

DefenseNews



THE NEW REALITY OF UNDERSEA AND LITTORAL WARFARE

Sponsored by:





The Freedom-class littoral combat ship USS Detroit (LCS 7) exits the Gutan Locks while transiting the Panama Canal. Detroit is deployed to the U.S. Southern Command area of responsibility to support Joint Interagency Task Force South's mission, which includes counter illicit drug trafficking in the Caribbean and Eastern Pacific.

THE NEW REALITY OF UNDERSEA AND LITTORAL WARFARE

By: Andrew Welsh-Huggins

The rapid advancement of long-range weapons and the risk they pose to naval forces are creating challenges for the U.S. Navy, which increasingly is leveraging the use of Unmanned Vehicles (UVs) and Unmanned Underwater Vehicles (UUVs) in undersea and littoral operations to support a more distributed fleet, extend the operational reach of ships and submarines, and allow increased operational flexibility.

These developments represent a future of smaller platforms carrying far fewer personnel — or none at all, in some cases — which can help save service members' lives, said Brian Furgala, Technical Director of the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) group in Hill's Mission

Technologies division. Global engineering and defense technologies provider Hill, based in Newport News, Va., is recognized as America's largest shipbuilder.

"You can leverage unmanned assets at the frontline and remove the threat to personnel from these potential first-strike conflict situations," Furgala said.

Smaller, unmanned platforms have distinct advantages over larger, manned platforms, he said, including a cost-equivalent ability to deploy more small assets to multiple locations. And as costs go down, this will push the further incorporation of unmanned assets.

"Technical advancements and cost reduction will continue to drive this incorporation of unmanned assets while enabling long-range fires,"

Furgala added.

New threats, new responses

Undersea warfare is no longer solely the domain of submarines and floating mines, but now — according to needs being signaled by the military services — includes autonomous unmanned seagoing vessels, smart torpedoes, and personal submersible vehicles for infiltration. The focus of littoral warfare is turning to smaller, unmanned platforms which, in combination with the use of artificial intelligence, can be used as sensor platforms or offensive weapons to allow operations in denied and contested areas.

New threats demand new responses, and the U.S. Navy is adapting with improved offensive and defensive capabilities, including sensors and



Sailors assigned launch a MK 18 MOD 2 unmanned underwater vehicle from a rigid-hull inflatable boat during a demonstration of U.S./U.K. mine detection capabilities.

communications systems that are harder to detect and intercept. Among the threats these UV and UUV platforms will target are submarine warfare, mines, surveillance, reconnaissance and piracy.

The smaller uncrewed platforms are often as fast as larger platforms and more maneuverable, providing equal or even better response times to mission execution in the same grid space. Using multiple, smaller platforms also adds redundancies in case of platform failure that are not always possible when multiple sensors are co-located on a single platform, Furgala said.

“If you have multiple sensors that are distributed to cover that same space, if one were to no longer be operational, you can repurpose the existing sensors to best cover that grid,” Furgala said, an advance he refers to as a “self-healing” network. “In the old approach, when you’ve got one particular platform that goes non-operational, there is a large gap that is difficult to fill.”

In addition, a single platform covering

a large grid space will typically need expensive sensors and weapons packages to achieve its mission.

“Multiple small platforms covering that same space, can have lower cost options and provide the same effectiveness, generally at a lower cost overall,” Furgala said.

Advancing technology and capability

Another driver in the push for UV and UUV platforms is the increased reliance on what’s known as software permission success. With a move to smaller and cheaper platforms, there’s an opportunity to refresh software and associated hardware to incorporate new technological advances, which can improve response speed, Furgala said.

With the miniaturization of computing and associated hardware, there’s more opportunity to do on-board processing and decision-making with data collected by the platforms.

“This is evolving the capabilities of what used to only be possible on large

vessels, shrinking them down and decentralizing processing for specific purposes,” Furgala said. “Technological advances have enabled us to develop processing capability at the edge, supporting decision-making as early as possible.”

One example of this technological evolution is the maturation of unmanned, underwater vehicles (UUVs), which are autonomous robots that can carry advanced sensors and payloads. Depending on their capabilities, they can be used for any role from scout vessels to multiple days’ worth of undersea exploration. UUV technology is advancing quickly, with the newest generation able to undertake longer missions, operate with more autonomy and change payloads depending on the mission parameters. Instead of ships carrying hundreds of personnel, UUVs can operate with zero personnel onboard, allowing for certain missions to be executed without putting lives in danger.

“With unmanned platforms proliferating the mission space, there is a lot of flexibility in what can be achieved,” Furgala said.

This arena is a place where technology has outpaced the traditional warfare approach, with the current goal being to keep up with new doctrines, techniques, tactics, and procedures.

“We want to provide enabling capabilities for decision makers and commanding officers to employ in the best way possible to achieve the mission,” Furgala said. The overall goal, he reiterated, is pulling personnel off the front line as much as possible by leveraging advances in autonomy and machine learning.

