal. For the remainder of the campaign, the Imperial Navy's submarine forces in the South Pacific ceased to be a factor in the battle for control of the waters around Guadalcanal.

It should be noted that the Japanese were not alone in using submarines to carry supplies. All major naval combatants used submarines as transports in desperate situations, including runs by American submarines carrying ammunition to Corregidor

during the Philippines campaign. Despite the limitations of submarines as transports, especially their limited transport capacity and awkward handling arrangements, they were often the only means of getting supplies to isolated bases. But only the Imperial Navy made a determined and sustained use of their front-line submarines as transport vessels. Indeed, the Japanese were unique in designing an entire class of unarmed transport submarines that were built throughout 1944 and came equipped with their own landing craft. However, the only submarines available in November 1942 for such duties were the large, conventional Imperial Fleet submarines.

The Imperial Navy furnished thirteen submarines for transporting supplies to Guadalcanal in November 1942, and eventually would use sixteen boats as transports. These submarines carried a total of 1,115 tons of supplies and later evacuated around 2,000 troops during the Japanese withdrawal in February 1943. These totals are considerable except in view of the effort required to transport such a small quantity of supplies. Each submarine could only carry twenty to thirty tons and it had to be manhandled to landing craft for transport ashore. Worst of all, the benefit of these missions was minimal, at best. Each submarine load of food could only feed the 20,000 man Japanese garrison for a single day.¹¹⁶ The Imperial Navy halted submarine supply runs for a time in December 1942, but their desperate supply situation and growing American air power forced the Japanese to return to submarine transport in January 1943.

The value of these submarine runs was minimal and submariners despised the use of their boats as supply vessels. The staff operations officer of the 7th Submarine Squadron complained after the war that the submarines were often called on to transport troops to the island without needed food and then forced to evacuate those same soldiers later.¹¹⁷ The boats that operated as transports represented nearly 20 percent of the Imperial Navy's submarine force and their use severely limited the number of submarines available for war patrols to the American coast, the western Pacific, the Indian Ocean, or Australia. Allied ASW forces destroyed four boats used on transport missions during the Solomons campaign.

The operations in the Solomon Islands represented both the high and low points for the efforts of the Imperial Navy's submarine forces. Japanese submarines scored the majority of their successes against warships during the Solomons campaign. They sank an aircraft carrier, a light cruiser, and a destroyer while damaging another carrier, a fast battleship, and a heavy cruiser sufficiently to drive them out of action and back to the United States for repairs. The efforts of the submarine arm went a significant way toward offsetting the loss of four Japanese carriers at the battle of Midway. The boats also fulfilled the primary mission of the submarine arm — to attrit American naval forces to the point where the Imperial Navy could confront the American Pacific Fleet on equal footing.

These successes came at a high cost for all branches of the Imperial Japanese Navy. The gradual erosion of its destroyer and aircraft strength in the grinding attrition of the Guadalcanal campaign did not bode well for the future of Japan. Rather than facing a single decisive battle to determine the course of the war, the Japanese were forced into a long campaign. Burgeoning American naval construction allowed the United States to replace its losses, but the number of damaged and sunk vessels gradually outpaced Japan's ability to replace lost vessels. Nowhere was this truer than the Imperial Navy's submarine arm. In six months of unrelenting combat around Guadalcanal, the Imperial Navy lost nine submarines. This total represents a loss rate of more than 30 percent of the boats allocated to the theater. Nine other submarines were lost in the first six months of the war in the entire Pacific. The Imperial Navy lost twenty-two submarines between December 1941 and February 1943, more than one-third of their initial force and well in excess of new construction. These losses weakened the submarine force at a crucial point in the war and reduced it to near impotency.

Another, albeit low key, attrition campaign similar to the fighting at Guadalcanal occurred in the Aleutians during the second half of 1942. Against all military logic, the Imperial General Staff chose to cling to Attu and Kiska Islands. The Japanese Fifth Fleet defended the northern waters and had one old I-boat and seven small coastal defense boats under its command. These boats defended Japanese Aleutian bases but they achieved little in the fog bound waters of the North Pacific. *RO-61* succeeded in damaging an

American seaplane tender in August 1942 only to be sunk the following day by an American destroyer. This attack represented the only success of Japanese submarines deployed in the Aleutians. US Army bombers damaged two more Japanese submarines in air attacks on their base at Kiska in September. *RO-65* sank during an emergency dive to escape an American aircraft.

Japanese submarines launched a single raid on the American mainland in late 1942. Hailed as retribution for the Doolittle raid on Japan, *I-25* transited the breadth of the Pacific and launched her floatplane on two bombing sorties over the American Pacific northwest in 1942. *I-25*'s floatplane dropped several small incendiary bombs on the forests of Oregon in an attempt to start forest fires on 9 September and again on 29 September 1942. The attacks caused a brief stir of panic on the American mainland, as did *I-25*'s destruction of two tankers off the American Pacific coast.¹¹⁸ During her return to Japan, *I-25* spotted two submarines operating on the surface. Knowing no Japanese boats were in the area, *I-25* submerged and attacked with torpedoes, sinking one of the unknown submarines. The victim of *I-25*'s attack was the *L-16*, a Soviet submarine on its way to Vladivostok.¹¹⁹ Fortunately this did not become clear until after the end of the conflict, as Soviet Russia and Japan were not at war at the time and the Japanese could ill afford to add the Soviet Union to their list of active enemies.

The most successful area of operations for the Imperial Navy's submarine force continued to be the lucrative Indian Ocean hunting grounds. Sixth Fleet allocated eight

large submarines of the 8th Submarine Squadron for operations in the Indian Ocean and western Australia. These boats continued to enjoy success against merchant shipping in the Indian Ocean. Five boats prowled the Indian Ocean from late August to early November on a commerce destroying mission. They sank ten merchant ships totaling nearly 60,000 tons; a very favorable rate compared with the slaughter of Japanese submarines in the South Pacific. Sixth Fleet dispatched the other three boats of the 8th Submarine Squadron to unsuccessful patrols around Australia, where they succeeded in sinking two freighters before ending their patrols.

The submarine operations in 1942 represented the high water mark of the submarine forces of the Imperial Navy. Though seventeen boats were lost, they destroyed 106 ships representing 488,708 tons of Allied shipping. A significant number of warships were included in the totals. During 1942, Japanese submarines sank or damaged a seaplane tender, two battleships, one heavy and one light cruiser, three carriers (two sunk, one damaged twice), three destroyers, and one neutral submarine. Despite their misuse as transports toward the end of the Solomon Islands campaign and their inability to halt the flow of supplies to Guadalcanal, submarines of the Imperial Navy came closest to fulfilling their role as fleet support combatants in the fall of 1942.

The Beginning of the End - Submarine Operations in 1943

In 1943, Japan's submarines began operating with a new official doctrine. The Imperial Navy issued instructions calling for submarines to concentrate on commerce destruction, rather than tangling with warships. However, the new doctrine had little real influence on operations. The Combined Fleet, which had first call on the undersea forces, wanted the ever-elusive decisive battle and never fully committed to using submarines for commerce raiding. Japan's submarines hunted merchant ships only when there were no more pressing missions to perform.

The limits to Japan's construction capacity and heavy submarine losses struck home in early 1943. American signals intelligence (SIGINT) and the increasing role of codebreaking (*Ultra*) intelligence for American submarine and anti-submarine operations became even more effective and Japanese submarine losses climbed due to radio intercepts. The year would mark the beginning of the end for the Imperial Navy's submarine force as an effective weapon. Because of heavy losses, the Japanese boats under construction represented replacements rather than reinforcements.

Nowhere were the limitations on the strength of Japan's submarine force more clear than in the Indian Ocean in early 1943. Though operations against British and Australian commerce during 1942 had been uniformly successful and relatively free from losses, the 8th Submarine Squadron had only three submarines available for patrols most of 1943.¹²⁰ The 8th Submarine Squadron's other boats were detached for operations

around Australia or were in Japan for desperately needed refits and repairs. Even with only three boats on active patrols, Japanese submarines sank seven merchant ships and damaged another in early 1943.

By July 1943, the number of active Japanese submarines in the Indian Ocean had risen to six as boats returned to the 8th Submarine Squadron from refits or South Pacific patrols. These six boats sank sixteen merchant ships between July and December 1943 and damaged five more. In addition, one boat reconnoitered the Royal Navy base at Diego Suarez in Madagascar while another landed pro-Japanese revolutionaries in India to foment rebellion in that restive colony.¹²¹

Operations in the Indian Ocean in 1943 were a resounding success for the Imperial Navy's submarine force, especially when compared with the disasters in the Central and South Pacific. The 8th Squadron boats sank twenty-three merchant ships and damaged six more without suffering any losses. These sinking rates were lower than Germans submarines achieved during the "Happy Times" of the Atlantic U-boat war, but were far better than rates achieved by boats operating against United States Navy task forces.

