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# War Experience and Force Requirements

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Michael Vlahos and Dale K. Pace

**N**aval force requirements—how we “size” the fleet—are framed by national policies for war. These policies, however indirectly, mandate Navy missions. To fulfill these missions, a fleet must be big enough and capable enough to do the job.

The reverse is also true. Perceptions of the adequacy of naval forces impact on how national policy is made before a war. Current naval forces tend to shape perceptions about future force levels. Today’s fleet sustains the credibility of war missions that are implicit in national policies, the policies that set force levels in the first place.

Estimating naval force levels is a difficult task. The process must operate within a narrow band of choices circumscribed by restraints imposed by traditional fleet size, national policies, and naval budgets. Within these limits, the key question, how much will be “enough” in a war? must be addressed.

Shipbuilding programs determine the available naval order of battle. Combatants require 7 to 12 years to be designed and built and often remain in service for several decades. The relationship between naval requirements, shipbuilding, and force levels demands a long-term perspective.

An adequate fleet ultimately means naval force that can pursue its wartime missions even when ships are lost. The art of estimating naval force requirements should encompass the relationship between shipbuilding programs and potential combat losses.

An assessment of naval adequacy should also include ship design factors, especially the combat endurance of ships. How much can careful design minimize war losses? This factor plays an important part in bounding the relationship between shipbuilding programs and anticipated war losses; it is worth an article of its own, which we will not attempt here. Our purpose is to encourage integration of two slighted factors—shipbuilding programs and potential war losses—into the estimation of naval force requirements.

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Prior to the Second World War, the United States sized its fleet to an arbitrary numerical ratio, ideally, a fixed percentage of the battle fleet of a potential enemy. Annual battleship building programs were defined by this same simple calculation. In the 1920s, the U.S. Fleet was sized by international treaty, the terms of which extended the concept of capital ship ratios as the basis for naval force requirements.

Even this crude approach to estimating naval force levels was an improvement over older American traditions. In the 19th century it was impossible to tie fleet size to a potential maritime threat. Linking naval force levels to potential war missions was a cultural taboo. Even during the early 20th century it was considered militaristic or belligerent to speak of a potential enemy when presenting shipbuilding programs to Congress. In contrast, the analysis of required force levels is driven by war assumptions, an approach that is often criticized in public debate.

Throughout our history, American national policies have tended to allot inadequate numbers of ships to fulfill the missions assigned to the Navy. This is still true today. U.S. naval forces must be ready for use in demanding, dissimilar conditions: peacetime (or non-war) operations, combat operations in Third World areas, conventional conflict with the Soviet Union, and nuclear war.

Today, the potential capability of Third World naval forces is increasing and Soviet combatants are gaining rapidly in sophistication. In terms of ship design, both the Soviet and Third World navies are reducing the technological superiority of U.S. ships and weapons. In 20 years, at least some Third World fleets—for example, that of India and perhaps that of Brazil—will have combatants that will at least equal the West's best. The Soviet Fleet may close the gap in submarine system capabilities within the next few years.

The traditional Navy approach to overcommitment has been to focus its force requirements on the most rigorous potential mission. That mission today—apart from the Navy's ballistic missile force—is described as a protracted conventional war with the Soviet Union. The American and Japanese naval experiences in just such a war 45 years ago offer many insights into the relationship between building programs and war losses, and mission adequacy in war. These insights can suggest an effective approach to estimating U.S. naval force requirements for the future. We will examine some of these insights and illustrate an approach that considers war losses for estimating force requirements.

### Insights from Combat Experience

Ships are lost in war. This is expected. Heavy losses can be accepted in a short war. In anticipation of a short struggle, it is possible to plan confidently for war objectives with a prewar order of battle.

But what of a high-intensity conflict of uncertain duration? Protracted war implies long-term ship attrition. Under those circumstances it is difficult to anticipate casualties on two levels: losses from planned operations and cumulative losses later. If war extends beyond the initial (or planned) phase, will enough ships be left to win? Can prewar planning anticipate long-term war losses and prepare to offer timely replacements with new construction?

There are valid reasons for looking at the Pacific war of 1941-1945. It was part of a protracted, global, conventional war that lasted 44 months. The U.S. Navy faced battle challenges not unlike those anticipated today: that of heavy land-based air attacks, that of massed air-to-surface missile strikes (kamikazes), that of a 24-hour-battle milieu, that of assimilating untested technologies, and that of an ever-present submarine threat.

Even more important for Navy planning today, however, is the persistent myth of the last war. The Navy's experience in Westpac remains the preferred case for today: the triumph of a superbly executed maritime strategy. The Pacific war, in keeping with today's maritime strategy, carried the fight to the enemy, overturning an earlier Navy stance of simply defending America's shores. It is worth comparing our efforts in that war—especially in ships built against ships lost—to what we might do today.

The Imperial Japanese Navy thus takes on a powerful historical resonance. The Japanese maintained a large peacetime fleet for political goals. This fleet was sustained at near-war readiness, with a high proportion of their order of battle at sea. The Japanese benefited from strong annual ship-buys, but were unable to program their shipbuilding for protracted war. Without the industrial base and particularly the shipbuilding industry needed for surge production, they were forced to fight a "come as you are" war at sea.

### Parameters and Definitions

Analysis by historical analogy requires conscious bounding of the useful limits of analogy itself. The problems faced in prosecuting that war, the basic ship and weapon systems structuring operations, and the prolonged intensity of the conflict make it a reasonable analogy for a contemporary protracted global war-planning contingency.

Comparison is also useful to project a pattern of phases to a war. Protracted wars in this century have assumed a rhythm of dynamic phases. In the Pacific war, this took the form of an initial phase which included the early Japanese offensives and the unanticipated first American counteroffensive at Guadalcanal. This highly intensive period was followed by an operational "breather"; then, high-intensity operations resumed. At the end of the Guadalcanal campaign in February 1943, both the U.S. and Japanese navies were exhausted. The United States took a five-month

breather; the Japanese naval pause lasted 15 months. The differing lengths of this mid-phase were functions of both losses and replacement rates.

