



**Committee on Transportation and Infrastructure  
U.S. House of Representatives**

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September 2, 2016

**SUMMARY OF SUBJECT MATTER**

TO: Members, Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment  
FROM: Staff, Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment  
RE: Joint Hearing on “Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change”

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**PURPOSE**

The Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment will hold a joint hearing on Wednesday, September 7, 2016, at 10:00 a.m., in 2167 Rayburn House Office Building to examine federal maritime navigation programs. The Subcommittees will hear from the United States Coast Guard, the United States Army Corps of Engineers (Corps), and the National Oceanic and Atmospheric Administration (NOAA).

**BACKGROUND**

A safe, secure, and efficient marine transportation system is critical to the U.S. economy. According to the Maritime Administration, waterborne cargo and associated commercial activities contribute more than \$649 billion annually to the U.S. gross domestic product and sustain more than 13 million jobs. Nearly 100 percent of the volume of overseas trade enters or leaves the United States by vessels navigating the marine transportation system. The National Marine Manufacturers Association reports the 12 million registered recreational boats in the United States generate an annual economic value of \$121.5 billion and support 964,000 direct and indirect American jobs. To facilitate the efficient movement of goods and commodities, protect the environment, and ensure the safety and security of the marine transportation system, the navigable waters of the United States are charted, marked, and maintained to assist in vessel navigation. The Coast Guard, the Corps, and NOAA each play integral roles in operating and maintaining different features of the U.S. navigation system.

A major challenge facing the Nation is to improve the economic efficiency and competitiveness of the U.S. maritime sector, while reducing risks to life, property, and the coastal environment. The emergence of satellite and advanced telecommunication based

navigation technologies presents new opportunities to improve the safety, security, and efficiency of the marine transportation system and reduce risks to the coastal and maritime environments. Operational integration of these new and emerging electronic navigation (e-navigation) technologies also poses challenges for federal and other governmental agencies, and for private commercial vessel operators and recreational boaters.

## NOAA

NOAA's National Ocean Service (NOS), specifically its Office of Coast Survey (Coast Survey), conducts hydrographic surveys which measure the depths and bottom configurations of water bodies. This survey data is subsequently translated by NOAA into nautical charts which are managed and published by NOAA for use by commercial and recreational vessel owners. The Coast Survey collects hydrographic survey data from a variety of sources, including NOAA's own fleet of hydrographic survey vessels, contracted private sector hydrographic survey firms, and from other federal navigation partners, such as the Corps. The hydrographic survey data the Coast Survey gathers is used to generate over 1,000 nautical charts covering 95,000 miles of shoreline and 3.4 million square nautical miles of waters within the U.S. Exclusive Economic Zone.

Nautical charts provide information to mariners on channel depths and configurations, natural and manmade obstructions to navigation, regulated navigation areas, security zones, and other information critical to safe navigation. The Coast Survey makes nautical charts available in several formats, including traditional paper charts and as downloadable data for incorporation into electronic chart systems. Effective April 13, 2014, the Coast Survey no longer publishes charts, but does make "print-on-demand" charts available to the public on its website (FR 2013-31378).

Since conditions on the water change constantly, the Coast Survey may update its collection of nautical charts 200 to 300 times a year. In addition to issuing updated chart information, the Coast Survey forwards the information about changes to its nautical charts to the Coast Guard for broadcast and publication in the Service's *Local Notice to Mariners*. This ensures mariners have the latest information about conditions on the water. In addition, on February 3, 2016, the Coast Guard published Navigation and Vessel Inspection Circular No. 01-16 to now accept the use of an Electronic Charting System (ECS) to satisfy the nautical chart carriage requirement in §33 CFR 164.33 for domestic U.S. vessels who wish to voluntarily elect to use electronic charts instead of paper charts.