The successes of the Japanese submarine forces in the Indian Ocean region were based on several factors. Boats of the 8th Submarine Squadron were under orders to hunt merchant vessels in preference to pursuing warships. The ASW assets of the Royal Navy were stretched far more thinly than those of the United States Navy, and the British could not provide the level of protection that the Americans enjoyed in areas of

active operations. There were no British major naval operations in the Pacific or Indian Ocean, leaving Imperial Navy submarines in the region free to hunt merchant shipping. The 8th Submarine Squadron was operating much nearer their bases than boats assigned to the vast Central Pacific. Finally, the Indian Ocean was something of a backwater area for both Britain's Royal Navy and the Imperial Navy. Each deployed forces to watch the other but it was not the primary theater for either combatant. The fate of Imperial Japan would be decided in Pacific Ocean battles and it was there that Imperial Navy submarine forces proved incapable of stopping the American advance or even preventing its own destruction.

The surge of operations to support the Guadalcanal campaign and the heavy submarine losses suffered there left squadrons in the region desperately in need of reorganization and repairs. Many boats stationed in the Pacific were in port for refits and repairs. Nowhere was this more true than of the boats stationed in the South Pacific. The refits severely restricted the number of boats available for missions.

The continuing success of commerce raiding in the Indian Ocean led to a brief revival of attacking merchant ships in the Pacific Ocean during early 1943. With no major Japanese operations planned and no American attacks under way, Sixth Fleet had more leeway in assigning missions to its submarines. In March 1943, the Combined Fleet issued a new Naval Directive for its third phase operations. The new directive included a change in priorities for Imperial Navy submarines. Japan's submarines would now focus

on the destruction "of enemy sea transport to obtain his surrender."¹²² Submarines would pay special attention to severing supply lines between America and Australia while the successful operations in the Indian Ocean would continue. Even with this new appreciation for the possibilities of commerce raiding, the orders also contained only slightly less emphasized instructions to carry out "surprise attacks" against the enemy fleet and that elements of the submarine force would be used to carry supplies to advanced bases.¹²³ Indeed, standing orders for submarine reconnaissance granted fleet and base commanders specific power to recall submarines that were on commerce destroying missions if they were needed for "strategic reconnaissance."¹²⁴

In April 1943, commanders of the 1st and 3rd Submarine Squadrons dispatched their boats on commerce destruction missions with moderate success. Four boats of the 1st Submarine Squadron prowled the waters near Fiji and Samoa while four from the 3rd Submarine Squadron patrolled the Solomons and eastern New Guinea. The eight submarines sank fifteen cargo ships between April and June 1943 and lost only *I-178*; a much more promising exchange rate than the losses suffered in earlier South Pacific operations.

Submarines of the 7th Submarine Squadron based at Rabaul also took up commerce raiding during the relative quiet of early 1943. Their operations in the heavily patrolled waters off Guadalcanal met with much less success. The squadron's boats were primarily older coastal defense types and the surviving minelaying submarine *I-122*. They were

less capable than the more modern 1st and 3rd Squadron boats. Although *RO-103* sank two medium sized transports near Guadalcanal in June, two boats were lost in the same area. An American destroyer sank *RO-34* while two American PT boats destroyed *RO-102*.¹²⁵

The aftermath of the Battle of the Bismarck Sea forced many boats operating in the Solomons and New Guinea area to interrupt their patrols. This "battle" developed from an attempt by the Japanese Army to run reinforcements into New Guinea to hold coastal bases against the Allied advance. A convoy of eight troopships and eight destroyers with fighter cover attempted to lift the troops to New Guinea. Alerted by *Ultra* intercepts, land-based bombers of US Army and Royal Australian Air Forces swarmed over the convoy on 2 March 1943. Swatting aside the Japanese fighter cover, the Allied aircraft sank all eight transports and four escorting destroyers. The surviving destroyers could only pick up a few survivors before they fled the area. A shocked Imperial Navy pulled four submarines from their patrols near the scene of the massacre and sent them to rescue survivors.¹²⁶

Given the inability of surface vessels to reach the now isolated New Guinea garrisons, Japan again pressed submarines into service to carry reinforcements and supplies to the garrisons at Lae and Buna. The 7th Submarine Squadron transported more than one thousand troops and 1,400 tons of supplies in forty-eight sorties without loss between March and June 1943.¹²⁷ Regardless of the fortunate lack of losses, submarines

could not carry enough supplies to maintain the New Guinea garrisons in the face of attack and Allied ground troops captured Lae in September 1943. The mission was a double failure for the boats of the 7th Submarine Squadron. While engaged in ultimately futile efforts to supply the Japanese Army, they were not hunting Allied shipping.

The brief experiments against Allied merchant shipping in the South Pacific came to an end with the resumption of the American offensive in the Solomons. On 30 June 1943, American forces seized Rendova Island south of New Georgia. RADM Harada Kaku's 7th Submarine Squadron had only three coastal defense boats at Rabaul with another two on patrols. RADM Harada ordered a concentration of his available submarines to attack invasion shipping.¹²⁸ The Japanese boats met with only moderate success but suffered heavy losses. Submarine torpedoes sank an American LST and a destroyer, while American ASW forces destroyed two boats, *RO-103* and *RO-107*, in the immediate aftermath of the landings. Losses in the area mounted, as an American ASW vessel sank *RO-101* in September 1943, while *RO-100* hit a mine near Bougainville in November. The four submarines lost in these operations would have been a small price to pay to halt the American noose tightening around Rabaul, but the losses were in vain. The submarines of the 7th Submarine Squadron were no more capable of stopping American landings in the South Pacific than the American Asiatic Fleet's boats had been able to stop the Japanese landings in the Philippines at the beginning of the war.

Since the Imperial Navy's Combined Fleet had not yet recovered from the hammering it suffered in the Solomons, Imperial Japanese Navy surface vessels were in no position to challenge the opening of the American Central Pacific offensive in late 1943. This direct route was preferred by United States Navy planners for the drive to Tokyo. American forces took their first steps in November 1943, with the landing of United States Marine Corps and Army troops to seize two atolls in the Gilbert Islands — Makin and Tarawa. Though Imperial Headquarters abandoned both Japanese garrisons to their fates, the Imperial Navy deployed aircraft and submarines to the area to attack American forces.

ADM Koga, commander of the Imperial Navy's Combined Fleet, wanted to use large numbers of submarines to attack American naval and amphibious forces. However, only eight large submarines and one coastal defense boat were available to contest the Gilberts landings.¹²⁹ Their use in the Gilberts by the Combined Fleet, and the orders issued by Sixth Fleet, demonstrated that the Imperial Navy's higher commanders had learned few lessons about undersea warfare during the Midway, Solomon Islands, or New Guinea campaigns.

The boats frequently shifted their patrol lines between the two islands that were the sites of the American landings. The submarines first formed picket lines east of Tarawa, then shifted north to Makin as the Imperial Headquarters received reports of

American naval positions.¹³⁰ Sixth Fleet subjected its submarines to a barrage of orders and the attempts to micromanage submarine operations led to a disaster.

The only success scored by the Imperial Navy's submarines in the Gilberts was sinking the escort carrier *USS Liscome Bay*. *I-175* torpedoed and sank her with heavy casualties near Makin Island on 25 November 1943, while the carrier was providing air cover over the invasion beaches. However, Imperial Navy submarines paid an exorbitant price for this victory. *I-169* and *I-174* were fortunate and escaped with only minor damage. However, as the understated Japanese report of the battle concludes, "the other [seven] submarines did not return to base."¹³¹ This staggering loss rate led ADM Koga to order the cessation of submarine operations in the Gilberts on 4 December 1943. It is no coincidence that when American forces landed in the Marshall Islands in 1944, the Imperial Navy launched no major submarine effort against the American landings. Sixth Fleet sent only two submarines to pick up downed Japanese aircrews and American ASW forces destroyed both boats.

American and Canadian forces increased pressure on the Japanese-held islands in the Aleutians. American and Japanese naval forces clashed in the area and the threat of interception by American cruisers led the commander of the Japanese Northern District to turn to his I-boats to supply the garrisons at Attu and Kiska. Northern District pulled eight submarines from active patrols to carry critical supplies. The boats carried out these

operations without loss, but effectively removed a significant number of the Northern District's boats from the Japanese order of battle.

The American invasion of Attu in May 1943 found only three Japanese submarines patrolling waters around the island. The Japanese boats lacked radar and were particularly vulnerable in the poor visibility of the frequently foggy region. American ASW forces sank one I-boat and damaged another without the submarines impairing the American invasion force. A force of six midget submarines based at Kiska never became operational due to the lack of support facilities.¹³²

After American troops landed on Attu and annihilated the Japanese garrison, Imperial Headquarters deemed Kiska untenable given the American forces and assigned thirteen submarines of the Northern District to evacuate the garrison.¹³³ The operation began at the end of May 1943, and the toll on the Imperial Navy's submarine force mounted quickly. Two boats were lost in the first two weeks of June and RADM Kota Takero, a staff officer of the Northern District, suspended the submarine operation in light of the heavy American ASW presence.¹³⁴ Imperial Headquarters, desperate to retrieve the garrison, ordered the operation resumed and quickly suffered another loss. *I-7* was attacked while on the surface by an American destroyer she could not see in the fog. Her attacker, *USS Monaghan*, ruthlessly used radar directed guns to shell the hapless I-boat. The crippled submarine beached itself to avoid sinking and was a total loss with heavy casualties.¹³⁵

After losing a third submarine in a two-week period, the Northern District suspended the use of submarines to evacuate the trapped Kiska garrison. For all their efforts, the boats retrieved only nine hundred of the seven thousand man garrison. A force of cruisers and destroyers finally rescued the remaining troops in July. The submarine force had again paid a heavy price for the shortsighted nature of the Imperial Headquarter's planning and doctrine.