In the Second World War, as today, a carrier was a carrier, a "fleet carrier," or real "flattop" if it operated with the fleet, specifically the high-speed task groups. The CV category therefore includes the light fleet carriers, or CVLs. In functional terms, these converted cruisers were just as much battle group combatants as the big ships of the *Essex* class.

The eight-inch gun "Treaty," or "heavy" cruiser (CA) is distinguished from the so-called "light" cruiser (CL) with five or six-inch guns. In the interwar U.S. Navy, the Treaty cruiser force assumed an importance out of proportion to its gunpower. In a fleet dominated by a slow, obsolescent force of battleships, the 10,000-ton Washington cruisers became the functional equivalent of small, fast battleships. During the initial phase of the war, in the Southwest Pacific, the CA force was employed in classic capital ship fashion. Japanese CAs were used in exactly the same way. So great were American CA losses in this phase, that the U.S. Navy was forced to use its equally big post-Treaty six-inch cruisers as substitutes.

Both navies needed fast, modern, well-gunned, and protected surface combatants. The only such ships available were the eight-inch cruisers. In contrast, the Japanese had only two fast, modern battleships in 1942—the *Yamato* and *Musashi*—and they were national treasures that could not be risked. Two fast, but very old, battleships, the *Hiei* and the *Kirishima*, were thrown into the fray, and both were lost. The United States had only two fast battleships available for the Southwest Pacific in late 1942 and risked both of them for decisive return.

Some hoary combatants were still counted by both navies in their December 1941 orders of battle. These included a number of destroyers designed and built shortly after World War I. This study looks only at "modern" destroyers; again, meaning "battle-group capable" to those who sent them into action. The U.S. Navy suffered from interwar block obsolescence in destroyers; this meant, in functional terms, all DDs completed after 1934. In the Japanese Navy the demarcating line is more ambiguous. All destroyers not reclassified and refitted as patrol escorts or fast transports before 1942 are considered "modern."

### Approaches to Combatant Shipbuilding, 1937-1945

Most combatant additions during the first year of a war will have been appropriated for years before, during normal peacetime: a period without a war-threatening crisis or expectation of an impending conflict.

During the Pacific war, what was the impact of "normal" prewar building programs on the outcome of the initial phase of the war? Pearl Harbor was preceded by two years of European war; the U.S. Navy benefited from a

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general national perception of impending war. This sense of urgency was translated into unusually large prewar building programs, with many funded ships laid down for periods of up to 18 months before hostilities. On 7 December 1941 the United States actually had more surface combatants on the way than in commission.

What was the impact of the first wartime building programs on the outcome of the initial phase of the war and the length of the mid-phase?

Full-mobilization programs were initiated after 7 December 1941. They had no impact on the initial phase of the war. However, some of these orders had a major impact on the scheduling of later offensive operations.

How soon did war programs make a difference in the scheduling and tempo of offensive operations? Were they needed to win the war? How much did they alter the outcome at the margins?

Three shipbuilding constraints should be mentioned:

- First, could building times be compressed significantly for major surface combatants? To what extent were some warship completion times a function of available subsystems, like gun turrets and mountings, rather than speed of hull fabrication?

- Second, the actual size of the shipbuilding plant. Could a builder's load be increased?

- Third, starting time is crucial. At what point does a crash wartime program, especially in shipbuilding, become irrelevant? The war may be decided before the big ships are even launched.

Construction times for major surface combatants laid down and completed prewar against ships laid down and put in service during wartime are compared below, with the exception of the battleships. All BBs completed during the war were laid down before the war.

Averages are drawn from samples including all classes of modern prewar and war-built ships: 10 DDs, 10 CVEs, 5 CAs, 5 CLs, and all the BBs and CVs.

Building times for big-gun ships could be cut at the margins—22 percent for battleships and 11 percent for heavy cruisers—but not significantly. The fabrication of complex weapons systems—heavy turrets and mountings—and the output of armored plate were late prewar limitations. Still, it is remarkable that 45,000 and 50,000-ton ships could be finished in two and one-half years.

However impressive, the compression for fleet carriers is less remarkable. They were far less complex than battleships. Even with building times of less than two years, they were not ready to take part in the initial period of the war. In only two types of ships could the yards compress the building or conversion time enough to allow some to take part in the initial period: destroyers and escort carriers.

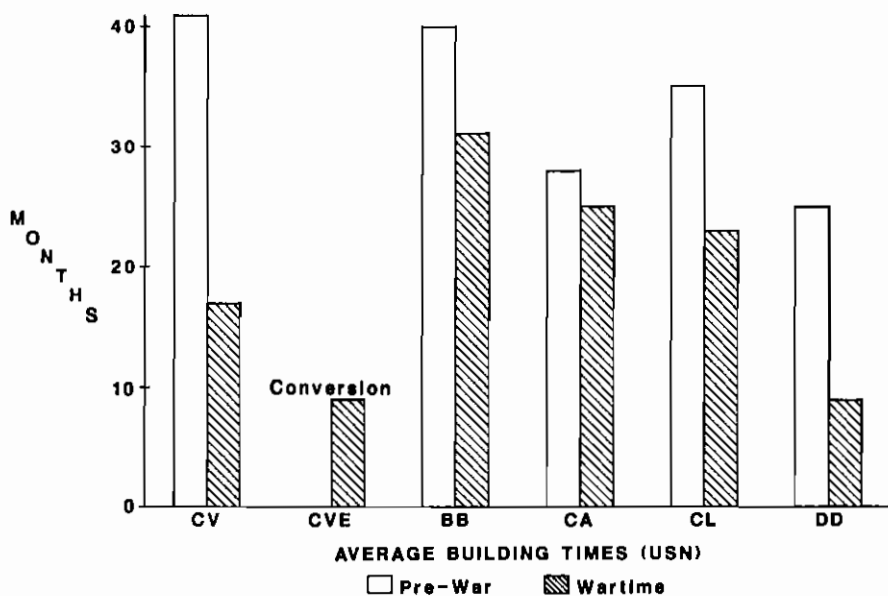


Figure 1

The majority of surface combatants added to the Japanese Navy during the war were appropriated in the course of “normal” prewar building programs at least two fiscal years before the war. As it turned out, those appropriated in 1940 and 1941 were less likely than earlier ships to see service. It is also important to note that the size of Japan’s late prewar programs did not reflect the shipbuilding urgency of an impending war.

