New Hydrographic Survey Specifications
Updates and Enhancements

US Hydro Conference
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- "Revamped" HSSD
  - Over two years of development
  - First published version released in April 2024
  - Used by NOAA field units in 2024 field season
  - Contractors using in 2025

- Foundational components for new HSSD
  - S-100 based metadata and data licensing
  - Facilitate tools for automated compliance
  - Best integrate with the National Bathymetric Source (NBS)
  - Accommodate external data contributions

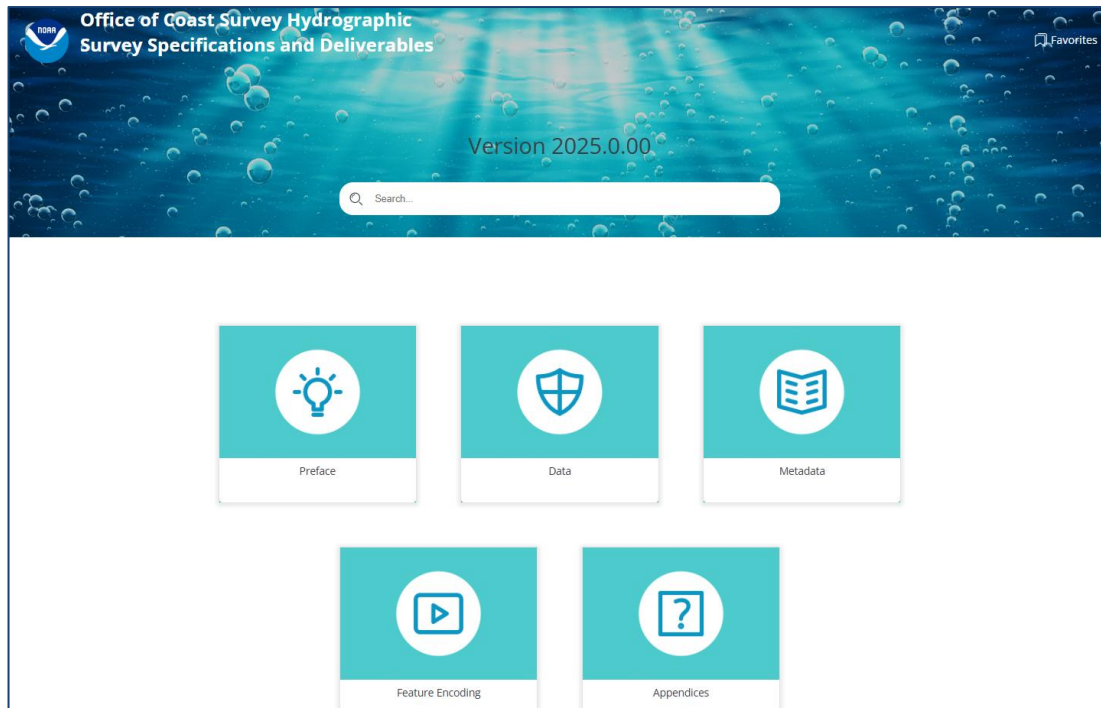**HSSD – H**ydrographic **S**urvey **S**pecifications and **D**eliverables

Office of Coast Survey
Hydrographic Surveys Division

Hydrographic Survey Specifications and Deliverables

Version 2024.1.01

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- HSSD Committee formed
  - Responsible for support and ongoing maintenance of HSSD

- Rapid release capability
  - New HSSD updates released as necessary (e.g. midseason)