The Japanese submarine force started 1943 with a revised battle doctrine for their boats in a naval service that still sought a climactic clash between opposing battle lines. The lessons of the war led the Imperial Navy's submariners to call for a *guerre de course*, but heavy losses suffered by the Imperial Fleet at Midway and the battles around Guadalcanal meant that submarines were incorporated even more tightly into the planned decisive battle. Japanese planners still expected submarines to provide forward reconnaissance of American bases and warn of any sortie. Once the American fleet was operating away from its land-based air cover, some submarines were to slip behind it and prevent its retreat to the safety of its air cover. Japanese auxiliary forces, including submarines, were to launch repeated night torpedo attacks to prepare the way for a decisive clash of the opposing battlelines.

This continued reliance on the Imperial Japanese Navy's battleships may seem odd given the success of its carrier forces early in the war and the battleship's relative decline as an independent arbiter of sea power. However, the heavy losses suffered by

the Imperial Navy's carriers and their air groups left the Combined Fleet with little else to offer but its intact core of battleships. Of particular interest in the revised instructions was the insistence that submarines prevent an expected retreat of the defeated American fleet.¹³⁶ When the expected decisive clash of the American and Japanese battle fleets did not occur in 1943, the Imperial Navy's submarines continued to be forced into missions for which they were neither trained nor designed.

As a result, the Imperial Navy's 1943 submarine operations were a series of disasters from which the submarine force never recovered. The Imperial Navy lost twenty-seven submarines in 1943, a staggering total that represented more than one third of its submarine assets available during the year. Japan's submarines sank only 299,959 tons of Allied shipping. German losses in the same year were eighty-seven boats, but the Germans sank more than two million tons of shipping in the Atlantic alone.

The paltry returns of the Japanese effort resulted from poor planning and the limited number of submarines available. It is worth noting that German submarine losses in 1943 exceeded the total number of submarines available to the Imperial Navy. The Imperial Japanese Navy scattered its limited submarine assets throughout the largest battlefield in the world in response to local tactical emergencies rather than being wielded as the single strategic weapon demanded by Japanese doctrine. Indeed, at the time, the US Navy believed that the Imperial Navy was intentionally reserving its submarines to counter future Allied advances.¹³⁷

Logistical and transport operations absorbed a great deal of the effort of the Imperial Navy's submarine force and led to many losses. The almost criminal use of submarines as cargo vessels was a constant theme in 1943. Unfortunately, the Combined Fleet came to view submarine cargo operations as a normal procedure rather than an aberration and the Imperial Navy constructed several classes of unarmed transport submarines 1943 and 1944. The use of frontline submarines for regular transport duties was ludicrous in view of their miniscule carrying capacity and pulled many of the limited number of boats off war patrols. These operations also had an extremely high price tag for the submarine force and were extremely corrosive to the submariners' morale.

The Imperial Navy's brief flirtation with commerce raiding returned good results with only moderate losses but died in face of the overwhelming need for submarines for other missions. Much like their use as transports, the use of submarines on reconnaissance missions or in response to Allied landings was a matter of necessity rather than choice. Imperial Navy submarines often represented the only force capable of performing the missions they were given, even if the missions came at the expense of commerce raiding.

Operations in 1943 broke the back of the Imperial Navy's submarine forces much as the previous year's actions had destroyed the elite elements of Japan's carrier arm. Though twenty-seven boats sunk seems small, the return for the lost boats was even smaller. Heavy losses in all classes of shipping strained Japanese shipbuilding capacity

beyond its ability to keep pace with losses. Japanese industry was unable to build enough hulls to strengthen the Imperial Navy in comparison to the industrial power behind the American fleet. American shipbuilding meant that each Japanese submarine faced a growing number of destroyers, escorts, and aircraft with increasing levels of experience and training. From 1943 on, operations of Imperial Navy's submarine force were directed more toward survival than attack.

Ultra and the submarine war

Communications are vital to prosecuting a submarine campaign. Due to the independent and long-range nature of submarine operations and the need to disseminate information for successfully prosecuting the Imperial Navy's intercept operations, the Japanese paid careful attention to developing submarine communications protocols with specific times for different types of communications with its boats. The Imperial Navy made efforts to centralize communications and repeated messages sent to the submarines over the long nightly communications period to ensure boats received their instructions. Standing orders directed submarines to broadcast only at specific times and switch frequencies to avoid detection by direction finders.¹³⁸ Unfortunately for the Imperial Navy, American cryptographic success in breaking Japanese codes rendered these measures meaningless.

It would be difficult to overestimate the impact of signal intelligence and code breaking had on the submarine campaigns of the Second World War. A large measure of the German success during the "Happy Time," the high tide of the German undersea effort, was attributable to the success of German naval intelligence in breaking Allied merchant and convoy codes. ADM King and ADM Nimitz gave unstinting praise, within the limits of secrecy, to American and British codebreakers for their ability to penetrate Japanese naval, merchant, and diplomatic codes. This Allied codebreaking effort, called Ultra, was crucial to far more than the occasional tactical emergencies such as the battle of

Midway. Ultra was a critical tool in the submarine war against Japan. Indeed ADM King credited Ultra intercepts with contributing to more than half the sinkings the American submarine force recorded against the Japanese merchant marine.

Intelligence and radio intercepts are even more critical to prosecuting a commerce destroying submarine campaign than they are to normal fleet operations. In most other types of naval combat, friendly units can count on some degree of outside aid in reconnoitering targets and conducting operations. Submarines have little aid in finding their targets, particularly in the vast expanses of the Pacific Ocean. Air reconnaissance is problematic at best, and aid from surface vessels impossible due to the very conditions that necessitate using a submarine in the first place. By their nature, submarines generally operate in waters where conventional surface craft cannot for fear of being detected and destroyed.

The result is that submarines often had to rely on their own systems for detecting and engaging targets. During World War II, this often meant detecting targets visually or, for American submariners, by radar. When combined with the low speed of 1940s generation diesel-electric submarines, this short detection range meant that the difference between a target that escaped and one that was engaged was measured in hundreds of yards. Without any sort of intelligence on enemy movements, it required a vast number of boats or the presence of natural choke points to generate any reasonable number of intercepts. The German Kriegsmarine experienced difficulty in finding targets even with

submarine bases within a few hundred kilometers of their patrol zones and a relatively discrete area (the Western Approaches to the United Kingdom) toward which merchant ships had to sail. The problem of generating submarine intercepts in the vast distances of the Pacific was enormous. Submarine patrol zones were thousands of miles from their bases rather than the few hundred in the Atlantic.

The difficulty facing Japanese submarines becomes clearer when the number of available boats is considered. The Imperial Japanese submarine force attained its apex in 1943 when Japanese submarine strength reached seventy operational boats. The total seems impressive until the scope of the campaign is considered. Nearly a quarter of the boats were short range "RO" type coastal boats unsuited for long range patrols. Another quarter to one third of the submarine force was unavailable at one time or another for refits, repairs or were enroute to or from their patrol zones. With one submarine squadron (six to eight boats) deployed off Australia and another one to two squadrons (six to sixteen boats) in the Indian Ocean, the problem becomes clear. Even assuming minimum deployments to Indian Ocean and Australian waters (twelve boats total), only twenty to twenty four boats were available for operations in the Central and Eastern Pacific. This situation forced the Japanese to attempt to patrol the largest battlefield in the world with fewer submarines than the Germans would often deploy against a single convoy.

Before the use of Ultra against Japanese shipping lines, American submariners were sinking ships at a rate comparable to that of Japanese submarines. Early in the war, Japanese and American submarines tried to patrol known transit points and bases, but these areas were also the focus of ASW efforts. With Ultra providing intelligence on the Japanese shipping lines, open ocean intercepts could be generated away from the well protected base areas and the success rate of American submarines rose astronomically. The effects of Ultra on American submarine successes would be almost impossible to overstate. The *Maru* code used by the Imperial Navy not only gave the number of ships, escorts, cargoes and destinations, but it also provided noon positions.¹³⁹

But SIGINT and cryptographic successes affected more than the ability of American submarines to find their targets. The same cryptographic tools that aided American submariners in finding their targets proved a lethal weapon against the Japanese submarine effort. Allied ASW commanders were able to accurately plot and track Japanese submarine patrols throughout most of the war and route important movements around their positions. A frightening percentage of Japanese submarines were destroyed as a result of Ultra intercepts. A few examples will demonstrate the lethality of Ultra and SIGINT against the Japanese submarine force.