Table 1 summarizes the entire Japanese and American shipbuilding effort from 1937 to 1945. Only combatants that might have been ready for active service (commissioned before June 1945) are listed.

### Combatant Shipbuilding Programs

#### U.S. Navy

#### Japanese Navy

	“Brisk” Prewar 1937-39	Prewar Mobilizing 1940-41	War Tempo 1942-45	“Brisk” Prewar 1937-39	Prewar Mobilizing 1940-41	War Tempo 1942-45
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#### Design-Built:

CV	1	13	27 (25)	3	1	20 (18)
CVE	—	—	85 (58)	—	—	—
BB	8	9 (7)	—	3	—	5 (5)
CA	—	14 (5)	28 (26)	—	2 (2)	—
CL	4	40 (14)	23 (20)	6 (1)	—	5 (5)
DD	24	212	263 (131)	37	26 (12)	—

### Combatant Shipbuilding Programs (Cont.)

	U.S. Navy			Japanese Navy		
	“Brisk” Prewar 1937-39	Prewar Mobilizing 1940-41	War Tempo 1942-45	“Brisk” Prewar 1937-39	Prewar Mobilizing 1940-41	War Tempo 1942-45
	<b>Converted:</b>					
CV	—	—	9	2	3	2
CVE	—	2	15	—	3	2
<b>Converted CVEs to Royal Navy:</b>	—	3	30	—	—	—

**Table 1**

Note: Only two-thirds of U.S. Navy BBs and cruisers in 1940-41 programs were completed by June 1945. Numbers in parentheses show those ships still incomplete by June 1945.

The phrase “brisk pre-war” is used to describe the deliberate, if modest, fleet expansion programs of Japan and the United States after 1935 but before 1940.

All Japanese ships, but one, in the 1937-39 programs were completed during the war. The Japanese completed the single CV in the 1940-41 programs, but only about half of the DDs. Actual war programs produced but two ships. In contrast, the success of Japanese war conversion programs is notable: 7 CVs and 5 CVEs, all in active service by early 1944, in contrast to just 4 fleet carriers built between 1939 and mid-1944, a ratio of 3:1. However, Japan had no capacity to respond to the U.S. Navy’s 1940 “Two Ocean” program; it was already building near the limits of its shipbuilding plant.

For Japanese naval planners, their very brisk prewar building programs permitted full-force operations only during the initial period of the Pacific war. The Japanese Navy was at the crest of the curve in late 1941: prewar programs pushed its order of battle to a brief, but crucial moment of advantage in the naval balance. In contrast, the U.S. building curve came a couple of years later, too late to have an impact on initial period operations.

But the United States had a far greater capacity than Japan had to increase its prewar shipbuilding tempo. Comparison between the Japanese and U.S. Navy programs of 1937-39 shows the reason for prewar Japanese confidence in their political goal to dominate the western Pacific. For example, although they laid down only 3 battleships to 8 of the United States’, the actual tonnage ratio perpetuated their 70 percent ambition. In light cruisers and DDs, the Japanese out-programmed the U.S. Navy by 50 percent. In battle group



carriers (including converted hulls) they surpassed the Americans by 500 percent.

The 1940 U.S. program destroyed Japan's hopes. A significant number of ships in this huge program remained unfinished by the end of the war, including 22 percent of the battleships and 65 percent of the cruisers. All of the 1940 program carriers, however, and all of the DDs of that program were in service by war's end, but even the first of the CVs was not ready for action until the late spring of 1943. In this context, that of an opportunity soon to be lost, Japan's decision for war in the autumn of 1941 makes sense.

The American war programs were far less successful than that of 1940 in delivering major surface combatants before war's end. About half the DDs programmed and only about 9 percent of the CVs, CAs, and CLs appropriated under the blast of war reached the fleet.

Converted hulls made as much impact on the U.S. order of battle as on the Japanese. Nine battle group carriers, 50 converted CVEs (of which 33 were transferred to the Royal Navy), and 58 purpose-built CVEs reached the fleet. The average building or conversion time for CVEs—9 months—was so short that a few could actually be used in the initial period. The four converted fleet oilers of the *Sangamon* class were employed essentially as battle group CVs in late 1942 and early 1943, when for a month there was not one operational fast carrier in the Pacific Theater.

### Force Levels and War Operations

Building programs must be assessed in terms of their effect on the naval order of battle.

When completed, a single year's appropriation for the U.S. Navy, that for 1940, would outweigh a decade of Japanese shipbuilding. The impact would be felt increasingly and, in Japanese terms, fatally, after 1942. Battleships symbolized this dread anticipation for the Japanese naval high command. The balance would shift by late 1942 when the U.S. Navy would have six new capital ships.

In contrast, the actual American naval order of battle in the Pacific in late 1941 offered the Japanese a rare offensive opportunity. The extent of actual Japanese naval superiority in the Pacific, and the relative *overall* equality in total order of battle is shown below. This edge, however, according to Japanese assessments, would rapidly erode after March 1942 (see figure 2).

Comparing the Japanese and American naval orders of battle by year gives a series of operational snapshots. Employed traditionally for drawing fleet ratios, it illustrates the impact of losses on a fleet's capacity to conduct operations, and the impact of building programs as an offset to losses. Comparing orders of battle also offers a dynamic sense of ebb and flow in wartime order-of-battle by comparing ships added to ships lost by year (see figure 3).

