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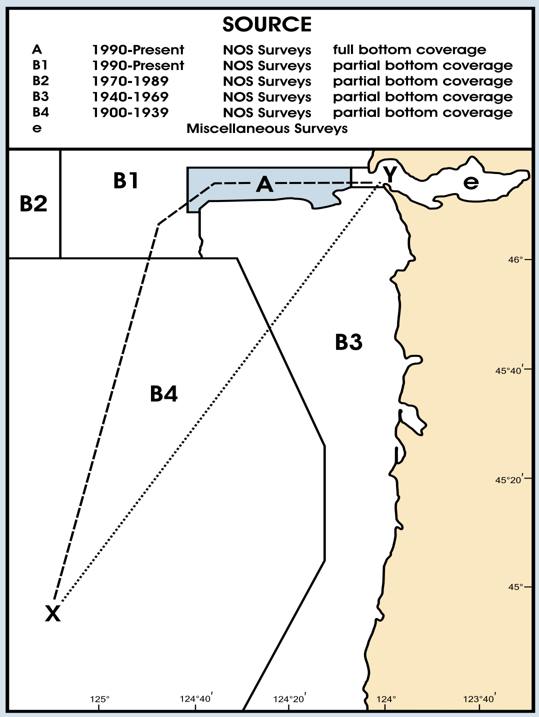
Corrections

(101) Chapter:1

Source Diagrams

Referring to the accompanying sample Source Diagram below and the previous discussion of survey methods over time, transiting from Point X to Point Y, along the track indicated by the dotted line, would have the following information available about the relative quality of the depth information shown on the chart.

Point X lies in an area surveyed by NOAA within the 1900-1939 time period. The sounding data would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might exist between the sounding points in areas of irregular relief. Caution should be exercised.



The transit then crosses an area surveyed by NOAA within the 1940-1969 time period. The sounding data would have been collected by continuous recording single beam echo sounder. It is possible that features could have been missed between sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or may vary in age, reliability, origin or technology used. No inferences about the fitness of the data can be made in this area from the diagram.

Referring again to the accompanying sample Source Diagram, and the previous discussion of survey methods over time, a mariner could choose to transit from Point X to Point Y, along the track shown with a dashed line.

The transit starts again in an area surveyed by NOAA within the 1900-1939 time period. The sounding data would have been collected by leadline. Depths between sounding points can only be inferred, and undetected features might still exist between the sounding points in areas of irregular relief. Caution should be exercised.

The transit then crosses an area surveyed by NOAA within the 1990 - present time period, with partial bottom coverage. The data is collected in metric units and acquired by continuous recording single beam echo sounder. It is possible that features could have been missed between the sounding lines, although echo sounders record all depths along a sounding line with varying beam widths.

The transit then crosses into an area surveyed by NOAA within the 1990 - present time period, having full bottom coverage. This area of the charted diagram is shaded with a blue screen to draw attention to the fact that full bottom coverage has been achieved. The data would have been collected in metric units and acquired by side scan sonar or multibeam sonar technology. Undetected features in this area, at the time of the survey, would be unlikely.

The transit ends in an area charted from miscellaneous surveys. These surveys may be too numerous to depict or may vary in age, reliability, origin or technology used. No inferences about the fitness of the data can be made in this area from the diagram. By choosing to transit along the track shown by the dashed line, the mariner would elect to take advantage of survey information that is more recent and collected with modern technology.

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Bottom Coverage and Survey Methods

Prior to 1940, most survey data was acquired by lead line, and soundings were positioned using horizontal sextant angles. This positioning method is considered to be accurate for near shore surveys. However, lead line surveys only collect discrete single-point depths. The depths between the soundings can only be inferred and undetected shoals and other uncharted features may exist in these areas, especially in areas of irregular relief.

