1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030

THE FUTURE OF NAVAL AVIATION

"This experiment and the advances which have been made in aviation seem to demonstrate that it is destined to perform some part in the naval warfare of the future."

—Secretary of the Navy George von Lengerke Meyer's judgment of the first takeoff by an aircraft from a ship on 14 November 1910

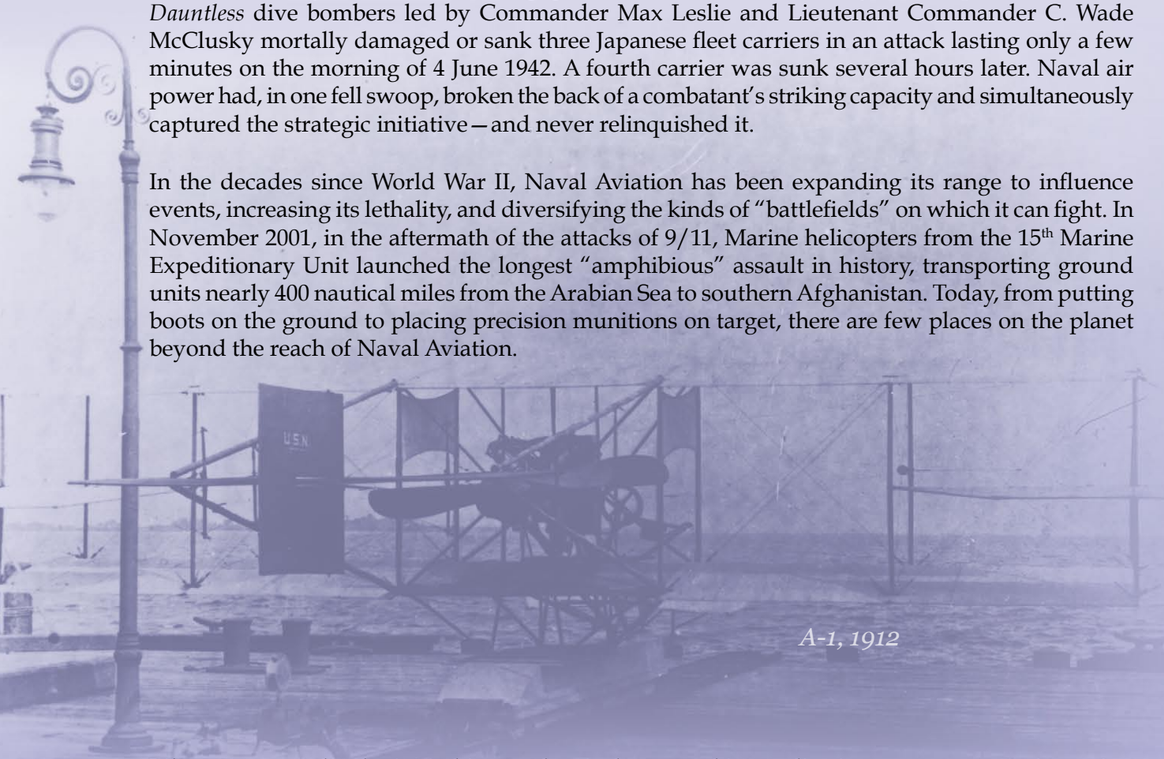
USS Langley, *1928*

A Century of Excellence

In 2011, the U.S. Navy will celebrate the 100th anniversary of Naval Aviation. The Navy officially dates the beginning of its aviation element to 8 May 1911, when the service's first aircraft were requisitioned. Marine Corps Aviation dates its birth to 22 May of the following year, when First Lieutenant Alfred A. Cunningham reported for duty as the first Marine Corps aviator. Even before these dates, however, the feasibility of launching and recovering aircraft at sea already had been proven, and the first naval aviators already were being trained. Although naval aircraft served faithfully in World War I, it would be a generation before U.S. Naval Aviation would truly prove itself in battle. When it did, it did so in spectacular fashion.

In one of history's most decisive engagements, the Battle of Midway, three squadrons of SBD *Dauntless* dive bombers led by Commander Max Leslie and Lieutenant Commander C. Wade McClusky mortally damaged or sank three Japanese fleet carriers in an attack lasting only a few minutes on the morning of 4 June 1942. A fourth carrier was sunk several hours later. Naval air power had, in one fell swoop, broken the back of a combatant's striking capacity and simultaneously captured the strategic initiative—and never relinquished it.

In the decades since World War II, Naval Aviation has been expanding its range to influence events, increasing its lethality, and diversifying the kinds of "battlefields" on which it can fight. In November 2001, in the aftermath of the attacks of 9/11, Marine helicopters from the 15th Marine Expeditionary Unit launched the longest "amphibious" assault in history, transporting ground units nearly 400 nautical miles from the Arabian Sea to southern Afghanistan. Today, from putting boots on the ground to placing precision munitions on target, there are few places on the planet beyond the reach of Naval Aviation.