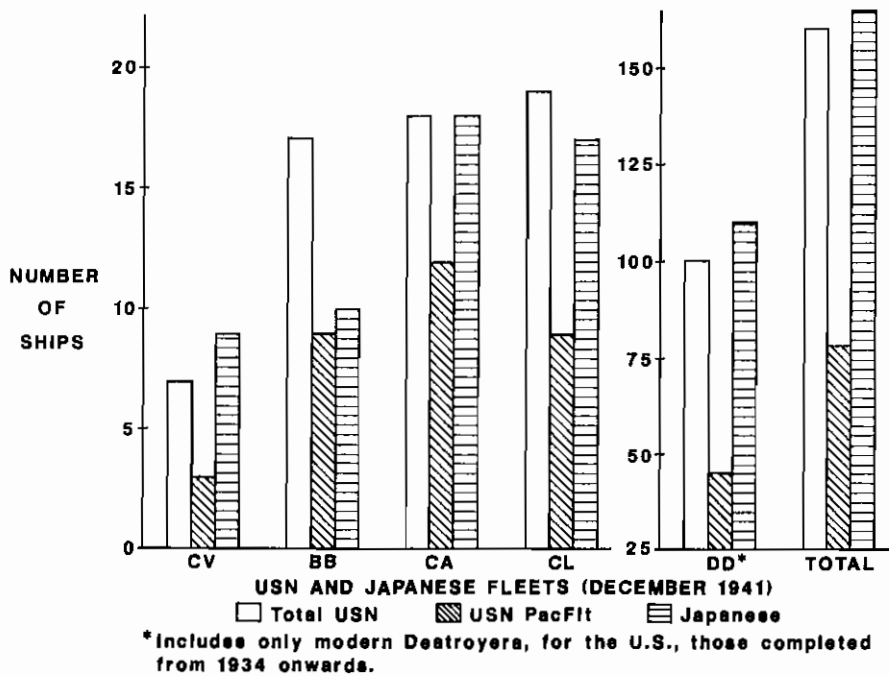


Figure 2

The prewar Japanese fleet was not programmed to accept heavy losses in two key surface combatant types: CVs and DDs. Carrier numbers were maintained only through the conversion of ships in 1942, and the abstinence from operations in 1943. Destroyers could never abstain from critical offensive and escort operations, and losses among them outpaced additions by 2:1 in 1942, 2.5:1 in 1943, and nearly 7:1 in 1944. By the end of 1942, these losses began to impede operations. Both convoy and battle group escort effectiveness declined as a result.

Even prewar battleship and cruiser levels could be preserved through three years of war only by withholding them from fleet action. After two old BBs were lost at Guadalcanal, battleships were withheld for 18 months, and 75 percent of the prewar order of battle remained in October 1944. Carriers were held back for more than 18 months (after the Battle of Santa Cruz in October 1942), and by June 1944 the carrier force exceeded prewar levels. Heavy cruisers were kept out of action for one year after November 1943 and held at 78 percent prewar numbers until Leyte Gulf in October 1944.

In the Guadalcanal campaign, the Japanese used heavy cruisers, as did the Americans, as surrogate battleships. By the end of 1942, four had been lost and a fifth, the *Mogami*, had been put out of action for two years. Altogether, the cruiser force had been degraded by 30 percent. The end of the

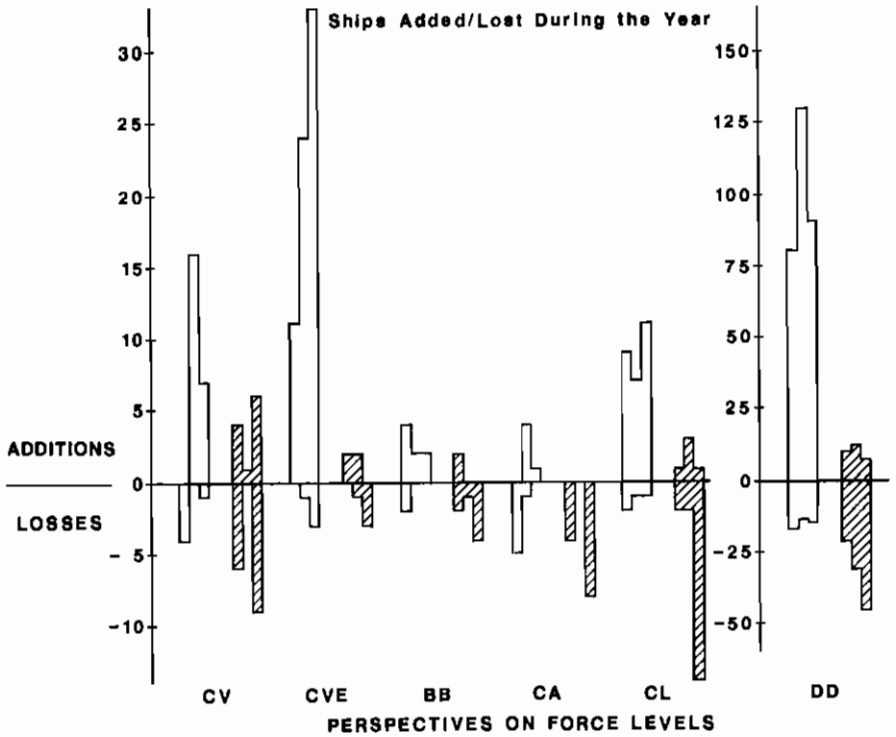
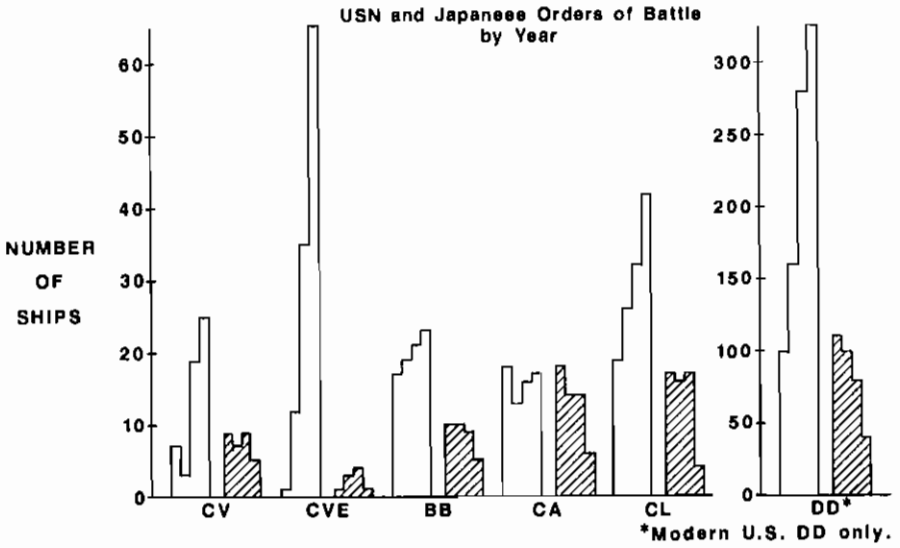


Figure 3

Guadalcanal campaign marked the end of the initial period of the Pacific war for a reason: on both sides too many ships were being lost.