American radio intelligence noted the association of submarine call signs and logistics headers on messages for the Japanese Guadalcanal garrison in late 1942 and early 1943. This led to two separate ambushes of Japanese submarines involved in supply

attempts for the troops on Guadalcanal. When the Japanese submarine *I-3* arrived off Guadalcanal on December 9, 1942 to offload supplies, it surfaced between two American PT boats laying in wait for it. The PT boats torpedoed and destroyed the submarine as she began to unload supplies. This success led to a temporary halt on using submarine resupply.¹⁴⁰ On January 29, 1943, Allied forces set another ambush for an incoming submarine supply run. Submarine *I-1* was approaching Guadalcanal in the early morning hours when two New Zealand corvettes attacked and destroyed it in a wild melee of gunfire and ramming. The ambush was no lucky coincidence. The two corvettes had been alerted by American intelligence of the submarine's schedule.¹⁴¹

The two largest scores of Japanese submarines by individual vessels were also the result of Ultra intercepts. The American destroyer escort *England* achieved her record score of six submarine kills as she operated with an ASW hunter killer group that rolled up a Japanese picket line of submarines pinpointed by Ultra in May 1944. Early in 1945, Ultra intelligence indicated that the Japanese planned to evacuate vital trained air personnel from Luzon by submarine. The American navy deployed four submarines to ambush the evacuation effort. The submarine *Batfish* destroyed three Japanese boats tasked with the evacuation in the first few days of February 1945.

Ultra was also instrumental in halting the exchange of critical war materials between Germany and Japan. The two co-belligerents could only communicate through radio or submarine contact and both sides ran boats to rendezvous with one another to

trade rare Japanese raw materials for German technical goods. As recounted earlier, *I-30* successfully ran all the way to occupied France and returned to Singapore with German technology where she struck a mine and sank. Over the course of the war, four Japanese submarines departed for Germany loaded with raw materials and only one completed the journey.

Ultra-plotted ambushes led directly to the loss of two boats trying to make the trip between Empire waters and Europe. *I-29* departed for Germany in December 1943 and safely arrived in France in March 1944. Allied radio intelligence tracked her in the Atlantic but could not intercept her before the big I-boat reached sanctuary. She was then loaded with German technical data and blueprints for jets and rockets. Allied radio intelligence tracked *I-29* when she left Lorient and on 29 July 1944 intercepted a detailed itinerary and cargo manifest from *I-29* itself. ADM Nimitz deployed three American submarines to intercept her on *I-29*'s final leg of the journey from Singapore to Japan. With the intercepted information giving *I-29*'s course, speed and route it is hardly surprising that one of the lurking American boats ambushed and sank her after she left Singapore.

I-52 suffered a similar fate in an ocean thousands of miles away. She departed for Germany in April 1944, loaded with gold bullion worth \$2.3 million, quinine, rubber, and other raw materials. By June, she was in the Atlantic and had rendezvoused with a U-boat to pick up a German liaison officer. *Ultra* intercepts tracked *I-52* as she journeyed

across the Indian Ocean but Allied forces were never in a position to intercept her. German radio instructions to *I-52*, detailing the rendezvous point and the safest course to follow afterward, doomed the Japanese boat. Allied intelligence intercepted the message detailing the rendezvous two weeks before its occurrence. The U-boat's log reported that a patrol plane forced her to dive only a few miles from the rendezvous as it scoured the area with spotlights and flares. The I-boat was not as lucky. It was detected by the radar of a TBM Avenger bomber flying off the escort carrier *Bogue*. The Avenger attacked the surfaced I-boat with two depth charges and then dropped an acoustic homing torpedo that struck the I-boat as she started to dive, sinking her with all hands.¹⁴²

Ultra was not only critical to the destruction of Japanese submarines or the vectoring of American boats to their targets, it was also essential to the American ability to avoid Japanese submarine ambushes. When a Japanese submarine torpedoed the American aircraft carrier *Wasp* in 1942, Admiral Nimitz sent a scathing letter to Admiral Noyes, commander of the *Wasp's* task force. In essence Nimitz accused Noyes of operating at slow speeds in an area patrolled by Japanese submarines. Noyes replied that his forces had never operated in that area and that there was no special warning of Japanese submarines. It was extremely unusual for the easygoing Nimitz to berate an admiral in such a direct manner. The exchange of letters between the two admirals indicates that Nimitz believed there were Japanese submarines nearby and expected Noyes to know of their presence. It is interesting to note that Admiral Fletcher managed

to have a significant portion of the pre-war American carrier force sunk under his command at various times without any reprimand, but Noyes never again commanded carriers in combat.

Overall, the presence and use of Ultra and SIGINT were other nails in the coffin of the Imperial Navy's submarine force. Radio intelligence allowed the USN to vector its submarines into position while routing its own forces around the IJN submarines. It also made the rapidly expanding American ASW forces far more effective in prosecuting the war against the beleaguered Japanese submarine force. The Japanese habit of making radio reports at night allowed American direction finding equipment at Dutch Harbor, Oahu, Samoa and Midway to accurately plot the positions of many I-boats even in periods where Japanese codes resisted decryption.¹⁴³ Indeed by mid-1943 submarine warnings in the Atlantic and Pacific theaters were sometimes sent within twenty minutes of an intercepted submarine transmission.¹⁴⁴

Japan's limited success in code breaking was a factor in both the successes and failures of its submarine war. The overall inability of the Imperial Navy's radio intelligence organs to penetrate Allied codes placed their forces in a difficult position and limited their ability to surprise the Allies or respond to Allied attacks.¹⁴⁵ The one exception corresponds to a bright spot of the Japanese Navy's submarine war — operations in the Indian Ocean. The Japanese cryptographic group, Tokumu Han, succeeded in cracking BAMS, the basic Allied merchant code used by convoys.¹⁴⁶

Though the Imperial Navy's submarine force was often unable to take advantage of the information provided due to their subservience to the Combined Fleet, boats in the Indian Ocean assigned to commerce raiding profited from the early warning of the sailing of Allied convoys.

Conclusion

Did the submarines of the Imperial Navy succeed or fail? Such a question defies a simple answer and inspires a host of conditional responses. At the simplest level, Imperial Japan lost the war and that would lend credence to the theory that the submarine effort of the Imperial Navy was a failure. It is sobering to consider that Germany's four leading submarine aces sank more Allied tonnage than the entire Japanese undersea force.*

The Imperial Navy was never able to fight the type of war for which it had trained and planned. For no portion of the Imperial Navy was this more true than of submarines. The Imperial Navy built its submarines to hunt slow American battleships and auxiliaries. They had a high surface speed, excellent range with significant firepower, and were designed to conduct offensive warfare. Because of their design, they were large and unwieldy underwater, slow to change depth and unable to dive very deeply. These factors combined to make Japanese submarines exceedingly vulnerable to attack by Allied ASW forces and led to heavy losses.

The use of submarines as transport forces was an almost criminal misuse of the Imperial Navy's submarines. The submariners despised transport missions and the missions led to heavy losses among the boats involved. Problems with the use of submarines as supply vessels were legion, but were primarily centered on the tiny cargo capacity, narrow fittings of the boats and limitations on the size and nature of cargo that

could be carried. Submarines could be used to insert or even retrieve troops into a theater, but they simply could not carry enough supplies to maintain any sizable force on their own.

The design and construction of special submarines as cargo vessels dealt with the symptoms of submarine supply, rather than the underlying problem. These special cargo submarines could carry supplies more effectively than a cruiser or fleet boat, and arguably freed up combat submarines for other missions. This overlooks the fact that every supply submarine that was constructed represented a drain on the materials and manpower for one less potential combat submarine. Though the Imperial Navy would convert many supply submarines to carry the *Kaiten* manned torpedoes, they were less maneuverable than the fleet boats and even more vulnerable to detection and destruction. However, the use of submarines to supply the isolated garrisons of the Imperial Army was seen as critical to Army-Navy cooperation.¹⁴⁷ Given the general lack of cooperation between Japan's two services, any efforts to improve them were seen as vital to getting Army agreement to Navy proposals and construction priorities.*

* *U-48* sank 312,420, *U-99* sank 244,749, *U-123* sank 244,040, and *U-124* sank 224,053 tons of Allied shipping during the war. These four submarines accounted for more than one million tons of Allied shipping. See Axis Submarine Successes and Aces of the Reich.