Unmanned platforms

The use of unmanned platforms must be a priority as the U.S. Navy’s

strike capacity is shrinking, Lt. Kyle Cregge, a U.S. Navy Surface Warfare Officer, wrote in March in an op-ed for the Center for International Maritime Security. The Navy, Cregge recommended, must build and deploy the Large Unmanned Surface Vehicle (LUSV) at scale to restore and grow VLS (Vertical Launch System) capacity over the next decade. Under this approach, every Surface Action Group (SAG) — a grouping of combatant ships other than aircraft carriers organized for a specific mission — would be more effective.

“Together, these manned-unmanned teams will form more lethal SAGs than a single ship or manned surface action group operating alone,” Cregge wrote. “Led by Surface Warfare Lieutenants as Unmanned Task Group Commanders, this USV-augmented SAG offers a lethal instantiation of the next-generation hybrid fleet.”

Cregge added that mutual support from a manned ship can reduce operational risk and enable the small crew led by the Surface Warfare Early Commander to embark on their unmanned service vehicle to execute critical manned operations during dangerous or restricted waters evolutions. “These small teams then debark to a designated mothership and perform USV mission integration when the USV is in an unmanned mode,” Cregge wrote.

Illustrating the priority of uncrewed vessels, the Navy last year announced it was increasing its unmanned capabilities with its new Unmanned Surface Vessel Division (USDIV). “To meet the challenges of the 21st Century, we must continue to innovate the surface force,” Cmdr. Jeremiah Daley said at the time. “USVDIV One will accelerate the delivery of credible and reliable unmanned systems in conjunction with increasingly capable manned platforms into the fleet.”

Though submarine leaders were early adopters of UUV systems a decade ago, challenges — particularly the difficulty of recovering unmanned vehicles back into submarines — have led to UUVs being more commonly associated with surface ship operations, Defense News reported last year.

Now, as the Navy seeks to become a manned/unmanned hybrid fleet, submariners are looking to two key milestones: delivery of an Orca Extra Large UUV test vehicle, and the completion of modifications that will allow the Razorback Medium UUV to be deployed and recovered from a submarine’s torpedo tube.

"I believe that we are on the cusp of an unmanned technological revolution, and this calls for regional navies to work together more closely."

- Vice Adm. Brad Cooper

In September 2021, Navy Vice Adm. Brad Cooper established the U.S. Naval Forces Central Command (NAVCENT)’s Task Force 59, a hub for experimentation with unmanned systems and artificial intelligence, including unmanned sea vessels and unmanned underwater vehicles. The Navy also established operating hubs for unmanned systems in Aqaba, Jordan and in Bahrain — the first regional partner to work with the Navy on integrating artificial intelligence and new unmanned systems after Task Force 59 was established, according to the Navy.

Among the first platforms tested was the Saldrone Explorer unmanned

surface vessel, housing a package of solar-powered sensors and deployed off the coast of Bahrain in December 2021. Last year, Cooper announced that the Navy had conducted the largest unmanned maritime exercise in the world where 10 nations brought more than 80 unmanned systems to evaluate and operate in regional waters. And in February, Task Force 59 conducted a weeklong unmanned systems and artificial intelligence integration exercise with the United Arab Emirates Navy in the Arabian Gulf.

“This exercise allowed us to further train our artificial intelligence platforms to sort through new data sets, which will ultimately enhance our detection capabilities,” Lt. Jay Faylo, Task Force 59’s lead exercise planner, said in a statement. The same month, UAE-based Marakeb Technologies announced the development of its Multi-Mission Unmanned Surface Vessel (MMUSV) Golden Unit. The MMUSV, a new addition to the UAE Navy, is an unmanned ship containing a variety of sensors and defense systems useful on multiple missions. At the 2023 Naval Defence & Maritime Security Exhibition (NAVDEX) in the United Arab Emirates, Israel and the UAE also unveiled their first unmanned vessel created jointly by the UAE defense consortium EDGE and Israel Aerospace Industries (IAI).

Unmanned systems using artificial intelligence can remain at sea for more than 100 days, an achievement difficult for a crewed ship to do without significant logistics support, Vice Adm. Cooper said in a May 2022 State Department briefing. These same systems also expand the surveillance reach in a region as vast as the Middle East, where 8,000 kilometers of coastline stretch from the Suez Canal, around the Arabian Peninsula, and into the North Arabian Gulf. “I believe that we are on the cusp of an unmanned technological revolution, and this calls

for regional navies to work together more closely,” Cooper said at that briefing.

‘An evolutionary path’

The transition to broader use of unmanned undersea vehicles likely won’t come overnight. Adm. Mike Gilday, Chief of Naval Operations, has suggested “an evolutionary path” for unmanned vehicles that would involve minimally manned platforms for a while.

“I’d like to get to a place, with large USVs where we can deploy them with strike groups and ARGs let’s say in the 2027-2028 timeframe,” Gilday said in an April 2022 interview at the Center for Strategic and International Studies Headquarters.