- Multiple formats available
  - PDF, Online HTML viewer, and Portable HTML

- HSSD version 2025.0.00
  - Current version, released in January, 2025

Office of Coast Survey Hydrographic Survey Specifications and Deliverables

Version 2025.0.00

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Preface | Data | Metadata

Feature Encoding | Appendices

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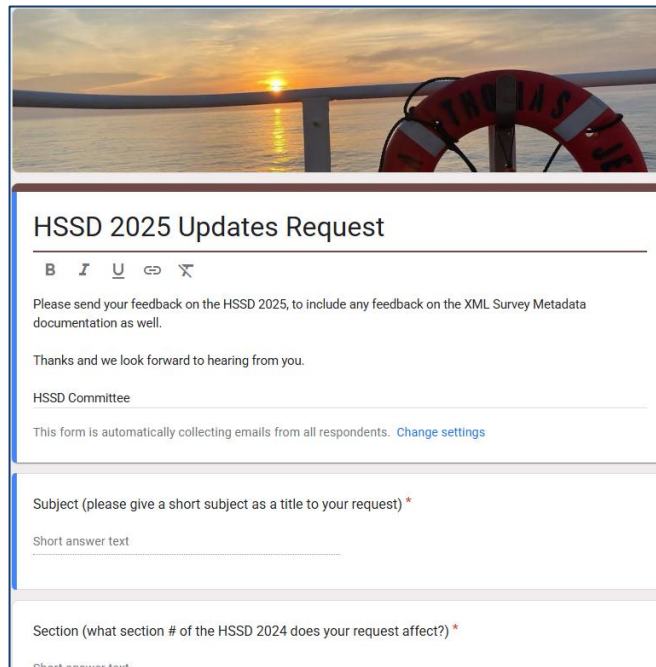OCS Hydrographic Specifications available via online viewer!

https://www.nauticalcharts.noaa.gov/publications/hssd_viewer.html
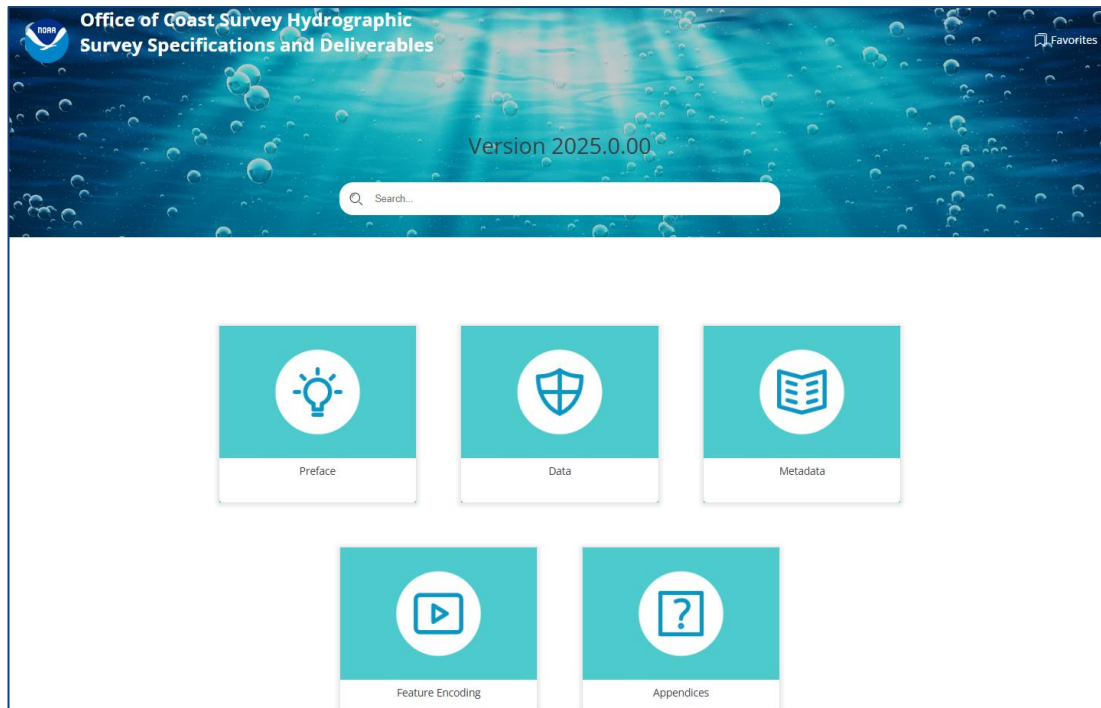
- New HSSD put to the test right away
  - Francis Scott Key Bridge Collapse on March 26, 2024 – NOAA fast response, survey, and chart delivery

- Learning curve with new quality metrics
  - New vocabulary for communicating data quality via S-100 based metadata attributes
  - Not just one uncertainty criteria; there is a spectrum with 6 options – field units record the level achieved