* While inter-service conflicts are common, they reached new heights in the competition between the Imperial Army and Imperial Navy during the Second World War. The two services maintained completely separate R&D programs, refused to share materials such as aircraft engines, or even information in such critical fields such as radar development. The relations between the two services were so bad that in one aircraft factory where both services maintained design teams which separated their work areas with a huge curtain to prevent "spying" by their sister service. The most extreme example of this bureaucratic infighting was the decision by the Japanese Army to commission not one, but two classes of submarines to carry supplies to isolated army garrisons. These boats were built without any naval cooperation in the last two years of the war and crewed by Japanese Army personnel. A total of twenty six boats of the *Yu* and

The submarines of the Imperial Navy also suffered from their subordination to the needs of the battle fleet. Under the decisive battle doctrine of the Imperial Navy, light units such as the submarine force were attrition units. The Japanese navy expected that its submarines would suffer heavy losses, but hoped that they would inflict correspondingly heavy losses on the American battle fleet while preserving the capital units of the Imperial Navy intact. However, the anticipated decisive battle never occurred. Instead the boats were rushed from one grinding attrition battle to another.

The submarines of the Imperial Navy were never used as a strategic offensive weapon in the concentrated manner of American boats, despite the existence of the Sixth (Submarine) Fleet as an active headquarters. Instead, the boats were split between the Sixth Fleet and the Combined Fleet and parceled out among area fleets for local defense. Only in missions for the Pearl Harbor and Midway operations were a majority of Imperial Navy submarines concentrated under a single command and, on both occasions, they were consolidated under the Combined Fleet rather than the submarine force.

In later operations, the boats were used in a tactically defensive role against American landings, a mission for which they were not designed nor the for which the crews were trained, and which brought high losses. Such missions brought the I-boats into conflict with first line American ASW forces deployed in heavily protected and patrolled areas and losses reflected that fact. Consequently, entire squadrons of Imperial

Yu1001 classes were laid down or completed, but other than two surrendered to American forces at the end

Navy submarines would be decimated in operations against the concentrated American naval forces.

The precious advantage that *Ultra* presented to American submariners and ASW forces is another factor to be considered in weighing the success of the Imperial Navy's submarine forces. This knowledge accounts for a great deal of the success of American submarines and a number of the losses of their Japanese counterparts. *Ultra's* success in helping American task forces and convoys avoid Japanese submarines may never be fully revealed but the impact was critical.

Japanese submarines also suffered from the handicap of entering the war against a navy with a substantial lead in ASW tactics and technology. The British Royal Navy had been dueling Germany's U-boats for more than two years before the beginning of the Pacific War and many of their hard learned lessons had been passed on to the United States Navy. Additionally the American ASW forces had received several months of on the job training before the bombing of Pearl Harbor during the undeclared, but very real, naval war with Germany in 1941. American destroyer commanders used their ASW tactics against the foremost practitioner of submarine warfare for months before going into action against the submarines of Japan.

The effect of American industrial production must also be considered when examining the success or failure of Japan's submarine war. The United States built more

of the war the fate of the vessels remains a mystery.

than 1,000 destroyers and destroyer escorts in its own shipyards. Though most of these vessels were deployed in the Atlantic to combat the U-boats, the central position occupied by the Allies meant that as the U-boat threat diminished more and more ASW forces were shifted to the Pacific. Even if Imperial Navy's submarines had ruthlessly pursued a commerce raiding campaign, the huge number of Allied ASW vessels would have limited their success even without the benefit of *Ultra*. With *Ultra*, the advantage possessed by American ASW forces was overwhelming.

Yet, it would be a mistake to characterize the efforts of Japan's undersea forces as meaningless or futile. Several operations launched by Japanese submarine forces were bold, imaginative, and effective. The use of submarines as reconnaissance platforms ran contrary to American doctrine but the submarines, and the floatplanes they carried, represented the only strategic reconnaissance platforms able to operate deep in Allied territory that were available to the Imperial Navy. These reconnaissance missions often returned vital intelligence to the headquarters of the Combined Fleet of the state of enemy forces at strategic points such as Sydney, Pearl Harbor, and Diego Suarez.

Contributions made by submarine force during the critical Solomon Islands campaign are noteworthy. Sinking two carriers in 1942, and the damage caused to the carrier *Saratoga* by Japanese submarines, presented the Imperial Navy with an opportunity to regain the numerical advantage in aircraft carriers that they had lost at Midway. For a time, the damaged carrier *Enterprise* was the only remaining American

carrier in the South Pacific and the Japanese had a chance to crush the American foothold at Guadalcanal and gain a breathing space for further operations. A great deal of the credit for creating this situation must go to the submarine force.* It was required to operate as an adjunct to the fleet by doctrine and design, and it fulfilled its purpose of balancing the odds for the Imperial Navy to fight a decisive battle with the United States Navy for control of the Pacific.

An interesting trend becomes apparent when the submarine forces of the three major submarine navies, Germany, the United States, and Japan, are compared. The number of operational submarines can be compared to the total tonnage of shipping sunk by each submarine force to reach a rough estimate of "tonnage per boat." Submarines of the German Kriegsmarine were, not surprisingly, the most effective in tonnage sunk. German submarines sank nearly 17.5 million tons of shipping with a total submarine force of 1198 boats — 17,529 tons per U-boat. The United States Navy's submarine force came in a near second with 4.7 million tons of shipping destroyed by 315 submarines — 14,920 tons per boat. The submarines of the Imperial Navy came in a distant third with 149 boats (18 of which were built as unarmed transports) sinking 980,891 tons — a total of 6,583 tons per I-boat. On the surface, that would seem to indicate German U-boats were nearly three times and American boats twice as effective as their Japanese

* Through the Second World War aircraft sank a total of 20 aircraft carriers of 342,000 tons while submarines sank 15 carriers of 306,000 tons. *USS Yorktown* was crippled at Midway by aircraft and is therefor attributed to the aircraft total in this count even though she was actually finished off by submarine. See Fleet Tactics and Coastal Combat by CPT Wayne Hughes Jr.

counterparts. But German U-boats achieved the majority of their successes during the "Happy Time" early in the war before Allied ASW efforts hit full stride. Of the 17.5 million tons of shipping the Germans sank, they sank nearly fourteen million before 1943. The success rates of all Axis submarines plummeted after 1942 as Allied ASW forces gained experience and strength.

American sinking rates seem substantially more efficient than what Japanese submarines accomplished in the same amount of time, but looking purely at these numbers ignores the realities faced by the two navies. The vast majority of successes achieved by American submarines came after 1943. The extremely deficient torpedoes used by the United States Navy were finally put right in 1943, and the increasing use of *Ultra* intelligence generated a far higher number of intercepts. The proliferation of radar on American boats and the inability and unwillingness of the Imperial Navy to protect commerce shipping sealed the fate of the Japanese merchant marine. It is impossible to quantify the effect of the attrition of Japanese destroyer strength or the use of *Ultra* intelligence to allow American submarine wolfpacks to overwhelm Japanese convoys, but there can be no doubt that they increased the lethality of American submarines.

The failure of the Imperial Navy's submarine force demonstrated flaws in Japanese planning at a strategic level. The Imperial Navy never used its submarine force in the way it had been designed. The boats of the Imperial Navy were designed according to a doctrine that saw victory in the decisive battle as the ultimate goal of any naval force

and were uncompromisingly oriented toward that objective. The subordination of the Imperial Navy's submarine forces to the needs of the fleet saw Japanese boats being parceled out in support of fleet operations. The allocation of submarines to operations in the South Pacific during the early days of the war was particularly suspect. These boats could have been better employed to reinforce submarines operating off Hawaii or the American coast and the patrols should have been maintained over a much longer duration than the Sixth Fleet was able to establish. By early 1942, the United States Navy had eliminated convoying between the Pacific Coast and Hawaii as unnecessary, given the lack of Japanese submarine activity in the area.¹⁴⁸

The Japanese Navy was quite aware of the opportunities to use submarines as commerce raiders and foresaw their use against merchant ships when the needs of the battle fleet did not intrude. But the Imperial Navy was too small, in comparison to its foes, to permit any use of forces that did not directly contribute toward victory in the decisive battle. The Imperial Navy argued that a commerce campaign against the United States could not succeed and would never end the war on Japanese terms. It was acceptable for Germany to wage a long attrition campaign in the Atlantic to gain time to defeat Russia in the East before turning back to the West. Japan did not have the luxury of planning for a long war. If the Imperial Navy did not win a war ending victory quickly it would be forced to try to preserve its strength while attriting the power of the Allied

navies. A strategy focused on commerce raiding would have made Japan's submarines more effective but it would not win the war.

The Imperial Navy's submarine force would be a vital element in either case. A commerce raiding campaign in the Pacific would lengthen the war and make Allied victory more costly, but a *guerre de course* could never lead to victory. Victory was the goal that the Imperial Navy sought and it would require every vessel of the Imperial Navy, perfect planning and execution, and a great deal of good fortune to achieve.

The required planning and good fortune were not present in the Pacific after 1942. Having invested everything in a long shot bid to win the war outright, there was no way for the Imperial Navy to change course in mid-stream. Submarines of the Imperial Navy faced an ever-increasing number of American ASW platforms equipped with advanced detection gear and the priceless advantage of radio intelligence. Eventually Japan's submarines were reduced to a sort of naval *banzai* as they were thrown time and again into the teeth of American task forces attempting to stem the tide of American offensives. Japan's inability to win the war quickly meant the I-boats faced the same options as the remainder of Imperial Japan's armed forces — to surrender or die.