The U.S. battle line recovered quickly from losses at Pearl Harbor. All four *South Dakota*-class (1938 program) ships were in service by late 1942. With the slightly earlier *Washington* and *North Carolina*, these battlewagons were put directly into forward combat areas and were the decisive factor in pulling out a favorable end to the initial phase. Without them, Guadalcanal would have been lost.

The U.S. carrier force was as hard hit as Japan's in the initial phase. Japan lost 75 percent of its prewar force; the United States, 57 percent. Japanese carrier air power survived through the initial period only by timely 1942 arrivals, especially the converted fleet carriers *Junyo* and *Hiyo*. U.S. conversions (9 *Independence*-class CVLs) did not reach the fleet until 1943. The single American CV completed in 1942, the *Essex*, handed over on 31 December, should be counted as a 1943 ship. Though U.S. prewar carrier programs, running at an average of one ship every other year since FY 1930, met and then exceeded Treaty limits, losses among their small number nearly crippled the U.S. Navy in 1942. At the end of 1942, only two U.S. CVs were in service in the Pacific. Both had been battle-damaged twice during the year, and their combined out-of-action time was 13 months!

The U.S. "Treaty Cruisers" fought the Guadalcanal campaign. They were the substance of American naval power in the actual combat theater, having fought in four of the five major surface actions during that campaign. They suffered accordingly. Including the *Houston*, sunk in February in the Sunda Strait, 5 of the remaining 18 had been lost by the end of 1942; the *Chicago* would join them in January 1943 off Rennell Island, at the very end of the Guadalcanal battle. In addition, four more were lost to the Navy, each for an entire year, as a result of torpedo hits (three in one night at Tassafaronga at the end of November). Of the remaining eight, three were still under repair from slightly less severe battle damage (*Salt Lake City*, *Portland*, and *San Francisco*), and three were in the Atlantic. After just four months of intense combat, the Navy had less than 30 percent of its heavy cruiser force in hand, and most of them were in the Atlantic. None had been commissioned before 1929. The last one allowed under the Treaty was completed in 1939, and therefore no new ones were ordered before 1940. The force still had not recovered by 1945.

Heavy prewar ordering paid off in battleships, light cruisers, and destroyers. The big 6-inch gun cruisers took over from the 8-inch gun CAs in all the Solomons action of 1943. The 66 DDs added in 1942 all came from the 1940 program: another big prewar building boon. For the three years before 1940, DDs were being added at a steady rate of only eight per year. Had that pace continued into 1940 and 1941, the U.S. Navy, like its Japanese enemy, would have faced immediate operational constraints.

**U.S. Heavy Cruisers, 1942: 18 ships.**

By 7 December, after one year of war:

<i>Pensacola</i>	damaged
<i>Salt Lake City</i>	damaged
<i>Northampton</i>	sunk
<i>Chester</i>	damaged
<i>Louisville</i>	
<i>Chicago</i>	damaged
<i>Houston</i>	sunk
<i>Augusta</i>	in the Atlantic
<i>Portland</i>	damaged
<i>Indianapolis</i>	
<i>New Orleans</i>	damaged
<i>Astoria</i>	sunk
<i>Minneapolis</i>	damaged
<i>Tuscaloosa</i>	in the Atlantic
<i>San Francisco</i>	damaged
<i>Quincy</i>	sunk
<i>Vincennes</i>	sunk
<i>Wichita</i>	in the Atlantic

Figure 4 shows just how limited U.S. naval operations might have been in the western Pacific without the 1940 building program. In the late 1930s, Congress was giving the Navy a generous peacetime allotment: the London Treaty of 1930 plus 20 percent. The General Board in fact drew up a long-term program based on these Congressional provisions. Translated into a pattern of annual orders, this would have involved one fleet carrier per year for five years (eventually replacing the *Lexington* and *Saratoga*), two BBs a year after FY 1938 (FYs 39 to 42, replacing old BBs), no CAs until FY 46, and an expanded CL program of 4:2:2:3:3:3:2 (FYs 38 to 45). The entire destroyer force hit “block obsolescence” in the early 1930s. In response, 73 modern DDs were appropriated in FYs 31 to 36. Thereafter, the pace slowed to eight DDs per year.

Without the two-year “run-up” from 1940, the U.S. Fleet would have had enough battleships, and perhaps enough light cruisers, for a long war. Every other ship-type would have been short by the end of the initial period. Even with the construction “compressibility” of destroyers, losses could not have been made up before mid-1943. For the rest of the war, the Navy would have limped along with only a dozen CAs, and a fleet carrier force in no way superior to Japan’s.

Two operational consequences are implied. First, the initial period would have been followed on both sides (not simply by Japan) by a lull of at least a year. Second, the U.S. Navy would not have had the transcendent carrier air power advantage with which to force its will on the Japanese Fleet. Attrition carrier battles much like those of 1942 (Coral Sea, Midway, Eastern