- Reporting changes
  - Built for speed and data throughput; not for narratives

- New deliverables formats
  - BAG (grids), Geopackage (features), GeoJSON (outlines)

Depths less than 30 feet
Depths of 30 to 50 feet
Depths greater than 50 feet

HSSD Committee

- Responsibilities
  - Answers questions regarding interpretation of HSSD
  - Handles and discusses incoming change requests
  - Publishes HSSD new version releases with updates

- Tickets received
  - 74 as of Jan 2025 release; 54 were "processed", with 39 tickets resulting in edits to the HSSD

- New HSSD versions
  - Released as necessary (annually at minimum)
  - Capability for rapid release during the field season

HSSD 2025 Updates Request

Please send your feedback on the HSSD 2025, to include any feedback on the XML Survey Metadata documentation as well.

Thanks and we look forward to hearing from you.

HSSD Committee

This form is automatically collecting emails from all respondents. Change settings

Subject (please give a short subject as a title to your request) *

Short answer text

Section (what section # of the HSSD 2024 does your request affect?) *

Short answer text

- IHO S-100 based metadata
  - Values defined by NOAA Quality Metrics

- A common metadata framework
  - From specification to final compilation (i.e. NBS)

- Defines data quality
  - In terms of Coverage, Features, and Uncertainty
  - Determines our National Bathymetry

- Added Metadata Attribution Guide
  - Informs the metadata entry
  - Grid and survey specific metadata
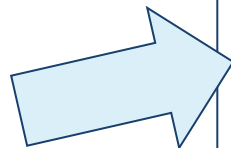
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Version 2025.0.00

Appendix 2. Metadata Attribution Guide

Survey-Specific Metadata

A set of survey-specific metadata as shown in **Reports** must be included for each survey submitted. **Requirements marked as "ISD" are for NOAA ISD only.** Requirements marked as "**ESD**" are for **External Source Data providers**.

Name	Format/Note	Example
Project Unique ID	See below	OPR-O392-FA-23
• ISD: Assigned in Project Instructions. • ESD: Not required.		
Project Name	See below	Southeast Alaska
• ISD: Assigned in Project Instructions. • ESD: Not required.		
Survey Unique ID	See below	H13777
• ISD: Use Registry Number as assigned in Project Instructions. • ESD: Not required.		
Survey Name	See below	Entrance to Clarence Strait
• ISD: Use Sub-locality as assigned in Project Instructions. • ESD: Institutional identification or reference to survey.		
Time Zone Offset from UTC	+- hhmm (or "Z" for UTC)	-0800
• The time recorded in the data files. If the time recorded in the data files is UTC, enter in "Z". If data is recorded in local time, record this value, which is an offset from UTC.		
Start Date	YYYYMMDD	20230304

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- QC Tools
    - Automates HSSD compliance
    - Since 2015!

- Jointly developed
    - CCOM/JHC and NOAA OCS

- Community effort
    - Built on feedback/ideas from the users

- Version 4 released in April 2024
    - HSSD 2024+ compatible
    - Set Quality Metric in parameters

Matt Wilson
NOAA OCS (AHB)

Tyanne Faulkes
NOAA OCS (PHB)

Giuseppe Masetti
CCOM/JHC

Fresh
Release of
QC Tools 4!

QC Tools 4 - automates HSSD

Flier Finder

Uncertainty Calculator

Holiday Finder

Grid QA

BAG Checks

Feature Scan

VALSOU Checks

Hydrographic Data Delivery

QC Tools inputs:

✓ **Grids**
- • Verifies uncertainty, resolution (vr), density, identifies fliers.
- • Verifies BAG structure, metadata, validity.

✓ **Features**
- • Verify attribution, agreement with grid.

✓ **Delivery Structure**
- • Verifies folder structure and file names.

Automates compliance:

✓ 5.7 Cleaning
✓ 5.8 Uncertainty

✓ 6.1 Formats
✓ 6.3 Metadata
✓ 6.4 Resolution
✓ 6.5 Data Gaps
✓ 6.9 Density

✓ 7.0 Features
✓ 17.0 Feature Encoding

✓ 16.0 Delivery Structure

Ensuring BAG requirements

- BAG is the final product sent to NBS
  - Many requirements for seamless compilation

- BAG structure checks
  - Metadata, Elevation, Uncertainty, Tracking List

- Metadata checks
  - CRS encoding, start/end dates, etc.