In February, Gilday predicted that unmanned or uncrewed vessels would play an increasingly important role in the service’s mission. The Navy is investing in uncrewed systems — in the air, on the water, and beneath the surface — to augment existing and near-future military might, Gilday said at the West 2023 conference in San Diego. A recent update to Gilday’s “Navigation Plan,” a strategic-vision-style document, included an outline of a fleet comprising about 373 manned ships and 150 uncrewed vessels, Defense News reported. The same day, Rear Adm. Fred Pyle, while addressing the Navy League, said that the first of the Navy’s next three five-year Future Years Defense Programs (FYDP) would include investments in unmanned surface vessels.

Global developments

The U.S. Navy isn’t alone in pursuing such technology. In February, China unveiled its new A45 unmanned service vessel, developed by Beijing-based Poly Technologies. The vehicle, introduced at the 2023 NAVDEX, has



U.S. Navy personnel deploy a REMUS 300 unmanned underwater vehicle.

autonomous, obstacle avoidance, and swarm capabilities. In his op-ed, Cregge, the U.S. Navy Surface Warfare Officer, cited the need “to enable a replaceable, lethal force to deter or deny Chinese aggression from the Taiwan Strait to the Second Island Chain.”

Also in February, Brazil’s state-owned naval engineering house EMGEPRON announced it had teamed with TideWise, a privately-owned unmanned systems specialist, to develop a long-range unmanned surface vessel to carry out mine countermeasure operations.

At the 2021 Naval Innovation Days in Issy-les-Moulineaux, French shipbuilder Naval Group unveiled an underwater drone that could enter French Navy service later this decade. In England, Lloyd’s Register created its Unmanned Marine Systems Code in 2017 and in February awarded the UK Royal Navy’s uncrewed AP24 Rigid Inflatable Boat its first UMS certification.

In early March, the Australian government announced the arrival of the first two of five Ocirus BlueBottle USVs for the country’s Defence Force. “Uncrewed Surface Vessels will also provide the Navy with a platform for continuous experimentation, including

support to other autonomous surface and sub-surface systems,” said Matt Thistlethwaite MP, Australia’s assistant minister for defence.

Also in March, the U.S. Navy reported that 30 unmanned and artificial intelligence systems were among the participants in the International Maritime Exercise (IMX) 2023, the Middle East’s largest maritime exercise, with attendance by more than 50 nations and international organizations.

Globally, the USV market is projected to more than double from 2021 to 2028, from \$1.5 billion to \$3.2 billion, according to a new report from The Insight Partners. “The rising adoption of underwater mine countermeasure systems is a major factor propelling the adoption of military USVs,” the report concluded. “Further, the mine detection countermeasure systems worldwide are undergoing several developments.”

In the U.S., the littoral warfare developments come at a challenging time for the Navy, which is currently planning for 35 littoral combat ships (LCSs) designed to operate in shallow waters close to shore. However, the Navy hasn’t demonstrated that this type of ship can perform its intended missions, according to a 2022

report from the U.S. Government Accountability Office, which has led to some Congressional concern about the LCS fleet.

“Operational testing has found several significant challenges, including the ship’s ability to defend itself if attacked and failure rates of mission-essential equipment,” the GAO report found. “The Navy is also behind schedule in developing the various mission modules — different configurations of key systems for different missions, such as mine countermeasures — for the LCS.”

In January, speaking at the Surface Navy Association’s National Symposium in Arlington, Virginia,

Navy Secretary Carlos Del Toro said he envisions a Navy combining unmanned, autonomous, and manned platforms “that will reduce risks to our personnel and lower operating costs as we protect freedom of navigation in vital areas like the South China Sea and elsewhere.”

“What that means, in very concrete terms,” Del Toro continued, “is that these technologies will indeed save lives. Nothing more important to me than doing everything we can for our sailors to come home unharmed.”

Future warfare

The adoption of small, unmanned platforms is not a replacement of the LCS, but will serve in a complementary

role, Furgala said, by providing early intelligence that can then guide an LCS to an area in need. As the nature of potential future conflicts are identified, HII is doing its best to provide a concept of operations for addressing those conflicts to the services’ leaders. Combining traditional Department of Defense acquisition timelines with what’s available in the commercial sector should provide some of these new capabilities as quickly as possible.

“Being able to have this information without placing your personnel at risk, I think is key,” Furgala said. “So the continued proliferation of unmanned platforms to provide that information from the front lines, I think is critical in current and future warfare.” **DN**

About Defense News:

Defense News is the authoritative, independent, professional news source for the world’s defense decision-makers. In print and online, we provide the global defense community with the latest news and analysis on programs, policy, business and technology. To stay informed, visit defensenews.com.

About HII:

HII is a global, all-domain defense provider. HII’s mission is to deliver the world’s most powerful ships and all-domain solutions in service of the nation, creating the advantage for our customers to protect peace and freedom around the world. HII delivers critical capabilities including shipbuilding and technologies ranging from unmanned systems to cyber, ISR, AI/ML and synthetic training.

DefenseNews