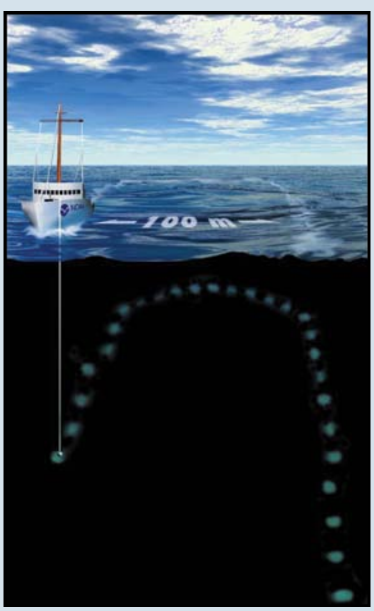
From 1940 to 1990, sounding data acquisition typically used continuous-recording single beam echo sounders as stand-alone survey systems, which resulted in partial bottom sounding coverage. Although the sampling is continuous along the track of the sounding vessel, features such as discrete objects or small area shoals between sounding lines may not have been detected. Positioning of the sounding vessel in this period progressed from horizontal sextant angles, through land based electronic positioning systems, to differentially corrected Global Positioning System (DGPS) satellite fixes.

From 1990 to the present, most surveys have been conducted using either multi-beam sonar systems or a combination of side scan sonar and single beam echo sounder systems to achieve full bottom coverage. The term full bottom coverage refers to survey areas in which the field party has acquired continuously recorded, high-resolution sonar data in overlapping swaths. This sonar data, either multi-beam bathymetry or side scan imagery, has been analyzed in an attempt to locate all hazards to navigation within the survey's limits; all position data has been determined using DGPS. NOAA began utilizing airborne light detection and ranging systems (LIDAR) for near shore bathymetric surveying in the late 1990s. This type of survey method provided sounding data at a lower resolution than sonar systems, thus making small obstructions and hazards difficult to identify. Although LIDAR systems provide continuously recorded swath data, the resulting sounding resolution is not dense enough for the survey to be considered full bottom coverage. However, LIDAR surveys in which significant anomalies have been further investigated using multi-beam sonar are considered adequate for the full bottom coverage designation. Stand-alone LIDAR surveys are depicted on the source diagram as partial bottom coverage areas.

Although full bottom coverage surveys are not feasible in all areas, this method is typically preferred over lead line, single beam echo sounder, and LIDAR technologies. Full bottom coverage surveys typically extend inshore to depths of 4-8 meters (13-26 feet). Due to scaling factors, a full bottom coverage survey area may appear to extend further inshore once depicted on the source diagram. Generally, sounding data in depths of 6 meters (20 feet) and shoaler – 8 meters (26 feet) and shoaler in Alaskan waters – has been acquired using a partial bottom coverage method. Caution and prudent seamanship should be used when transiting these near shore areas.

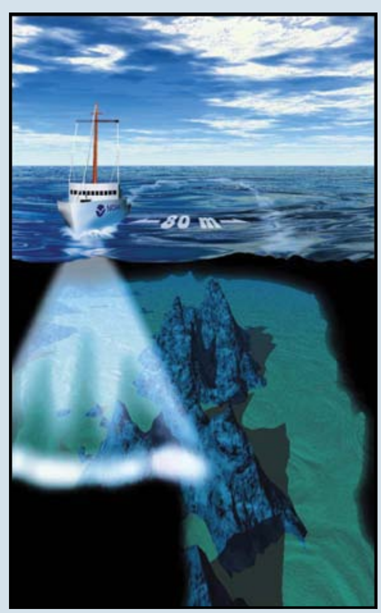
The spacing of sounding lines required to survey an area using a single beam echo sounder depends on several factors such as water depths, bottom configuration, survey scale, general nature of the area and the purpose of the survey. For example, a 1:10,000-scale survey conducted in an estuary will typically have 100-meter line spacing requirements but may be reduced to 50 meters or less to adequately develop an irregular bottom, shoal or some other feature that may present a hazard to navigation. Also, hydrographic project instructions for surveys may have required line spacing that deviates from these general specifications.