- Elevation and Uncertainty checks
  - All nodes populated with both; not NaN; etc.
  - Uncertainty not negative; within threshold; etc.

- GDAL compatibility checks

National Bathymetric Source (NBS) compiles BAGs from many sources
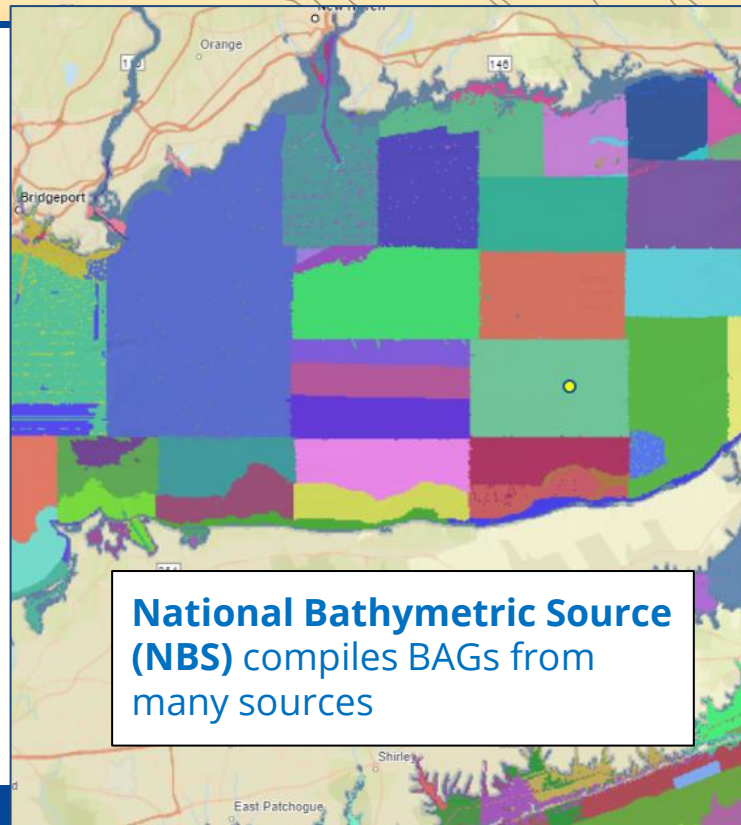
QC Tools 4 BAG Checks

- "**NOAA NBS**" profile – fully aligned with HSSD.

  - Checks for all NBS requirements.

  - Other options – trouble spots in BAG are "flagged".

- "**General**" profile – per the BAG specification.

- Full list of checks:

  https://www.hydroffice.org/manuals/qctools4/stable/qc_tools/hdr/qc_tools_hdr_bag_checks_how_does_it_work.html

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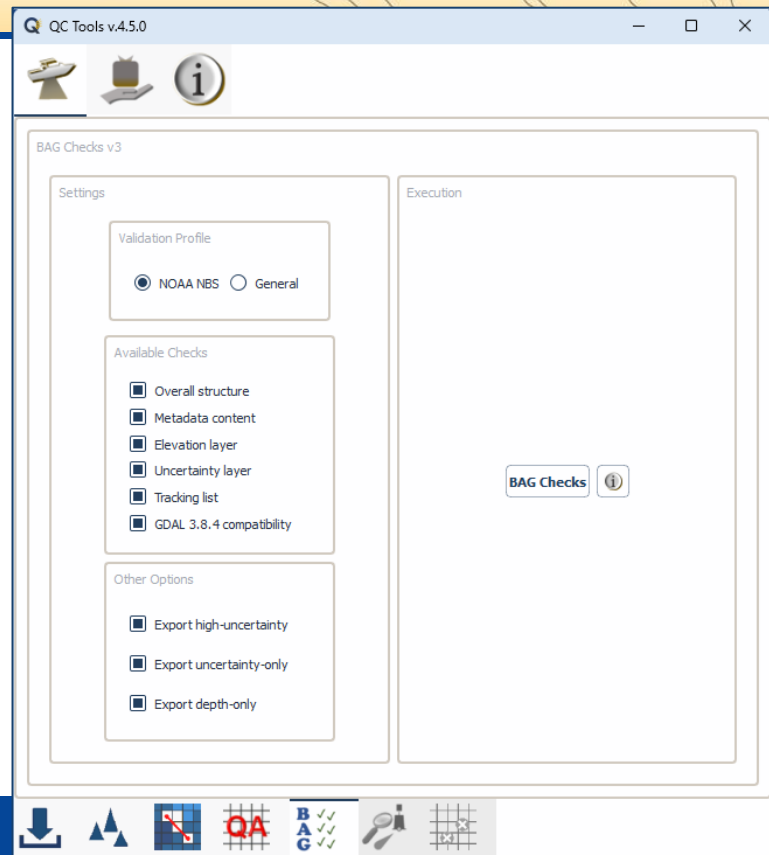
- Survey Metadata XML form
  - PDF output added
  - Personnel roster tab added