The war plan for Imperial Japan was not a single gamble but rather a long series of gambles for victory. Japan's leaders felt these risks were necessary if their country was not to be reduced to a second-rate power. Ultimately, the Japanese strategy was a political, strategic, and military failure. Japan's opening gambits created the illusion of

great success but provided no clear progress towards ending the war on favorable terms. Japan's war in China could have served as a potent warning to those Japanese leaders willing to heed its lessons. The early and stunning Japanese successes in China only led it further and further into the vast interior. The result left Japan holding more territory than it could control with no means of forcing the Chinese Nationalists or Communists to accept a peace treaty. The same result would occur on a massive scale during Japanese operations in the Pacific in the opening months of the war. Swift and dramatic successes against the Western Allies left Japan in possession of more territory than she could safely control and no closer to threatening American or British vital interests to force a peace.

The submarines of the Imperial Navy fulfilled vital roles in the war plans of Japan. They carried out strategic reconnaissance of Allied positions and ports from South Africa to San Diego. They inflicted heavy warship losses on the United States Navy at a time when the balance of naval power in the Pacific was fragile and presented the Imperial Fleet an opportunity to seek its decisive battle on relatively even terms in 1942 and early 1943. Though its bid for victory in the Pacific failed, it is to the credit of the Imperial Navy and its submarine forces that they came as close as they did to permanently altering the balance of power in the Pacific. The submarine arm of the Imperial Navy fought well within the limitations of its equipment and doctrine. The outcome of the Imperial Navy's submarine campaign did not cost Japan the war. However, operating with a flawed doctrine and hampered by too many demands on too

few resources, Japan's submarines were not able to secure control of the Pacific in the face of growing American naval might and a willingness to fight the war to conclusion. Even after hopes of victory had faded, the submariners of the Imperial Navy continued to go out on patrol in the face of fearful odds. Any warrior of ancient Nippon would have appreciated the understanding of bushido exhibited by Japan's undersea samurai.

Endnotes

- ¹ United States Strategic Bombardment Survey, Interrogation of ADM Toyoda, Interrogation of Japanese Officials Vol 2, (Washington, Government Printing Office, 1946), 326.
- ² James Tritten, "Naval Perspectives for Military Doctrine," Paper, Defense Technical Information Center website; 1994, 6.
- ³ Ernest Dupuy and Trevor Dupuy, The Encyclopedia of Military History (New York: HarperCollins Publishers, Inc., 1993), 947-948.
- ⁴ David Walder, The Short Victorious War: The Russo-Japanese Conflict 1904-1905 (New York: Harper and Row Publishers, Inc., 1973), 287-288.
- ⁵ David C. Evans and Mark Peattie, Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941 (Annapolis, MD: Naval Institute Press, 1997), 108-109.
- ⁶ A. T. Mahan, The Influence of Sea Power Upon History, 1660-1783, 6th ed., (New York: Dover Publications, Inc., 1987), 540.
- ⁷ Arthur Marder, Mark Jacobsen and John Horsfield Old Friends and New Enemies: The Royal Navy and Imperial Navy. Vol II: The Pacific War - 1942-1945 (Oxford: Clarendon Press, 1990), 162.
- ⁸ Carl Boyd and Akihiko Yoshida, The Japanese Submarine Force and World War II (Annapolis, MD: Naval Institute Press, 1995), 14.
- ⁹ Thomas H. Buckley, The United States and the Washington Naval Conference (Knoxville: The University of Tennessee Press, 1970), 345.
- ¹⁰ H.P. Willmott, Empires in the Balance: Japanese and Allied Strategies to April 1942 (Annapolis, MD: Naval Institute Press, 1982), 36.
- ¹¹ Ernest Andrade Jr., "The Naval Limitation Treaties and the Submarine, 1921-1936." in Proceedings of the Citadel Conference on War and Diplomacy. Ed. David White and John Gordon. (Charleston, SC: The Citadel Development Foundation, 1977), 55.
- ¹² Sadao Asada, "From Washington to London: The Imperial Japanese Navy and the Politics of Naval Limitation, 1921-1930" in The Washington Conference, 1921-1922: Naval Rivalry, East Asian Stability and the Road to Pearl Harbor. Erik Goldstein and John Maurer ed. (Essex, UK: Frank Cass & Co. Ltd, 1994), 148.
- ¹³ Evans and Peattie, Kaigun, 195.
- ¹⁴ Andrade, "The Naval Limitation Treaties and the Submarine, 1921-1936," 57.
- ¹⁵ Masanori Ito and Roger Pineau, The End of the Imperial Japanese Navy (New York: W.W. Norton, 1956) 23.
- ¹⁶ U.S. Congress, Senate, Committee on Naval Affairs, The Decline and Renaissance of the Navy, 1922-1944, report prepared by Senator David Walsh, 78th Cong., 2nd sess., 1944, p. 9.
- ¹⁷ Edward Miller, War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945 (Annapolis, MD: Naval Institute Press, 1991), 162-163.
- ¹⁸ Stephen T. Ross, ed. American War Plans 1919-1941, Vol. 2, Plans for War Against the British Empire and Japan: The Red, Orange, and Red-Orange Plans, 1923-1938 (New York: Garland Publishing, Inc., 1992), 96.
- ¹⁹ Willmott, Empires in the Balance, 126.

²⁰ Clay Blair, Silent Victory- The US Submarine War Against Japan (New York: J.B. Lippincott Company, 1975), 67.

²¹ Gary Weir, Building American Submarines, 1914-1940 (Washington, DC: Naval Historical Center, 1991), 40.

²² Weir, Building American Submarines, 46.

²³ Evans and Peattie, Kaigun, 204.

²⁴ Ibid.

²⁵ Kawamura Yoya. KTB, "History of the Japanese Submarine Navy - Part I." Vol 104 (Internet Article).

²⁶ Boyd and Yoshida, The Japanese Submarine Force, 44.

²⁷ Ibid.,6.

²⁸ Evans and Peattie, Kaigun, 218-219

²⁹ This excerpt and the remainder of the paragraph are from "Boeicho Boeikenshujo Senshibu, Kaisen yomurei (Navy battle regulations) (1934)" as translated by Carl Boyd, The Japanese Submarine Force in World War II, 191-195.

³⁰ Boyd and Yoshida, Japanese Submarine Force, 19.

³¹ Erminio Bagnasco, Submarines of World War Two (London: Cassell & Co., 1973) 182.

³² Ibid., 16.

³³ Ibid., 186.

³⁴ Evans and Peattie, Kaigun, 428.

³⁵ Ibid.

³⁶ Ibid., 429.

³⁷ Ibid., 430

³⁸ Ibid., 431.

³⁹ Ibid., 432.

⁴⁰ Ibid.

⁴¹ Japanese Monograph Series No. 102 Submarine Operations December 1941 - April 1942 (Washington, DC: Dept of the Army, Office of the Chief of Military History, 1947), 1.

⁴² Japanese Monograph Series No. 160, Outline of Naval Armament and Preparations for War (Washington, DC: Dept. of the Army, Office of the Chief of Military History, 1947), 35.

⁴³ Submarine Operations December 1941 – April 1942, 3.

⁴⁴ Japanese Monograph Series No. 97, Pearl Harbor Operations: General Outline of Orders and Plans (Washington, DC: Dept of the Army, Office of the Chief of Military History, 1947), 28-29.

⁴⁵ Submarine Operations December 1941 – April 1942, 9.

⁴⁶ Shigeru Fukudome, "Hawaiian Operation." US Naval Institute *Proceedings*. 81 (December 1955): 1326.

⁴⁷ Ibid.