Leadline (pre 1940)



Single Beam (1940's - 1980's)

Multibeam (1990's - present)



Chapter 1, Paragraph 99 through Paragraph 111 , read:

(99)

Source and Zone of Confidence (ZOC) Diagrams

(100) The age and accuracy of hydrographic survey data that support nautical charts can vary. Depth information on nautical charts, paper or digital, is based on data from the latest available hydrographic survey, which in many cases may be quite old. Diagrams are provided on nautical charts to assist mariners in assessing hydrographic survey data and the associated level of risk to navigate in a particular area. There are currently two types of diagrams shown on NOAA paper and raster navigational charts (RNCs) of 1:500,000 scale and larger—Zone of Confidence (ZOC) diagrams and source diagrams. ZOC information (designated CATZOC) is also found on electronic navigational charts (ENCs). This provides consistency in the display of source data between ENCs and newer paper charts.

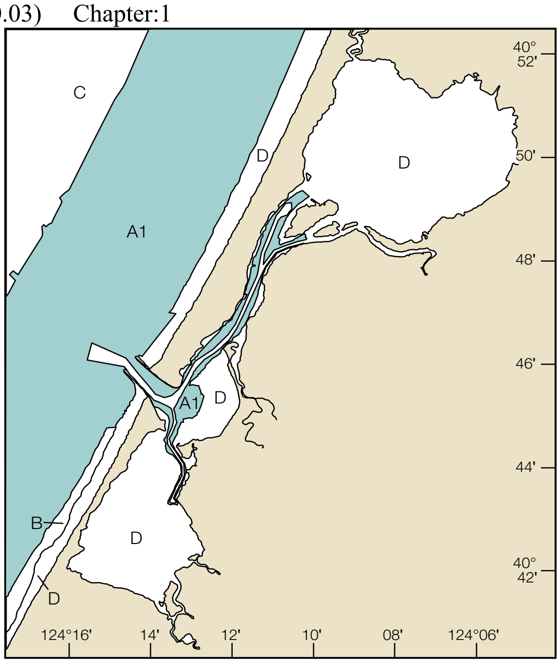
(100.01) Both source and ZOC diagrams consist of a graphic representation of the extents of hydrographic surveys within the chart and accompanying table of related survey quality categories. CATZOC information on an ENC, unlike the diagrams on a paper chart or RNC, is displayed over the ENC data using symbols rather than letters. These symbols are displayed on a separate layer, which can be viewed when planning a route, then switched off until needed again at another time.

(100.02) <Inserted Table>

ZOC CATEGORIES
(Refer to Chapter 1, United States Coast Pilot)

ZOC	DATE	POSITION ACCURACY	DEPTH ACCURACY	SEAFLOOR COVERAGE
A1	2008-2009	± 16 ft	= 1.6 ft + 1% depth	All significant seafloor features detected
B	1949	± 160 ft	= 3.2 ft + 2% depth	Uncharted features hazardous to surface navigation are not expected but may exist
C	1949	± 1600 ft	= 6.5 ft + 2% depth	Depth anomalies may be expected
D	-	Worse than ZOC C	Worse than ZOC C	Large depth anomolies may be expected

(100.03) Chapter:1



(100.03) <Inserted Image>

(101) <Updated Image>

(102) <Updated Image>

(103) On ZOC diagrams, the quality of the hydrographic data is assessed according to six categories; five quality categories for assessed data (A1, A2, B, C and D) and a sixth category (U) for data that has not yet been assessed. On the ENC, the categories are shown using a rating system of stars—the higher the quality, the greater the number of stars. Assessment of hydrographic data quality and classification into zones of confidence is based on a combination of: survey date, position accuracy, depth accuracy and sea floor coverage (the survey's ability to detect objects on the seafloor.)

(104) Source diagrams will be replaced with ZOC diagrams as new editions are created. Similar to the ZOC diagram, they provide the mariner with additional information about the density and adequacy of the sounding data depicted on the chart. The adequacy with which sounding data reflects the configuration of the bottom depends on the following factors: survey technology employed (sounding and navigation equipment), survey specifications in effect (prescribed survey line spacing and sounding interval) and type of bottom (e.g., rocky with existence of submerged pinnacles, flat sandy, coastal deposits subject to frequent episodes of deposition and erosion).

(105) <Deleted Paragraph>

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(TXT 1-5/16; NCM 04/16; NOS 18622)