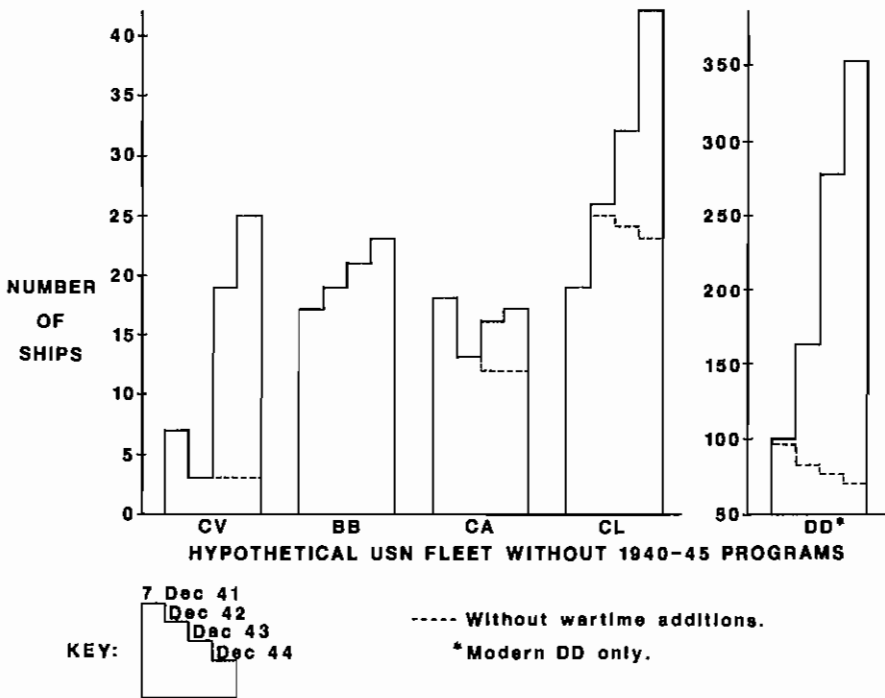


Figure 4

Solomons, Santa Cruz), would have been followed of necessity by surface battles, as in the Solomons. Prewar programs emphasizing battleships (on both sides) would have forced many more battleship actions.

**U.S. Aircraft Carriers, 1942: 7 ships.**

By 7 December, after one year of war:

<i>Lexington</i>	sunk
<i>Saratoga</i>	twice damaged
<i>Ranger</i>	in the Atlantic
<i>Yorktown</i>	sunk
<i>Enterprise</i>	twice damaged
<i>Wasp</i>	sunk
<i>Hornet</i>	sunk

Simply, the Navy would have had to fight with what it had. It would have taken longer and losses would have been higher. The whole war would have resembled the four months in and out of Ironbottom Sound.

The naval combat around Guadalcanal was characterized by both the relative equality of American and Japanese forces engaged and the intensity of those engagements. An examination of campaign losses, shown below, highlights the larger effect of a period of high-intensity combat on two fleets that at that stage in the war did not have the security of waiting for

replacement units. Ship casualties demanding home shipyard repair lasting beyond the end of the campaign (February 1943) are included.

There were five major surface actions in this campaign:

- Savo Island, 9 August 1942
- Cape Esperance, 12 October 1942
- Guadalcanal I, 13 November 1942
- Guadalcanal II, 14-15 November 1942
- Tassafaronga, 30 November 1942

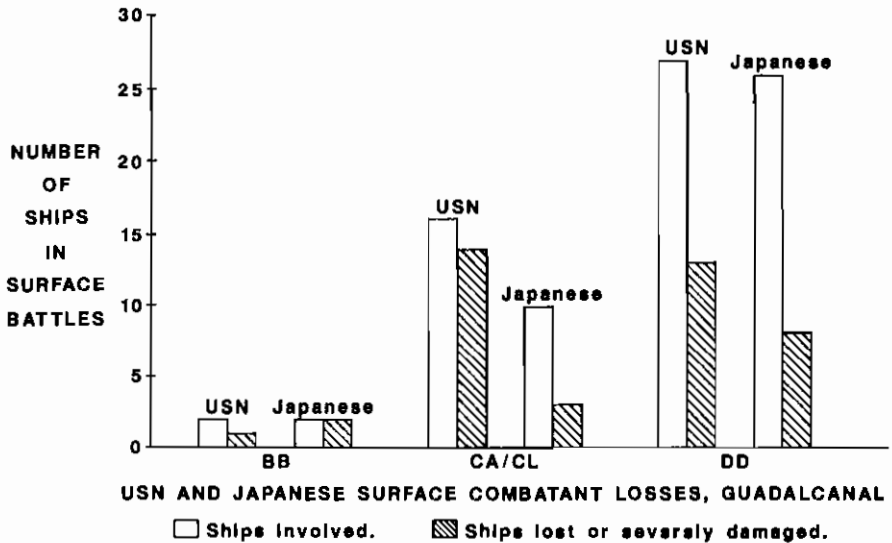


Figure 5

These losses were a significant proportion of forces actually engaged. They also represented a major share of total naval forces available for the South Pacific theater when the battle for Guadalcanal began.

Although the U.S. Navy appears here to have suffered more campaign damage, it was in a better position than its foe to recover in 1943. Its carrier losses were more than replaced in 1943, and eight big, new 6-inch gun cruisers were available by mid-1943 to substitute for lost CAs. All of the damaged CAs were back in service by October 1943. The Japanese carrier force also recovered in 1943, but added only one new flight deck, and for the rest of the war there would be no new battleships or big cruisers. The intensity of the initial period simply could not be sustained by the Japanese. Even the U.S. Navy held back during the first half of 1943 as it waited for new ships of all types to arrive and work up with the fleet.

### Combatant Losses in the Late-War Phase

After the Japanese Fleet had been defeated and U.S. sea command was established, U.S. surface combatant losses were still significant. They were

inflicted primarily by land-based air attack. The most effective form of air targeting was performed by kamikazes which were essentially air-to-surface guided missiles, but with human pilots.

During the Okinawa battle in 1945, the following ship casualties were inflicted by land-based air attack:

### U.S. Navy Surface Combatant Losses, Okinawa Campaign

Ship Type	Losses	Percentage of Initial Force
CV	3	18
DD	64	34
LST/LSM	23	10

Table 2

The figures indicate operational losses: combatants either sunk or still unrepaired at the end of the war. At war's end, the CV, the DD, and the landing ships were the most valuable fleet units: the heart of the offensive against the home islands. They were also the most vulnerable.

### Summary of Insights

Insights from the Pacific war can be used in estimating contemporary naval force requirements. Both American and Japanese naval experience tell us that:

- Initial period operations can be protracted. Japan had planned naval missions that were expected to end within six months. High tempo combat operations, however, continued unabated for 13 months. Contemporary U.S. naval planning should contemplate such an extended initial period of a war.
- Few major surface combatants were added in this period. Fleet reinforcement was driven by the relative emphasis of prewar building programs. The United States added only four new battleships and nine light cruisers in major surface combatants. This reflected a prewar focus on the battle line. Japan, in contrast, added two battleships and four carriers to its fleet. Without the American victory at Midway, the Japanese carrier advantage over the United States would have lasted past mid-1943, forestalling the Southwest Pacific offensive. Both U.S. and Japanese capital ship reinforcements in the initial period can be compared to the awaited addition of two new CVNs to a 15-carrier navy today. These were significant early additions to both fleets. It must be remembered, however, that capital ships demand a building lead time of 5 to 10 years from appropriation to commissioning.



