



**Committee on Transportation and Infrastructure**  
**U.S. House of Representatives**  
**Washington, DC 20515**

**Bill Shuster**  
**Chairman**

Christopher W. Vieson, Staff Director

**Peter A. DeFazio**  
**Ranking Member**

Katherine W. Dedrick, Democratic Staff Director

May 4, 2018

**SUMMARY OF SUBJECT MATTER**

**TO:** Members, Subcommittee on Coast Guard and Maritime Transportation  
**FROM:** Staff, Subcommittee on Coast Guard and Maritime Transportation  
**RE:** Hearing on “Blue Technologies: Use of New Maritime Technologies to Improve Efficiency and Mission Performance”

---

**PURPOSE**

The Subcommittee on Coast Guard and Maritime Transportation will hold a hearing on Tuesday, May 8, 2018, at 10:00 a.m., in 2167 Rayburn House Office Building to examine emerging maritime technologies. The Subcommittee will explore how such technologies could improve U.S. Coast Guard mission performance and enhance the safety and efficiency of maritime transportation. The Subcommittee will hear from the Coast Guard, representatives of industry, and academia.

**BACKGROUND**

The Coast Guard performs 11 official statutory missions including search and rescue, aids to navigation, law enforcement, and interdiction of illegal drugs. These missions have direct and significant impacts on commerce, property, and life in the United States. In 2017, the Coast Guard rescued or assisted nearly 12,000 people in response to the aftermath of hurricanes Harvey, Irma, and Maria.<sup>1</sup> The Coast Guard’s missions not only support disaster relief, but are also essential to supporting the U.S. economy through its regulation, oversight, and enforcement of the U.S. Maritime Transportation System (MTS). The MTS remains integral to the country’s commerce, carrying 73.5 percent by weight and 46.6 percent by value of U.S. international merchandise.<sup>2</sup> In 2017 as a specific example, the Coast Guard’s domestic

---

<sup>1</sup> USCG. FY2019 Budget Overview. [https://www.uscg.mil/Portals/0/documents/budget/2019%20BIB\\_FINALw.pdf](https://www.uscg.mil/Portals/0/documents/budget/2019%20BIB_FINALw.pdf)

<sup>2</sup> U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration. 2013 Freight Facts and Figures. [http://www.ops.fhwa.dot.gov/freight/freight\\_analysis/nat\\_freight\\_stats/docs/13factsfigures/index.htm](http://www.ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/13factsfigures/index.htm) (as of August 2014).

icebreakers conducted more than 5,300 hours of icebreaking to facilitate the movement of \$1.5 billion of cargoes through ice-impeded waters of the Great Lakes and Eastern Seaboard.<sup>3</sup>

Maritime Domain Awareness (MDA), which is the effective understanding of the global maritime domain that could impact the security, safety, economy, or environment of the United States, is an important component critical to the Coast Guard's mission performance. As one of the military sea services, the Coast Guard gathers and distributes MDA information to other governmental and non-governmental partner agencies as it conducts each of the 11 official missions within a multi-layered security framework.

Congress continues to be interested in the Coast Guard's successful adoption and integration of new and emerging technologies. In the 115<sup>th</sup> Congress, versions of the *Coast Guard Authorization Act of 2017 introduced in the House* (H.R. 2518) and in the Senate (S. 1129) included a section requiring the Coast Guard to enter into an arrangement with the National Academy of Sciences (Academy). This arrangement would allow the Academy to prepare an assessment of existing and emerging unmanned technologies that could be used by the Coast Guard. The assessment will analyze how the use of new and emerging MDA technologies can assist the Coast Guard to carry out its missions at lower costs, expand the scope and range of the Coast Guard's MDA, use its personnel and assets more efficiently, and identify adjustments in any Coast Guard policies, procedures, and protocols to incorporate these new systems and technologies.

## **Blue Technologies**

"Blue technology" is a term that describes a wide swath of technologies and systems that support, sustain, and integrate the U.S. and global ocean economy. Accordingly, systems and technologies such as autonomous vehicles, sensors (both remote and in situ), ocean observation platforms, and hydrographic services, among many others fall under the term. The integration of advanced blue technologies could improve operational efficiencies and the Coast Guard's mission performance, as well as MDA. Emerging maritime technologies may contribute to enhanced operational flexibility, improved understanding of the maritime environment, and optimal deployment and use of conventional Coast Guard assets (e.g., cutters, aircraft, small boats, etc.).