A-1, 1912

Like so many technologies in history, the airplane—and its application at sea—was an invention waiting to happen. From Eugene Ely's first flight from the deck of USS *Birmingham* (CL 2), the machines of Naval Aviation have undergone tremendous change in a remarkably brief period. The very first aircraft purchased by the Navy, a Curtiss A-1 seaplane acquired in 1911, was powered by a 75-horsepower engine, allowing it to hurtle through the air at 60 miles per hour. Today, the Navy and Marine Corps' newest fighter aircraft, the F-35B/C *Lightning II*, is powered by an engine that generates up to 40,000 pounds of thrust and is capable of speeds in excess of 1,200 miles per hour. For more than two decades, naval aircraft were built primarily of wood and fabric before all-metal construction began in the 1930s. Today, aircraft are made from revolutionary composite materials that are lighter and stronger than steel. In the early years, aviators measured maximum altitude in a few thousand feet. Today, naval astronauts regularly pilot or crew spacecraft into orbit around the Earth—and beyond.

Over the course of the 20th century and into the 21st, the tactics and missions of Naval Aviation also have changed over time. Scouting for the battlefleet was the primary mission of the first naval aircraft, whether they were floatplanes such as the OS2U *Kingfisher* launched from battleships, or airships such as USS *Macon* (ZRS 5). Not until the completion of the first fleet carriers, USS *Lexington* (CV 2) and USS *Saratoga* (CV 3), in 1927 was it readily apparent that the employment of aircraft at sea would be focused on strike warfare. Torpedoes and dive bombing would be the primary weapons of the World War II era, used for attacking ships at sea and land targets near shore in support of Marine amphibious landings in the Pacific.

After 1945, Naval Aviation would influence battles ever farther afield and specialize in missions as diverse as search and rescue, anti-submarine warfare, and electronic warfare, and even would be asked, during the 1950s, to provide a nuclear strike capability. Since World War II, Navy and Marine aircraft have conducted countless peacetime patrols during the Cold War, supported troops on the ground in numerous conflicts, and participated in strategic air campaigns in five major wars from Korea to Iraq and Afghanistan. In all these endeavors and through all these changes, Navy and Marine Corps aviation personnel have excelled in everything that has been asked of them—and much more.

Like their counterparts in their parents' and grandparents' generations before them, young men and women continue to undergo rigorous training to become naval aviators and flight officers, to serve at sea and on land, at home and abroad, to support Navy and Marine Corps missions whenever and wherever they are needed. The Naval Aviation of the future, outlined in the following pages, will continue the same tradition of excellence into the next 100 years.

Transformation Roadmaps

Key to building the force of tomorrow is stabilizing Naval Aviation's investment strategy to acquire the level of warfighting capability and interoperability needed to be successful. This includes maximizing the return on our science and technology investments by transforming a high percentage of projects—with relevant and distinct capabilities—to actual fleet products that can be employed by our warfighters.

Ensuring that the right fleet products are available is the job of the Naval Aviation Enterprise Capabilities-Based Assessment Integrated Process (NCIP), which was developed to oversee the evolution of weapon systems. This process defines requirements and prioritizes capabilities by integrating the Naval Air Warfare Division's (N88) analysis tasks (e.g., the horizontal integration and capabilities assessment process, air campaign capabilities-based assessment, collaborative warfare process, Joint Capabilities and Integrated Development System capabilities-based assessment, and the Defense Acquisition System analysis of alternatives) so that resources are focused where they can generate the greatest warfighting effect. An NCIP steering group, composed principally of N88 section heads and other designated stakeholders, ensures that these capabilities-based analyses provide coherent support to investment decisions as part of the planning, programming, budgeting, and execution process and the development of the annual aviation plans.

The ships, aircraft, systems, and weapons depicted on the following pages represent the heart of Naval Aviation's recapitalization and modernization plan. Their development, production, deployment, and sustainment are essential to delivering the effects mandated by various defense planning scenarios and the contingency and operational plans of the six combatant commanders. We believe this vision provides the pathway for the successful transition of current systems to future readiness, and sustains the measure of warfighting superiority needed to deter and defeat our adversaries. Under the guidance of the *Navy Aviation Plan 2031* and the *Marine Corps Aviation Plan*, these programs will endeavor to:

- Ensure Naval Aviation's relevance by presenting credible warfighting capabilities to deter or defeat any threat
- Provide aircraft, systems, and weapons that reach their initial operational capability and achieve the effects they were designed to produce, and sufficiently enhance their capabilities to keep pace with threats
- Optimize Navy and Marine Corps aircraft inventories so they have the ability to execute the most demanding wartime scenarios or meet surge force and reconstitution requirements
- Synchronize new procurements with the sunset of legacy aircraft
- Avoid concurrent capability enhancements and new procurement in order to reduce spikes in total costs
- Consider the operational risks associated with less-than-optimal procurement quantities and their affect on other missions
- Emphasize joint interoperability
- Reduce total life-cycle costs.

The aircraft transformation roadmaps are grouped into four broad categories:

- Tactical Aircraft (Navy and Marine Corps)
- Helicopters (Navy) and Assault Support Aircraft (Marine Corps)
- Maritime Patrol and Reconnaissance Aircraft (Navy)
- Training, Logistics, and Other Aircraft (Navy and Marine Corps).

The weapon roadmaps are grouped into five categories:

- Long-Range Standoff Weapons
- Mid-Range Standoff Weapons
- Direct Attack Weapons
- Torpedoes
- Air-to-Air Weapons.

These roadmaps depict current aircraft in the 2010 column and the latest models planned to have reached initial operational capability in the 2032 column. In many cases the term "Replacement" is used to indicate that further analysis is required to define a future system.

Also discussed are the roadmaps for aircraft carriers, amphibious assault ships, and unmanned aircraft systems.