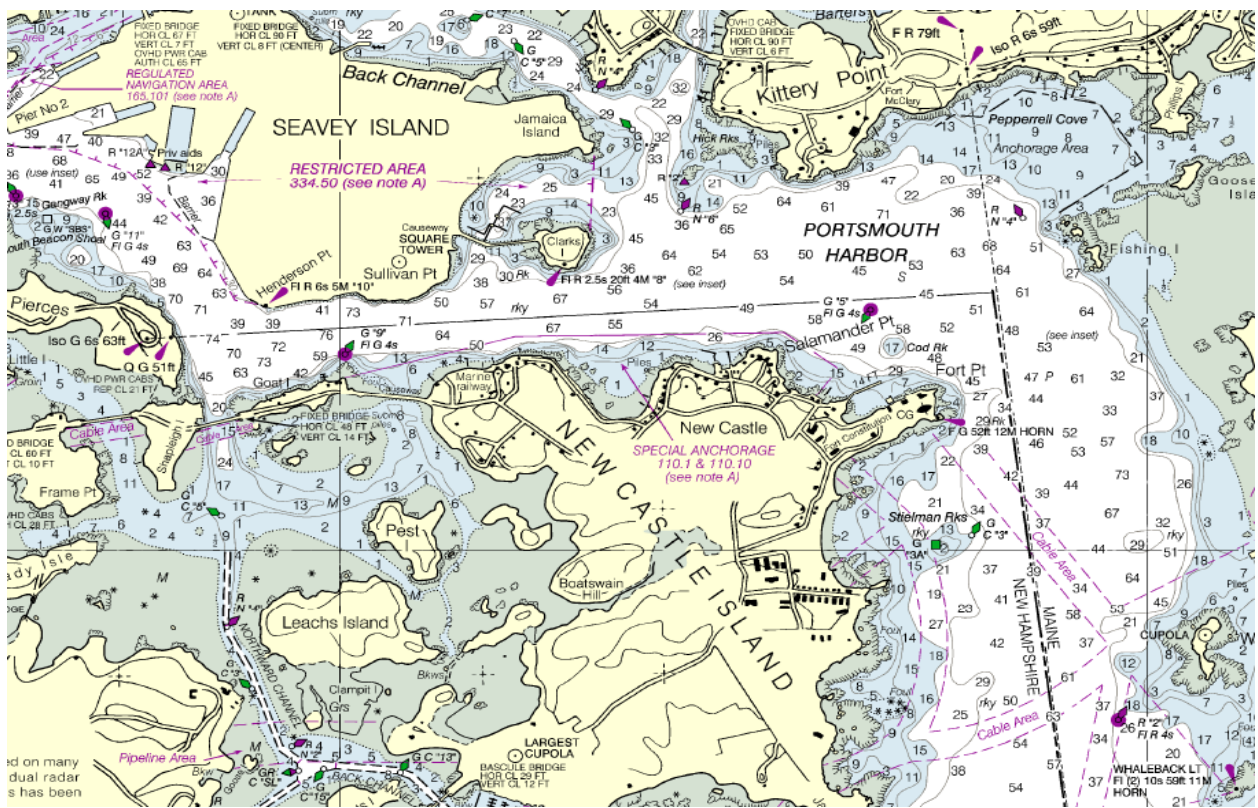
Two other NOS programs also provide important physical data and products that help inform and improve the accuracy and utility of NOAA's nautical charts:

- The National Geodetic Survey (NGS) - develops and maintains the National Spatial Reference System (NSRS), a national coordinate system that provides the foundation for transportation, navigation, land record systems, mapping and charting efforts, and a multitude of scientific and engineering applications. The NSRS system defines position (latitude, longitude, and elevation), distances, and direction bearings between points which are critical to navigation. Additionally, NGS implements a shoreline mapping

program to define the national shoreline and other coastal features needed for updating nautical charts and providing visual aids to mariners.

- The Center for Operational Oceanographic Products and Services (CO-OPS) – gathers tide information along the Nation's coasts, to enable reliable prediction, and the publication of daily, monthly, and seasonal tidal cycles for maritime users. Moreover, CO-OPS's technicians, scientists, and engineers collect real-time water level, current, and other oceanographic observations and monitoring data (such as tsunami warning data) that support safe and efficient maritime commerce and help to protect life, property, and the environment. A good example of a CO-OPS product is the Physical Ocean Real Time System (PORTS), a decision support tool that measures and disseminates observations and predictions of water levels, currents, salinity, and meteorological parameters (e.g., winds, atmospheric pressure, air and water temperatures) that mariners need to safely access into and egress from major U.S. ports.