### **Search and Rescue**

Rescue 21 is the Coast Guard's advanced command, control and direction-finding communications system that can locate distressed mariners at sea and on navigable rivers using Very High Frequency (VHF) radio transmissions. The system identifies the location of callers in distress through a line of bearing from the source of VHF radio transmissions to a radio tower, thereby significantly reducing search time. This direction-finding capability is a significant improvement over the legacy National Distress and Response System (NDRS), especially for mariners who may not be able to provide accurate positions. However, Rescue 21 relies solely on VHF radio transmissions, which is likely less prevalent than cell phones, particularly for mariners on smaller commercial

---

<sup>3</sup> USCG. FY2019 Budget Overview. [https://www.uscg.mil/Portals/0/documents/budget/2019%20BIB\\_FINALw.pdf](https://www.uscg.mil/Portals/0/documents/budget/2019%20BIB_FINALw.pdf)

and recreational vessels. The Coast Guard has an ongoing project assessing the use of cell phone technology to locate distressed mariners in mayday and search and rescue scenarios.<sup>4</sup> This project is scheduled to be completed in March 2019.

### Integrated Communications

Efficient and reliable communications between Coast Guard shore-side facilities, ships, small boats, and aircraft are critical to MDA and Coast Guard mission performance. The Coast Guard is currently recapitalizing its offshore assets with an integrated communications platform. The Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) acquisition program acquires and integrates electronic sensors and computer networking, data processing and information-sharing equipment, to better enable Coast Guard Service members to perform mission tasks, develop situational awareness and improve coordination with U.S. agencies and allied nations. The C4ISR program also provides command and control equipment that enables cutter crews to navigate, maneuver, target and fire weapons; collect and analyze sensor data; and perform other tasks to support ship operations. The ability of all Coast Guard assets to successfully communicate with one another will assist the Coast Guard in conducting missions in a more efficient and cost-effective manner.

### Unmanned Systems

Unmanned Maritime Systems (UMS), commonly described as autonomous and radio controlled Unmanned Surface Vehicles (USVs), and Unmanned Underwater Vehicles (UUVs), operate in surface or subsurface aquatic environments with the potential to increase MDA and support Coast Guard missions. Recent developments in radar and sensor technologies, power generation, transfer and storage, as well as delivery and recovery methods have led to a tipping point where investment in UMS could potentially provide a significant enhancement to Coast Guard operational capability. In partnership with other federal agencies, the Coast Guard has an ongoing project assessing UMS for Coast Guard missions, including understanding the scope of available platforms and evaluating the needs for full-scale application.<sup>5</sup> This project is scheduled to be completed in July 2018.

In the above-surface domain, there is an ongoing Coast Guard program to install small Unmanned Aircraft Systems (UAS) on National Security Cutters (NSC) in order to maximize NSC at-sea mission performance. This program was funded at \$6 million in fiscal year (FY) 2017 and \$500,000 in FY 2018, and the FY 2019 President's budget requested \$6 million. Additionally, the Coast Guard has another ongoing project, in collaboration with Customs and Border Protection and the Department of Homeland Security, exploring the use of land-based, long-range and ultra-long endurance UAS, which could provide multiple days of surveillance while employing advanced optics,




---

<sup>4</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Project #1108.

<sup>5</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Project #7808.

wide-area surface surveillance, and detection technologies<sup>6</sup>. This program was funded at \$18 million in FY 2017. H.R. 2518 includes authority for the Coast Guard to establish a land-based unmanned aircraft system program that would be under the control of the Commandant of the Coast Guard. H.R. 2518 passed the House on July 20, 2017 as Division E in the *Department of Homeland Security Authorization Act* (H.R. 2825) and the provisions of H.R. 2518 are included in S. 1129, which is awaiting Senate Floor action.

## Coast Guard UAS Concept

<p><b>Long-Range UAS</b>  <b>Persistent, strategic</b> maritime domain awareness for the regional commander            &gt;5,000 ft (to include Positive Control Airspace &gt;18,000 ft)</p> 	<ul style="list-style-type: none"> <li>• Wide-area surveillance</li> <li>• Scheduled missions</li> <li>• &gt;24-hour endurance, to include ultra-long endurance capabilities</li> </ul>
<p><b>Medium-Range UAS</b>  <b>Persistent, tactical</b> tool for the cutter            &lt;5,000 ft</p> 	<ul style="list-style-type: none"> <li>• Threat ID to support end-game interdiction</li> <li>• On-demand availability for the tactical commander</li> <li>• 12+ hour endurance</li> </ul>
<p><b>Short-Range UAS</b>  <b>Personal, tactical</b> tool for the operator            &lt;1,200 ft</p> 	<ul style="list-style-type: none"> <li>• SRU portable optic system</li> <li>• &lt;20 lb UAS</li> <li>• 20- to 30-minute endurance</li> </ul> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <p><b>Requirements under Development</b></p> </div>

Source: Loretta Haring. *Research, Development, Test and Evaluation Spotlight: Long-Range, Ultra-Long Endurance Unmanned Aircraft System*. Coast Guard Compass. Jan 9, 2018.