- ⁴⁸ Boyd and Yoshida, The Japanese Submarine Force, 47.
- ⁴⁹ Submarine Operations December 1941 – April 1942, 17.
- ⁵⁰ Ibid., 19.
- ⁵¹ Ibid.
- ⁵² Boyd and Yoshida, The Japanese Submarine Force in World War II, 63.
- ⁵³ Submarine Operations December 1941 – April 1942, 23.
- ⁵⁴ Ugaki Matome, Fading Victory. Translated by Masataka Chihaya. (Pittsburgh, PA: University of Pittsburgh Press, 1991) 72.
- ⁵⁵ Japanese Monograph No. 102, 24.
- ⁵⁶ Dorr Carpenter and Norman Polmar, Submarines of the Imperial Japanese Navy (Annapolis MD: Naval Institute Press, 1986), 17.
- ⁵⁷ Submarine Operations December 1941 – April 1942, 69.
- ⁵⁸ Japanese Monograph Series No. 161 Inner South Seas Islands Area Naval Operations Part I: Gilbert Islands Operations (Washington, D.C.: Dept of the Army, Office of the Chief of Military History, 1947), 8.
- ⁵⁹ Boyd and Yoshida, 67.
- ⁶⁰ Clark Reynolds, "Submarine Attacks on the Pacific Coast", Pacific Historical Review 33 No. 2 (May 1964): 186.
- ⁶¹ "Submarine Bombards Santa Barbara" LA Times, Vol LXI, Feb 1942.
- ⁶² "Pearl Harbor Attack Surprised Foe, Too" New York Times, Sept 9, 1945.
- ⁶³ Submarine Operations December 1941 – April 1942, 35.
- ⁶⁴ Japanese Monograph Series No. 105, General Summary of Naval Operations, Southern Force (Dept. of the Army, Office of the Chief of Military History, 1947), 8.
- ⁶⁵ Japanese Monograph Series No. 107, Malaya Invasion Naval Operations. (Dept. of the Army, Office of the Chief of Military History, 1947), 8.
- ⁶⁶ Japanese Monograph No. 107, Malaya Invasion Naval Operations, 12-13.
- ⁶⁷ Ibid., 22.
- ⁶⁸ Ugaki, Fading Victory, 131.
- ⁶⁹ Japanese Monograph No. 110, 3.
- ⁷⁰ Arthur Marder, Mark Jacobsen and John Horsfield, Old Friends and New Enemies: The Royal Navy and Imperial Navy. Vol II: The Pacific War - 1942-1945 (Oxford: Clarendon Press: 1990), 158.
- ⁷¹ Japanese Monograph No. 110, 9.
- ⁷² Richard Bates, The Battle of the Coral Sea, 1-11 May 1942: Strategic and Tactical Analysis (Newport, RI: Naval War College, 1947), 15.
- ⁷³ David Jenkins, Battle Surface! Japan's Submarine War Against Australia, 1942-44 (Sydney: Random House Australia, 1992), 185.
- ⁷⁴ Japanese Monograph No. 110, 12.
- ⁷⁵ Jenkins, Battle Surface, 209.

- ⁷⁶ Japanese Monograph No. 110, 13.
- ⁷⁷ Marder et al, Old Friends New Enemies, 160.
- ⁷⁸ Marder et al, Old Friends New Enemies, 158-159.
- ⁷⁹ Japanese Monograph No. 110, 40.
- ⁸⁰ Japanese Monograph No. 110, 19.
- ⁸¹ The Battle of Midway: Strategical and Tactical Analysis (Newport, RI: US Naval War College, 1947), 26.
- ⁸² Japanese Monograph Series No 93, Midway Operations: May - June 1942 (Dept of the Army, Office of the Chief of Military History, 1947), 32.
- ⁸³ The Battle of Midway: Strategical and Tactical Analysis, 33.
- ⁸⁴ Japanese Monograph No. 110, 25.
- ⁸⁵ Fuchida Mutsuo and Okuyima Masatake, Midway: The Battle that Doomed Japan (Annapolis, MD: Naval Institute Press, 1955), 219.
- ⁸⁶ Japanese Monograph No. 93, 66.
- ⁸⁷ Thaddeus Tuleja, Climax at Midway (London: Dent, 1960), 189-190.
- ⁸⁸ Boyd and Yoshida, Japanese Submarine Force in World War II, 84.
- ⁸⁹ Japanese Monograph No. 92, 66.
- ⁹⁰ The Battle of Midway: Strategical and Tactical Analysis, 173.
- ⁹¹ H.P. Willmott, The Barrier and the Javelin: Allied and Japanese Pacific Strategies, February to June 1942 (Annapolis, MD: Naval Institute Press), 508.
- ⁹² Carl Boyd, "American Naval Intelligence of Japanese Submarine Operations Early in the Pacific War" Journal of Military History, Vol 53, No. 2, (Apr 1989), 183-184.
- ⁹³ Japanese Monograph No. 110, 29.
- ⁹⁴ Japanese Monograph No. 110, 33.
- ⁹⁵ Japanese Monograph No. 110, 35.
- ⁹⁶ Japanese Monograph No. 110, 45.
- ⁹⁷ Japanese Monograph No. 110, 45.
- ⁹⁸ Japanese Monograph Series No. 169, Outline of Naval Armament and Preparations for War Part IV: Situation from the Outbreak of War to Revised Fifth Naval Armament Replenishment Plan (Dept of the Army, Office of the Chief of Military History, 1947), 49.
- ⁹⁹ Dull, 181.
- ¹⁰⁰ Boyd and Yoshida, 93.
- ¹⁰¹ Ugaki, 201.
- ¹⁰² Japanese Monograph Series No. 98, South East Area Naval Operations, Part I - May 1942-February 1943 (Dept of the Army, Office of the Chief of Military History, 1946), 26.
- ¹⁰³ Boyd and Yoshida, 96.
- ¹⁰⁴ Ibid., 97.

- ¹⁰⁵ Richard B. Frank, Guadalcanal, 201.
- ¹⁰⁶ Boyd and Yoshida, 98.
- ¹⁰⁷ Japanese Monograph Series No. 98, South East Area Naval Operations, Part I - May 1942-February 1943, 20.
- ¹⁰⁸ *Ibid.*, 99.
- ¹⁰⁹ Japanese Monograph Series No. 98, 28.
- ¹¹⁰ Frank, 249.
- ¹¹¹ *Ibid.*, 249.
- ¹¹² Boyd and Yoshida, 102.
- ¹¹³ *Ibid.*, 104.
- ¹¹⁴ Paul Dull, A Battle History of the Imperial Japanese Navy, 1941-1945 (Annapolis, MD: Naval Institute Press, 1978), 242.
- ¹¹⁵ Japanese Monograph Series No. 98, 53.
- ¹¹⁶ Frank, 502.
- ¹¹⁷ Boyd, 105.
- ¹¹⁸ Clark Reynolds, "Submarine Attacks on the Pacific Coast." Pacific Historical Review, Vol 33, No.2, (May 1964) 191-192.
- ¹¹⁹ Boyd and Yoshida, 111.
- ¹²⁰ *Ibid.*, 116.
- ¹²¹ *Ibid.*, 123.
- ¹²² Japanese Monograph No. 161. 57.
- ¹²³ *Ibid.*, 57.
- ¹²⁴ *Ibid.*, 70.
- ¹²⁵ Boyd and Yoshida. 115
- ¹²⁶ Interrogation of CAPT Ohmae Toshikazu in "Battle of the Bismarck Sea" War in Asia and the Pacific 1937-1949 Vol 5: Naval Armament and Naval Operations (Part II) (New York: Garland Publishing, 1980), 32.
- ¹²⁷ Boyd and Yoshida, 116.
- ¹²⁸ Japanese Monograph Series No 99, Southeast Area Naval Operations - Part II, February-October, 1943 (Dept. of the Army, Office of the Chief of Military History, 1947), 33.
- ¹²⁹ Japanese Monograph No. 161, 22.
- ¹³⁰ Japanese Monograph No. 161, 52-53.
- ¹³¹ *Ibid.*, 53.
- ¹³² Japanese Monograph Series No. 88 Aleutian Naval Operations March 1942-February 1943, (Dept of the Army, Office of the Chief of Military History) 69.
- ¹³³ Dull, A Battle History of the Imperial Japanese Navy, 265.
- ¹³⁴ *Ibid.*, 83.

¹³⁵ Boyd and Yoshida, 119.

¹³⁶ Carl Boyd's translation of "Boeicho Boeikenshujo Senshibu, ed. *Rengo kantai sensaku* (Combined Fleet tactical instructions) rev. ed. (1943) in Boyd, The Japanese Submarine Force in World War II.

¹³⁷ Office Of Naval Intelligence, ONI220-J: Japanese Submarines as reprinted in Japanese Naval Vessels of World War Two as Seen by US Naval Intelligence (Annapolis, MD: Naval Institute Press, 1987), (Work is unpaginated).

¹³⁸ Japanese Monograph Series No. 118, Operational History of Naval Communications, December 1941-August 1945 (Dept of the Army, Office of the Chief of Military History, 1953): 228-230.

¹³⁹ Ronald Lewin, The American Magic: Codes, Ciphers and the Defeat of Japan (New York: Farrar Straus Giroux, 1983), 224.

¹⁴⁰ Japanese Monograph No. 98, 55.

¹⁴¹ Frank, 575.

¹⁴² Carl Boyd, "US Navy Radio Intelligence During the Second World War and the Sinking of the Japanese Submarine I-52," The Journal of Military History 63, No.2 (Apr 1999): 347-349.

¹⁴³ Carl Boyd, "American Naval Intelligence of Japanese Submarine Operations Early in the Pacific War," Journal of Military History 53, No. 2 (Apr 1989): 176.

¹⁴⁴ Carl Boyd, "US Navy Radio Intelligence During the Second World War and the Sinking of the Japanese Submarine I-52," 342.

¹⁴⁵ Harvey Ardman, "US Codebreakers versus Japanese Codebreakers in World War 2," American Legion Magazine, (May 1972): 42.