In another critical category of surface combatant, however, Japan fell rapidly behind. The United States added 85 destroyers to the fleet during the initial period, while Japan added only 10. This shortcoming in prewar shipbuilding doomed the Imperial Navy to a diminishing destroyer force for the duration of the war, seriously weakening its battle force escort capabilities.

- Even fewer ships added by late prewar building programs. Late prewar building programs included only the last three appropriations before the war, FYs 1939, 1940, and 1941. During the initial period, the U.S. Navy added only five light cruisers among all major surface ships appropriated from 1939 to 1941. Japan managed to add only a single light cruiser to the fleet from these programs during the initial period. However, the United States added all 85 destroyers appropriated from 1939-1941, and Japan finished 13 of 19 in time for initial period operations.

Destroyers are separated in this analysis from the major surface combatants—battleships, carriers, and cruisers—for one reason: they could be appropriated and built in two years or less. Today, ships called “destroyers” take five years to reach the fleet from the Senate floor. It is doubtful whether a major surface combatant under construction for less than three years would see action in the first year of a war.

- Losses during the initial period can be heavy. By the end of January 1943—just slightly more than a year into the war—the U.S. Navy had lost (out of action for six months or more) 24 percent of its prewar battle fleet, 57 percent of its carrier force, 50 percent of its heavy cruisers (including four out of action until late 1943), 11 percent of its light cruisers, and 20 percent of its destroyers. Japanese losses were equally severe: 20 percent of its prewar battle fleet, 66 percent of its original carrier striking force, 22 percent of its heavy cruisers. The losses among capital ships are especially significant. If, as argued here on the basis of battle employment, heavy cruisers are to be added to battleships and carriers in the classification of capital ships, U.S. capital ship losses in the initial period amounted to 40 percent of the prewar battle force; Japan lost 30 percent. Contemporary U.S. Navy wartime missions should be prepared for high losses if the Navy is used to carry the fight to the enemy.

- Losses concentrated in key initial period missions. All initial period Japanese fleet carrier losses and all U.S. battleship losses were suffered in single operations (Midway and Pearl Harbor). Although the unbalanced losses inflicted in these celebrated battles might seem unusual, heavy ship casualties were the rule in the initial period of the Pacific war. Losses of ships engaged were actually higher if ships put out of action for more than eight months are included as casualties.

The surface battles of the Guadalcanal campaign make a powerful example of how many ships can be lost in a short period of intense action

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(August to December 1942). Japan lost both battleships it threw into action, 4 out of 11 cruisers, and 7 out of 30 destroyers: a loss rate of 30 percent overall. The United States had one battleship (the *South Dakota*) put out of action, 13 out of 18 cruisers lost or out of action (including the loss of the *Chicago*), and 9 of 27 destroyers: nearly half of all ships engaged.

- Losses from initial period operations can force a lull in operations until losses are replaced. Many initial period losses sustained by the United States and Japan could be made up. Ships out of action could be repaired, and new ships would eventually be added to the fleet. But the tempo of the initial period of battle could not continue. The United States could afford to take just a short breather: by mid-1943 the big, late prewar building programs were reaching the fleet. Japan, however, withheld its capital ships after Guadalcanal until mid-1944. For 18 months it waited for prewar shipbuilding to reach the fleet.

Today the U.S. Navy would enter a war with a shipbuilding program more like the Imperial Japanese Navy's in 1941 than its own crash programs 45 years ago. Granted, the U.S. Navy today probably need not expect a multiyear sea war, but the possibility of such a war with the Soviet Union cannot be excluded totally and therefore is today in the mainstream of American national security thought. It is, necessarily, a basic yardstick for naval planning. Part of the planning parameters of this "not unreasonable" mission context imply an initial period of operations that could last as long as a year, and a series of engagements in pursuit of naval missions that might well involve heavy ship casualties.

### An Approach to Force Requirement Estimation

U.S. naval approaches to estimating force level requirements are dependent upon technical and quantitative analysis. Currently, this approach is not responsive to key force level issues experienced during the Pacific war. Before suggesting an analytic approach that would incorporate these issues, it is useful to summarize the functional areas of analysis that might be involved in estimating force level requirements.

Technical analysis can be broken into four general categories. Because there is no widely accepted set of terms for them, the labels given these categories of analysis are the authors' own.

First is the engineering category which uses basic laws of physics and engineering to describe system performance—a sensor's detection range against a target or the engagement envelope of a missile, for example. The principles of this kind of analysis are well established and its results enjoy a high degree of acceptance and credibility.

Engagement analysis, the second category, assesses system capability, for example, the firepower of a surface-to-air missile system against a raid of

air targets. Engagement analysis, however, must aggregate many aspects of the problem and use implicit representations of processes instead of the explicit portrayals of engineering analysis. Therefore, it may be difficult to "validate" engagement analysis by comparing it to operational experience. Despite its limitations, engagement analysis enjoys general acceptance and reasonable credibility.

The third category, mission analysis, attempts to meld all aspects of naval warfare that affect the performance of a task group in fulfilling a mission measured usually in days—such as a land strike from a carrier battle group. Mission analysis has seldom been subjected to analytic rigor. Like wargaming, it relies heavily on human judgment. There are no widely accepted methods for analyzing the interaction between warfare areas, so there is much interpretive uncertainty over results. This is true especially if analytic results diverge from traditional warfare notions.

The fourth category is campaign analysis. Its time domain is measured in weeks and months, or even years. The U.S. Navy has done little of this. That which has been done has not been used to address force level issues. There is no established methodology for campaign analysis. A major part of the difficulty lies in the elusiveness of convincing scenarios (or a sequence of scenarios), as much as in an absence of accepted methodology.