As UAS become more widely available and affordable, concerns are being raised regarding the risk that unauthorized UAS may jeopardize Coast Guard operations. In March 2018, the Coast Guard MH-65 Dolphin helicopter crew from Air Station Port Angeles in Washington state was conducting training exercises near the airport when the crew maneuvered to miss a drone at an estimated distance of 50 feet.<sup>7</sup> The drone had not been authorized by the Federal Aviation Administration to fly within the five-mile radius of the airport. This incident highlights a need to better manage increased interactions from unauthorized UAS activities with Coast Guard surface and air assets. The Coast Guard has an ongoing counter-UAS project evaluating methods to search, detect, mitigate, and defeat illicit, illegal or threatening use of unmanned aircraft systems in a

<sup>6</sup> Loretta Haring. *Research, Development, Test and Evaluation Spotlight: Long-Range, Ultra-Long Endurance Unmanned Aircraft System*. Coast Guard Compass. Jan 9, 2018.

<sup>7</sup> USCG news release, Mar 20, 2018. <https://content.govdelivery.com/accounts/USDHSCG/bulletins/1e3927a>

maritime environment.<sup>8</sup> This project is scheduled to be completed in December 2020. S.1129 includes a section that would provide the Coast Guard with authority to address and mitigate threats posed by unmanned aircraft to the safety and security of a Coast Guard vessel or aircraft or any vessel or aircraft the Coast Guard is assisting or escorting.

### Automatic Identification System (AIS)

AIS is important for both safe navigation and MDA aspects of the Coast Guard's missions. AIS is a VHF-based, short-range communication system that provides a common platform for vessels to electronically exchange relevant vessel data (e.g., vessel identification number, vessel type, position, course, and speed) with other nearby vessels and shore-based AIS receivers. AIS data is overlaid on electronic charts to provide vessel operators with near real-time information on positions, courses, and speeds of other vessels. Several private companies have developed enhanced AIS systems that leverage navigation data from satellite and other sources and integrate it into a single common operational picture that can be viewed on several platforms including smart phones.

### Navigation Services

The Coast Guard maintains a system of over 47,000 federally owned, lighted and unlighted, buoys, beacons, and other aids-to-navigation (ATON) that mark 25,000 miles of waterways and navigable coastal waters. In recent years, the Coast Guard has augmented its physical ATONs with electronic or virtual ATONs, using AIS technology.<sup>9</sup> Electronic ATONs may enhance MDA and form an improved view of maritime traffic within or near U.S. and territorial waters. Use of electronic ATONs have been limited in the U.S. Arctic due to the lack of major ports and minimal maritime traffic. To address navigation safety and risks in the Arctic, the Coast Guard has an ongoing project examining a next generation Arctic Navigation Safety Information System including a near shore system and extended range AIS.<sup>10</sup>

### Maritime Boundaries of Exclusion

To conduct port security or environmental remediation, the Coast Guard may need to temporarily exclude unauthorized users from a maritime location. For example, during the 2016 Democratic and Republican National Conventions, the Coast Guard issued temporary security zones in the waters near the events, where unauthorized vessels were not permitted to enter without permission from the Captain of the Port.<sup>11</sup> To communicate the boundaries of exclusion to maritime users, the Coast Guard may use a combination of physical markers and manned patrols. There is an ongoing Coast Guard project to improve ways to mark, communicate, and patrol the boundaries of a maritime

---

<sup>8</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Project #7812.

<sup>9</sup> USCG Report to Congress. May 4, 2016. Electronic Aids to Navigation.

<sup>10</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Project #6211.

<sup>11</sup> 81 Federal Register 48331; 81 Federal Register 41811

area of exclusion, without a dependence on manned Coast Guard patrols.<sup>12</sup> Using novel technology to successfully fulfill missions while decreasing reliance on manned patrols enhances Coast Guard operational flexibility.

### Data Analytics

Data analytics improves decision-making through the use of modeling and simulation based on collected data. The Coast Guard has an ongoing project to estimate vessel violation probabilities in marine vessel inspections. This project identifies factors that influence a vessel's probability of having a violation and develops tools to optimize detection with limited inspection resources.<sup>13</sup> The use of data analytics within the Coast Guard advances optimal deployment of assets and personnel.

---

<sup>12</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Project #5921.

<sup>13</sup> USCG Acquisition Directorate. Research, Development, Test & Evaluation. *FY18 RDT&E Project Portfolio*. March 2018. Projects #7532

**WITNESS LIST**

**Panel I**

Rear Admiral Michael J. Haycock  
Assistant Commandant for Acquisition and Chief Acquisition Officer  
United States Coast Guard

**Panel II**

Mr. Eric J. Terrill, Ph.D.  
Coastal Observing Research and Development Center  
Scripps Institution of Oceanography

Mr. Michael B. Jones  
President  
The Maritime Alliance

Mr. Chris Coyle  
Member  
International Ocean Science and Technology Industry Association

Mr. Thomas S. Chance  
Chief Executive Officer  
Autonomous Surface Vehicles, LLC

Ms. Tuba Ozkan-Haller, Ph.D.  
College of Earth, Ocean and Atmospheric Sciences  
Oregon State University

Rear Admiral Jonathan W. White, USN, Ret.  
President and Chief Executive Officer  
Consortium for Ocean Leadership