The terrorist attacks against the United States on September 11, 2001, portended a change of major proportions in the long-familiar pattern of U.S. carrier air operations. Less than a month after the attacks perpetrated by Osama bin Laden and his al Qaeda terrorist organization, the nation found itself at war against al Qaeda’s main base structure in Afghanistan and against the ruling Taliban theocracy that had provided it safe haven. The war, code-named Operation Enduring Freedom, in no way resembled the open-ocean showdowns between opposing high technology forces that the Navy had prepared for throughout the preceding three decades. Instead, the attacks required a credible, deep-strike capability in the remotest part of Southwest Asia where the United States had virtually no access. Although Air Force heavy bombers flying from outside the theater delivered the vast preponderance of munitions, U.S. carrier-based air power, in flying 75 percent of all strike missions, substituted almost entirely for land-based theater air forces because of an absence of suitable forward operating locations for the latter (see the figure).

Barely more than a year later, the Navy’s carrier force again played a pivotal role when American forces conducted around-the-clock operations against Saddam Hussein’s forces in Iraq. Six of 12 carriers and their air wings were surged to contribute to the campaign, with a seventh carrier battle group held in ready reserve in the Western Pacific and an eighth also deployed at sea and available for tasking. The air wings from the committed carriers flew approximately half the total number of fighter sorties generated altogether by U.S. Central Command.

A report prepared by the International Security and Defense Policy Center of the RAND National Defense Research Institute presents highlights from a larger ongoing RAND study of U.S. Navy carrier air operations and capability improvements since the end of the cold war.

Recent Gains in U.S. Carrier Air Power
The many gains that have been registered in U.S. carrier air power over the past decade—and that...
were demonstrated during Operations Enduring Freedom and Iraqi Freedom—include the following.

- A proven ability to operate not as individual and autonomous air-wing platforms, but rather as a surged and massed force able to conduct coordinated deep-strike missions well beyond coastal reaches and to remain on station for hours, if necessary, providing on-call interdiction and close air support.
- An almost exclusive use of precision-guided munitions by Navy fighters. Of all Navy munitions dropped, 93 percent were either satellite-aided or laser-guided. The principal measure of effectiveness is no longer how many aircraft it takes to neutralize a single target, but rather how many targets a single aircraft can successfully attack. The aircraft were able to attack multiple targets with consistently high accuracy on each combat sortie around the clock, irrespective of weather.
- A pronounced shift from platform-centric to network-centric operations dominated by an ever-tighter fusion of data networks, sensors, platforms, and weapons that will eventually enable a seamless connection of all naval, joint, and coalition combat assets.
- Unprecedented close Navy involvement in high-level planning and command of joint air operations. The six participating carrier air wings had representatives in Central Command’s Combined Air Operations Center and ready access to a software package aboard ship that automatically searched the complex daily air operations plan for Navy-pertinent sections.

The Future Promises Further Improvements

Before the September 11 terrorist attacks, the Navy’s global presence had been enabled by a highly routinized and predictable sequence of maintenance, training, and unit and ship certification. A new Fleet Response Plan tested and validated during Operation Iraqi Freedom will continue to increase the efficiency of those processes, nearly doubling the number of carriers that can be made available and ready for tasking on short notice in times of urgent national need.

A planned follow-on carrier to the nuclear-powered Nimitz-class aircraft carriers will be a large-deck, nuclear-powered ship called CVN-21. It will feature electrical power-generation capability three times that of the Nimitz design and will also replace steam and hydraulic piping. Four electromagnetic aircraft launch catapults will replace the earlier-generation steam catapults. CVN-21 will have a more efficient flight deck and advanced arresting gear for aircraft recoveries. Most important, it will have an adaptable infrastructure that will allow the incorporation of new capabilities as they develop.

The Navy will continue the process of creating a seamless electronic information network. A new initiative called FORCENet aims to tie together naval, joint, national, and ultimately coalition information grids to achieve an unprecedented level of battlespace awareness and knowledge management at all levels.

Among other changes in the future will be a reduction in the number of aircraft assigned to each carrier, a goal made possible by the increased reliability and versatility of today’s aircraft. This restructuring will include:

- Further enhancement and utilization of the Navy’s latest combat aircraft, the F/A-18E/F Super Hornet. The Navy will be able to retire older aircraft, leading to cost savings and a leaner yet more efficient and capable carrier air-wing force structure.
- Introduction of the next generation of naval electronic warfare aircraft in the EA-18G. The EA-18G will conduct wideband electronic support and attack, selective reactive jamming, and active defense suppression. It will permit the transfer of digital, precision threat location and targeting information between it and the strikers.
- Introduction of the E-2D Advanced Hawkeye, offering significantly increased airborne surveillance and battle-management capabilities.
- The long-overdue acquisition of a stealth attack aircraft in the F-35C Joint Strike Fighter. With its unfueled mission radius of 700 nautical miles, the F-35C will restore to Navy carrier decks the deep-attack reach that was lost when the A-6E was retired.
- The prospective introduction of unmanned aerial surveillance and combat vehicles into the Navy’s carrier air-wing complements.

The nation’s carrier strike groups have taken on a substantial qualitative improvement in their overall combat leverage, and the future promises further improvement. The United States remains the only country in the world capable of deploying a carrier-based strike force of any significant size. Today, deep-strike carrier aviation is not only a natural concomitant of the nation’s status as the world’s sole surviving superpower; it also is the one outstanding feature that distinguishes the U.S. Navy unequivocally from all other naval forces around the world.
This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

This product is part of the RAND Corporation research brief series. RAND research briefs present policy-oriented summaries of individual published, peer-reviewed documents or of a body of published work.

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

Browse Books & Publications

Make a charitable contribution

For More Information

Visit RAND at www.rand.org

Explore RAND National Defense Research Institute

View document details

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use.