A common thread linking these categories of analysis is focus. They all concentrate on the capabilities of U.S. systems and ignore the potential impact of war losses. Yet loss estimates should play a central role in force level thinking. Certainly, forces assigned to a mission must be capable enough to fulfill that mission confidently. Major losses, however, might be incurred during the mission. Such losses might not prejudice immediate mission fulfillment, but they certainly would influence the leaders' confidence about their chances of success in succeeding missions.

The approach suggested by this paper for estimating required force levels begins with the concept of the "not unreasonable case." By definition, this means the most rigorous wartime mission-set compatible with a "peacetime" planning environment for, and broader political expectations of, a future war.

The not unreasonable case of a long conventional war with the Soviet Union has two major force level implications for the U.S. Navy. First, it implies a campaign of not less than a year, long enough to demand a series of naval operations in support of several missions. Second, a year or so of intense operations must be sustained by the prewar fleet. Third, although the initial period of such a war should end within a year, the war itself might continue. Force level requirements must be able to satisfy both the needs of initial period missions and the succeeding conflict context, whether peace, armed truce, or mobilization for a total war stage.

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In order to illustrate this case, we suggest a set of war missions. Using engagement and mission-level analysis, we will determine the naval forces required for these missions, and the losses incurred. Finally, we will define a desired capability to pursue another set of missions at the end of the initial period. By relating these three factors, it is possible to calculate the force level range required to support naval missions in the initial period of a war so that sufficient forces remain at its end to conduct later—or postwar—missions in pursuit of broader national war goals.

This illustration has an additional analytic constraint. Naval forces required for any initial period mission must be available for that mission. It is strategic sleight of hand to argue that there are enough ships for a mission, but only if they are concentrated in a single theater. Operational and strategic considerations make it hard to swing naval forces from one theater to another. This illustration assumes a national wartime need for simultaneous operations in support of allies on the periphery of Eurasia. Operations in the Pacific that are within a month of an operation in the Atlantic are “simultaneous” since transoceanic ship movements take time.

Simplified in order to highlight force level considerations, the following illustration examines only carrier battle group combatants—aircraft carriers, cruisers, destroyers:

Assume that a global war between NATO and the Warsaw Pact has erupted, but has not escalated to nuclear war. The initial period of this war—that is, the period of planned operations—is prolonged for several months, but less than a year. During this time, the United States chooses to conduct four major naval operations (missions) with carrier battle groups. All are within range of Soviet land-based strike aircraft. These operations might be land strikes in the Kola or Kamchatka areas. They might be operations in the eastern Mediterranean. They might well be in support of a major amphibious operation along the flanks of the Central Front. The number and size of these missions constitute a realistic minimum for a major war. The likely demands on the Navy could well be much higher if allied war goals were to be sustained over several months.

For each mission, assume a U.S. naval force of 20 to 40 surface combatants. This is typical for a multi-carrier battle force. Assume further that losses sustained during the operation will reach 20 to 40 percent. This outcome would be consistent with U.S. and Japanese task group losses in a number of engagements during the Guadalcanal campaign, and with more recent British task force losses in Operation Corporate. As an inflection to these analogies, a number of studies have indicated that expected U.S. losses increase with force size. In some cases, this results from postulating a more severe threat attacking a larger U.S. force. In other cases, however, it appears to be a function of the larger U.S. force providing the enemy with a “target rich” environment.

It should also be assumed that the National Command Authority wants to keep the option to conduct at least one other major operation at the end of the initial period of the war in both the Atlantic and the Pacific theaters simultaneously.

Number of ships required at the end of the initial period:

$$20-40 \text{ (Atlantic)} + 20-40 \text{ (Pacific)} = 40-80$$

Number of ships lost during the initial period:

$$\begin{array}{rcccccc} 20-40 & \times & 20-40\% & \times & 4 & = & 16-56 \\ \text{(Force Size)} & & \text{(Loss Percentage)} & & \text{(No. of Missions)} & & \end{array}$$

Number of ships unavailable due to non-battle accident:

Assume 3-5% of forces: 2-7

Number of ships required at the beginning of the war to support specified missions:

Number required at end: 40- 80

Number lost in battle: 16- 56

Non-battle losses: 2- 7

**Total: 58-143**

This illustration, of course, is purely arbitrary. It encompasses only carrier battle group forces. Any indication of an expected linkage between an explicit strategy and war losses is avoided by this illustration. This explains in part the wide range of loss outcomes. The authors simply are demonstrating a methodology. There are, however, some intriguing implications.

The number of surface combatants—carriers, battleships, cruisers, and destroyers—required by this example brackets the number of these ships in the Navy order of battle today.

There also is recent support for its premises. In 1982 the Royal Navy deployed a task force of 25 major surface combatants—carriers, destroyers, and frigates—4 were sunk and 1 was put out of action: 20 percent of the total force. Today, even relatively modest forces potentially can inflict high damage levels. The Soviet Union, moreover, would be a far more formidable foe than Argentina.

## Conclusions

- The U.S. Navy could suffer heavy losses in a future war of the scale, duration, and intensity suggested here.

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- No major reinforcements from new construction would be received during the initial period of this war.
- War missions are politically insensitive to fleet size. A smaller, less capable U.S. Navy would be charged with missions as needed, and simply suffer losses with less confidence of success. (Again, the Falklands underscores this political tendency, even for limited operations with less on the line.)
- Even if the Soviet Fleet were heavily attrited, significant U.S. naval forces would be required at the end of the initial period of operations.
- Even with the Soviet naval threat erased, other parts of Soviet military power would still be a challenge to a U.S. Navy supporting allied operations in Eurasia.
- Therefore, U.S. Navy missions must be tailored to expected losses, mission outcomes, and the duration of the initial period. Naval force requirements should be realistic. They should confront both the limitations of shipbuilding programs and the possibility of substantial ship losses in war.



### Conference on Military Education and Thought

The Virginia Military Institute will host the annual meeting of the American Military Institute on 14-15 April 1989 in Lexington, Virginia. The conference theme is "Military Education and Thought." Papers that treat the establishment of formal military education, the creation of academies and service schools, or the formulation and institutionalization of military doctrine through military education are invited. Papers may focus on any nation or period of history. Please send proposals before 31 October 1988 to: AMI Conference Coordinator, Department of History and Politics, Virginia Military Institute, Lexington, Virginia 24450.