In fiscal year 2016, NOAA spent over \$205 million on hydrographic surveys and other navigation related activities.



Nautical Chart of Portsmouth Harbor, NH

## Corps

The Corps' navigation mission is to provide a safe, reliable, efficient, effective, and environmentally sustainable waterborne transportation system for movement of commerce, national security needs, and recreation. The Corps is responsible for dredging and maintaining

the depth of nearly 25,000 miles of federal navigation channels throughout the country. The Corps also dredges 926 coastal, Great Lakes, and inland harbors. In addition to dredging channels, anchorages, and turning basins, the Corps operates and maintains 239 lock chambers at sites on the inland river system and is responsible for thousands of protective jetties and breakwaters throughout the country.

While NOAA conducts much of the hydrographic surveys of U.S. waters, the Corps is responsible for hydrographic surveys of all federal navigation channels, as well as the entire inland river system. The Corps uses its fleet of over 95 hydrographic survey vessels, as well as contracted private sector vessels to ascertain the depth and condition of federal channels on a regular basis. Hydrographic surveys are also conducted in conjunction with maintenance dredging activities to ensure federal navigation channels are dredged to approved depths. The Corps forwards the data from these surveys to NOAA for inclusion on NOAA's nautical charts.

In fiscal year 2016, the Corps was provided more than \$2.6 billion for the construction, operation, and maintenance of the Nation's inland and coastal navigation systems. This includes new and ongoing construction of coastal channels and inland locks, maintenance of existing channels, the operation and maintenance of locks and associated navigation infrastructure, and hydrographic surveys. Of that amount, the fiscal year 2016 appropriations provided more than \$1.2 billion from the Harbor Maintenance Trust Fund, for maintenance of the Nation's coastal and inland harbors, which is the same level provided in the *Water Resources Reform and Development Act of 2014* for these activities; however, even with this appropriation, the Corps continues to face a backlog of unmet harbor maintenance needs at high-use, moderate-use, and emerging harbors, despite the fact that, at the end of fiscal year 2017, the Harbor Maintenance Trust Fund is forecast to have a surplus of \$9.8 billion.

## **Coast Guard**

The Coast Guard is responsible for providing a safe, secure, and efficient navigation system to support domestic commerce, international trade, and military sealift requirements for national defense. To carry out these responsibilities, the Service conducts numerous port and waterways management tasks. These tasks include, maintaining physical aids-to-navigation (ATON), developing navigation standards and regulations, operating vessel traffic services, conducting icebreaking, permitting bridges over navigable waters, and the operation, implementation, and coordination of several electronic navigation and vessel tracking and identification technologies.

### *ATON Mission*

The Coast Guard maintains a system of over 47,000 federal government-owned lighted and unlighted buoys, beacons, and other ATON that mark 25,000 miles of waterways and navigable coastal waters. The Service also oversees an additional 50,000 private ATONs. The Coast Guard's 64 Aids-to-Navigation Teams rely on a fleet of 68 buoy tenders and 152 small boats to service its ATON system. The Coast Guard uses hydrographic survey data from the Corps and NOAA to help determine where ATONs should be positioned. In fiscal year 2016, the Coast Guard was appropriated \$1.37 billion to carry out its ATON mission.

## *E-Navigation*

The Coast Guard's Navigation Center (NAVCEN) in Alexandria, Virginia is responsible for the collection, integration, dissemination, presentation, and analysis of maritime information by electronic means to enhance maritime navigation and support Maritime Domain Awareness. NAVCEN manages the several e-navigation systems for the federal government including:

- Automatic Identification System (AIS) - AIS is a Very High Frequency (VHF)-based, short-range communication system that provides a means for vessels to electronically exchange data, including identification, position, course, and speed, with other nearby vessels and shore-based AIS receivers. Depending on signal strength, weather, geography, and receiver capability, AIS signals can generally be received up to 50 miles away.