¹⁴⁶ "The Japanese Version of the Black Chamber" in War in Asia and the Pacific 1937-1949 Vol 5: Naval Armament Program and Naval Operations (New York: Garland Publishing, Inc.), 20.

¹⁴⁷ Torisu Kennosuke, "Japanese Submarine Tactics," Proceedings of the US Naval Institute 87, No. 2, (February 1961): 78.

¹⁴⁸ H.P. Wilmott, The Barrier and The Javelin: Japanese and Allied Pacific Strategies- February to June 1942 (Annapolis, MD: Naval Institute Press, 1983), 130.

References

- Andrade Jr., Ernest. "The Naval Limitation Treaties and the Submarine, 1921-1936." in Proceedings of the Citadel Conference on War and Diplomacy. Ed. David White and John Gordon. The Citadel Development Foundation, 1977.
- Ardman, Harvey. "US Codebreakers versus Japanese Codebreakers in World War 2" American Legion Magazine 92 No. 2, (May 1972): 18-23 and 38-42.
- Asada, Sadao "From Washington to London: The Imperial Japanese Navy and the Politics of Naval Limitation, 1921-1930" in The Washington Conference, 1921-1922: Naval Rivalry, East Asian Stability and the Road to Pearl Harbor. ed. by Erik Goldstein and John Maurer. Essex, UK: Frank Cass & Co. Ltd, 1994.
- Bagnasco, Erminio. Submarines of World War Two. London: Cassell & Co., 1973.
- Bates, Richard. The Battle of the Coral Sea, 1-11 May 1942: Strategic and Tactical Analysis. Newport, RI: Naval War College, 1947.
- Burdick, Charles and Donald Detwiler, ed. War in Asia and the Pacific 1937-1949 Vol 5: Naval Armament Program and Naval Operations. NY: Garland Publishing, Inc., 1980.
- Blair, Clay. Silent Victory- The US Submarine War Against Japan. New York: J.B. Lippincott Company, 1975.
- Boyd, Carl and Akihiko Yoshida. The Japanese Submarine Force and World War II. Annapolis, MD: Naval Institute Press, 1995.
- Boyd, Carl. "American Naval Intelligence of Japanese Submarine Operations Early in the Pacific War." Journal of Military History 53, No. 2, (April 1989): 169-189.
- Boyd, Carl. "US Navy Radio Intelligence During the Second World War and the Sinking of the Japanese Submarine I-52." Journal of Military History 63, No. 2, (April 1999): 339-354.
- Carl Boyd's translation of "Boeicho Boeikenshujo Senshibu, ed. *Rengo kantai sensaku* (Combined Fleet tactical instructions) rev. ed. (1943) in Boyd, The Japanese Submarine Force in World War II.
- Carpenter, Dorr and Norman Polmar. Submarines of the Imperial Japanese Navy. Annapolis, MD: Naval Institute Press, 1986.
- Dull, Paul. A Battle History of the Imperial Japanese Navy, 1941-1945. Annapolis, MD: Naval Institute Press, 1978.
- Dupuy, R. Ernest and Trevor Dupuy. The Encyclopedia of Military History. New York: HarperCollins Publishers, Inc., 1993.
- Evans, David C. and Mark R. Peattie, Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941. Annapolis, MD: Naval Institute Press, 1997.

- Evans, David, ed. The Japanese Navy in World War II: In the Words of Former Japanese Naval Officers. Annapolis, MD: Naval Institute Press, 1986.
- Fuchida Mutsuo and Okuyima Masatake. Midway: The Battle that Doomed Japan. Annapolis, MD: Naval Institute Press, 1955.
- Interrogation of CAPT Ohmae Toshikazu in "Battle of the Bismarck Sea" War in Asia and the Pacific 1937-1949 Vol 5: Naval Armament and Naval Operations (Part II) New York: Garland Publishing. 1980.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 88: Aleutian Naval Operations March 1942-February 1943. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No 93: Midway Operations: May - June 1942. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 97: Pearl Harbor Operations: General Outline of Orders and Plans. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 98: South East Area Naval Operations, Part I - May 1942-February 1943. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No 99: Southeast Area Naval Operations – Part II, February-October, 1943, Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 102: Submarine Operations December 1941 - April 1942. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 105: General Summary of Naval Operations, Southern Force. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 107: Malaya Invasion Naval Operations. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No 110: Submarine Operations in Second Phase Operations.

- Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 118: Operational History of Naval Communications: December 1941-August 1945. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 160: Outline of Naval Armament and Preparations for War. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 161: Inner South Seas Islands Area Naval Operations Part I: Gilbert Islands Operations. Washington, DC: Department of the Army, Office of the Chief of Military History.
- U.S. Military History Section, Headquarters, Army Forces Far East. Japanese Monograph No. 169: Outline of Naval Armament and Preparations for War Part IV: Situation from the Outbreak of War to Revised Fifth Naval Armament Replenishment Plan. Washington, DC: Department of the Army, Office of the Chief of Military History.
- Jenkins, David. Battle Surface! Japan's Submarine War Against Australia, 1942-44. Sydney: Random House Australia, 1992.
- Kawamura, Yoya. KTB. "History of the Japanese Submarine Navy - Part I." Vol 104 accessed 14 August 1999; available from <http://www.magweb.com/sample/sktb/sh104jap.htm>; Internet.
- Lewin, Ronald. The American Magic: Codes, Ciphers and the Defeat of Japan. NY: Farrar Straus Giroux, 1982.
- Mahan, A.T. The Influence of Seapower Upon History, 1660-1783. 6th ed. New York: Dover Publications, Inc., 1987.
- Marder, Arthur, Mark Jacobsen and John Horsfield. Old Friends and New Enemies: The Royal Navy and Imperial Navy. Vol II: The Pacific War - 1942-1945. Oxford: Clarendon Press, 1990.
- Marder, Arthur, Mark Jacobsen and John Horsfield. Old Friends and New Enemies: The Royal Navy and Imperial Navy. Vol II: The Pacific War - 1942-1945. Oxford: Clarendon Press, 1990.
- Masanori Ito and Roger Pineau, The End of the Imperial Japanese Navy. New York: W.W. Norton, 1956.
- Miller, Edward. War Plan Orange : the U.S. Strategy to Defeat Japan, 1897-1945. Annapolis, MD: Naval Institute Press, 1991.

Morison, Samuel Eliot. History of United States Naval Operations in World War II. Vol 3: The Rising Sun in the Pacific: 1931 to April 1942. Boston: Little, Brown, 1947-1962.

Office of Naval Intelligence. ONI220J – Japanese Submarines as reprinted in Japanese Naval Vessels of World War Two As Seen By US Naval Intelligence. Annapolis, MD: Naval Institute Press, 1987.

Reynolds, Clark. "Submarine Attacks on the Pacific Coast", Pacific Historical Review 33 No. 2 (May 1964): 183-193.

Ross, Stephen T., ed. American War Plans 1919-1941. Vol. 2, , Plans for War Against the British Empire and Japan: The Red, Orange, and Red-Orange Plans, 1923-1938. New York: Garland Publishing, Inc., 1992.

Rowher, Jürgen. Axis Submarine Success, 1939-1945. Translated by John A. Broadwin. Annapolis, MD: Naval Institute Press, 1983.

Shigeru Fukudome, "Hawaiian Operation." US Naval Institute Proceedings 81 (December 1955): 1315-1331.

The Battle of Midway: Strategical and Tactical Analysis. Newport, Rhode Island: US Naval War College, 1947.

Thomas H. Buckley, The United States and the Washington Naval Conference. Knoxville: The University of Tennessee Press, 1970.

Torisu, Kennosuke. "Japanese Submarine Tactics" Proceedings of the US Naval Institute 87 No. 2 (February 1961): 78-83.

Tritten, Dr. James. "Naval Perspectives for Military Doctrine." Paper, Defense Technical Information Center accessed 19 May, 1997; available from <http://www.dtic.mil/dtic>; Internet.

Tuleja, Thaddeus. Climax at Midway. London: Dent, 1960.

U.S. Congress. House. Committee on Naval Affairs. The Decline and Renaissance of the Navy, 1922-1944. Report prepared by Senator David Walsh. 78th Cong., 2nd sess., 1944.

United States Strategic Bombardment Survey. Interrogations of Japanese Officials Vol 2. Washington, DC: US Government Printing Office, 1946.

Ugaki, Matome. Fading Victory. Translated by Masataka Chihaya. Pittsburgh, PA: University of Pittsburgh Press, 1991.

Walder, David. The Short Victorious War: The Russo-Japanese Conflict 1904-1905. New York: Harper and Row Publishers, Inc., 1973.

Weir, Gary E. Building American Submarines, 1914-1940. Washington, D.C.: Naval Historical Center, Department of the Navy, 1991.

Willmott, H.P. Empires in the Balance: Japanese and Allied Strategies to April 1942. Annapolis, MD: Naval Institute Press, 1982.

Wilmott, H.P. The Barrier and The Javelin: Japanese and Allied Pacific Strategies-February to June 1942. Annapolis, MD: Naval Institute Press, 1983.