

HYDROGRAPHIC SERVICES REVIEW PANEL

A federal advisory committee, advising the NOAA Administrator

Surveying and Charting in U.S. Channels, Harbors, and Anchorages

U.S. ports and harbors are critical to our nation's economic health. Maritime cargo activity accounts for 26% of the U.S. economy and generates nearly \$4.6 trillion in total economic activity.¹ In order to compete in the global economic arena, our ports and channels must be surveyed, charted, and maintained to the highest international standards to ensure safe passage of all vessels, large and small, commercial and recreational.

ISSUE AND STATUS

NOAA requirements for data usage on official charts are significant due to legal, liability, and technical standards. What is not well-known to the general public is that, although NOAA is responsible for production of U.S. nautical charts, it is not responsible for the collection of all data that are used to produce these charts, particularly in dredged harbors and channels. NOAA in-house and contract surveys, which are done mostly in channels, are required to be conducted to the appropriate International Hydrographic Organization (IHO) S 44 standards (2008), which defines two types of surveys to be used in ports, harbors, and shallow channels: Special Order and Order 1a. These standards require both full sea floor search and object detection. Object detection is especially critical in areas where ships with minimal under-keel clearance could strike an object or run aground with potential for port closure, liability, and/or environmental damage.

Multibeam sonar surveys are most frequently used to meet full sea floor search and object detection requirements in water depths greater than 4-10 m; sidescan and lidar are often used to supplement multibeam data or single-beam surveys in very shallow areas where multibeam surveys may be impractical. In general, single-beam sonar surveys alone cannot meet IHO S 44 Order 1a and Special Order standards because they do not provide full sea floor search or object detection.

In dredged harbors and channels, USACE is the leading agency that collects the data included on the charts. USACE's primary mandate is dredging and construction, not nautical charting. Various types of surveys are used to conduct these engineering missions. "New work" surveys

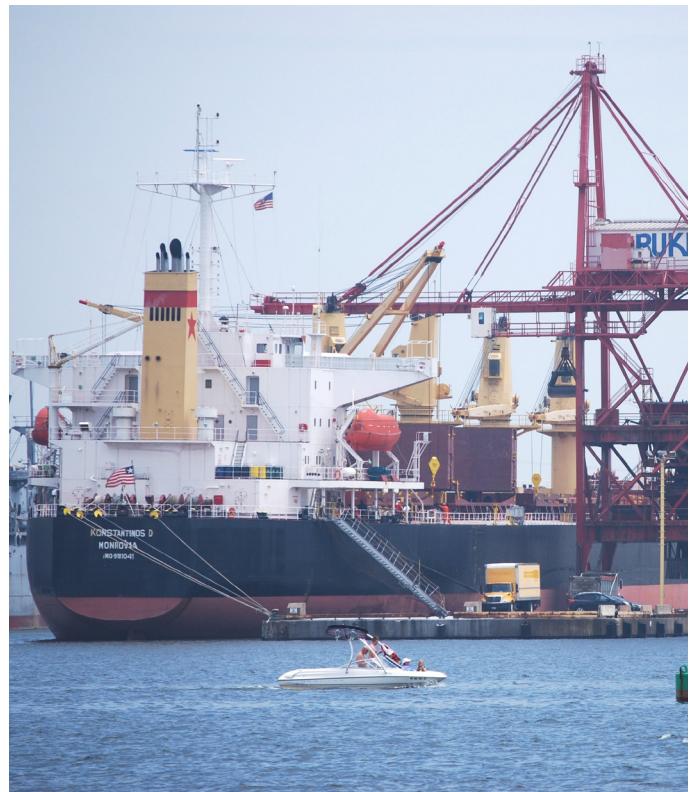
typically use multibeam data, which can be suitable for IHO compliance; however, multibeam surveys must be planned and executed appropriately to meet Special Order or Order 1a requirements. The assumption for channel management and maintenance after the "new work" survey is that, because an active channel has been deepened with 100% coverage to authorized depth and width, any future surveys are seen as "condition" surveys to determine maintenance dredging needs and location of natural shoals. For these surveys, USACE typically performs more frequent single-beam "condition" and other types of surveys on navigable



Why Object Detection is Important. Tanker Athos was punctured by a 9-ton anchor in a federal anchorage area, causing approximately 264,000 gallons of crude oil to spill into the Delaware River in November 2004.² Credit: NOAA.

channels. In general, these surveys have proven adequate for USACE channel management because in active shipping channels, maintenance dredging also provides 100% coverage of the dredged and surveyed areas and should encounter and remove any objects that are not detected in single beam surveys.

If post-maintenance-dredge single-beam surveys are used on nautical charts, there can be “underlap” or gaps in the survey data or between survey areas where potentially dangerous objects have not been detected. In order to do object detection, surveys must be properly planned and executed and the original data must be analyzed with object detection as an outcome. All USACE data provided to NOAA for inclusion on charts is typically a gridded product (i.e., not the original data) in a xyz-format, but no object detection is provided with the data. NOAA currently labels USACE data for use on charts as CATZOC B, indicating that “uncharted features hazardous to surface navigation are not expected but may exist.” In addition, most USACE districts post their data on an internal website and many, but not all, send the data directly to NOAA via eHydro. USACE has recently mandated that all data sent to NOAA must be via eHydro.



Port of Baltimore.

RECOMMENDATIONS FOR FEDERAL ACTION

NOAA should work with other partners and agencies to:

- Establish procedures to ensure that U.S. harbors, channels, and anchorages are surveyed and charted to IHO Order 1A standards, including object detection. Possible mechanisms to accomplish this might be: a collaborative interagency working group; an independent, non-governmental review team; and/or a subcommittee of the Integrated Coastal and Ocean Mapping group.
- Make clear, both internally and externally, what data are currently used for construction of U.S. nautical charts in our federally maintained harbors, channels, and anchorages and to what standard all data sets have been collected, using current and future industry-standard data-quality indicators.
- Establish consistent data exchange and posting between NOAA and USACE, preferably on a single, central web site.

¹ Martin Associates, 2014 National Economic Impact of the U.S. Coastal Port System.

² United States District Court for the Eastern District of Pennsylvania, 2016 Civil Action No. 05-cv-305 (JHS), available from <http://www.americanmaritimecases.com/assets/July-2016/Athos-I.pdf>

The Hydrographic Services Review Panel was established as directed by the Hydrographic Services Improvement Act of 2002, Public Law 107-372.

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