AIS data is overlaid on electronic charts to provide vessel operators with near real-time information on vessel position, course, and speed. The Coast Guard is currently testing AIS to transmit information to vessel operators indicating where it has imposed temporary restricted areas and where ATON outages exist. The Service plans to augment its physical ATONs with electronic ATONs and reduce where possible the number of physical ATONs that require regular or seasonal maintenance.

- Nationwide Automatic Identification System (NAIS) - The Coast Guard collects AIS signal data through its NAIS. NAIS consists of approximately 200 VHF receiver sites located along the coasts and inland river systems of the United States. NAIS allows the Coast Guard to collect data from AIS-equipped vessels traveling in the vicinity of the Nation's 58 largest ports.
- Long Range Identification and Tracking (LRIT) - LRIT is a worldwide, satellite-based automated tracking system for vessels on international voyages with 12 or more passengers, or over 300 gross tons. Unlike AIS, LRIT is a secure system in which vessel identity and position data is transmitted every six hours to data centers that distribute them to countries permitted to have the information. This system allows certain governments, such as the United States, access to flag, port, and coastal state LRIT information.
- Differential Global Positioning System (DGPS) – DGPS transmitters augment traditional GPS satellite signals to improve accuracy so that it can be relied upon for navigation. DGPS sites provide signal coverage to 92 percent of the continental United States, complete coverage of the coastline, as well as selected portions of Alaska, Hawaii, Puerto Rico, and the inland river system. In August 2015, the Coast Guard issued a notice proposing to shut down and decommission 62 of then-existing 84 Nationwide DGPS sites. By August 2016, 37 Nationwide DGPS sites had been disestablished, nine of which are Coast Guard maritime sites and 28 are Department of Transportation (DOT) inland sites. Going forward a total of 46 Coast Guard and Corps sites will continue to be available to users in major maritime ports and waterways (FR 2016-15816).

*Enhanced Long Range Aids to Navigation (eLORAN)*

Electronic navigation systems like AIS rely heavily on the DGPS/GPS system to provide the positioning, navigation, and timing (PNT) data necessary to properly function. However, GPS satellite signals are often subject to interference from space weather such as solar flares, as well as spectrum encroachment from radio emissions, and intentional and unintentional acts of GPS frequency jamming. When disruptions occur in GPS satellite PNT signals, mariners are currently left to rely on physical ATONs to safely navigate.

In 2004, President George W. Bush issued a National Security Presidential Directive that tasked the DOT to work with the Department of Homeland Security (DHS) to develop backup capabilities to mitigate disruptions to GPS signals (National Security Presidential Directive 39). In 2008, DHS proposed to upgrade the Coast Guard's antiquated Long Range Aids to Navigation (LORAN) system with an eLORAN system to act as a primary backup to GPS. eLORAN is a low frequency radio-based system capable of providing position, navigation, and timing information to users at levels of accuracy similar to GPS. Funding was not appropriated to begin the transition to eLORAN. In 2009, DHS announced plans to decommission LORAN and no longer sought funds to upgrade the system to eLORAN. In 2010, the Coast Guard terminated LORAN transmissions.

The *Coast Guard Authorization Act of 2010* (P.L. 111-281) required the Secretary of DHS to study and determine if a backup system to GPS is necessary. The Secretary concluded further study is required (*An Analysis of Whether a Single Domestic Backup Navigation System is Needed for GPS: Report to Congress. September 2011*). In November 2013, the Government Accountability Office released a report finding that DOT and DHS had made limited progress in developing a backup for GPS and faulted both departments for failing to better collaborate on the issue (GAO-14-15). Section 229 of the *Howard Coble Coast Guard and Maritime Transportation Act of 2014* (P.L. 113-281) prohibits the Coast Guard from dismantling or disposing of infrastructure that supported former LORAN, unless the DHS Secretary determines and reports to Congress that LORAN infrastructure is not needed to provide redundant capability for GPS.

**WITNESSES**

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Rear Admiral Shephard Smith  
Director, Office of Coast Survey  
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Mr. Edward E. Belk, Jr. P.E.  
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