- New HSSD 2025 compatible forms:
  - Hydrographic Survey Project Instructions
  - Hydrographic Data Review

- xml 2025 schema aligned with HSSD
  - Released Jan 2025

- Lead developer
  - Toshi Wozumi, NOAA Hydrographic Surveys Division (HSD)

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- Traditional narrative approach vs streamlined?
  - It's a divisive topic
  - Is it possible to have both?

- XML metadata
  - Contains grid and survey based metadata
  - Add CRS metadata (WKT)
  - Add Survey outline (GeoJSON)

- PDF printout
  - Human readable
  - Contains images, narrative information

```xml
<smd:grid>
  <smd:gridName>H13986_MB_1m_MLLW_Final_1of1</smd:gridName>
  <smd:coordinateReferenceSystem>
    <smd:projection>Projected UTM 17</smd:projection>
    <smd:horizontal>North American Datum 1983 (2011)</smd:horizontal>
    <smd:vertical>Mean Lower Low Water</smd:vertical>
  </smd:coordinateReferenceSystem>
  <smd:soundingTechnique>found by multi beam</smd:soundingTechnique>
  <smd:detection>
    <smd:significantFeature>Yes</smd:significantFeature>
    <smd:leastDepth>Yes</smd:leastDepth>
    <smd:size>
      <smd:fixed>2.0m (General 1)</smd:fixed>
      <smd:variable>10% (General 1)</smd:variable>
    </smd:size>
  </smd:detection>
  <smd:coverageAssessment>
    <smd:fullSeafloor>Yes</smd:fullSeafloor>
    <smd:bathymetric>Yes</smd:bathymetric>
    <smd:interpolated>No</smd:interpolated>
  </smd:coverageAssessment>
  <smd:uncertainty>
    <smd:horizontal>
      <smd:fixed>2m (Critical)</smd:fixed>
      <smd:variable>N/A</smd:variable>
    </smd:horizontal>
    <smd:vertical>
      <smd:fixed>0.25m (Critical)</smd:fixed>
      <smd:variable>0.75% (Exceptional/Critical)</smd:variable>
    </smd:vertical>
  </smd:uncertainty>
```

Isle of Shoals, New Hampshire
Descriptive Report

A. PROJECT

A.1. Area Surveyed

The Isles of Shoals are a group of islands and rocky shoals approximately 4 nm southeast of Portsmouth Harbor, New Hampshire. The survey area is bounded by the approximate coordinates listed in Table 3 and illustrated by Figure 1, which encompasses a region to the northwest of Appledore Island and Smuttynose islands. Data were acquired on 7, 8, 9, 20, June 2005. A total of 78.3 lineal miles were run including cross lines and shoreline investigations. No bottom samples were taken during the survey.

Depths ranged in the survey area from approximately 0.25 m to 35 m with reference to Mean Lower Low Water (MLLW).

Ongoing Topic #2: Feature Delivery

- A new delivery format required
  - Current S-57 .000 does not support CRS flexibility

- NOAA Geopackage is introduced
  - Open source, CRS flexibile, and supports feature attribution

- Next steps
  - Encourage Geopackage format adoption
  - Geopackage compatibility in software, tools (e.g. QC Tools)

- Lead developer
  - Stephen Patterson, NOAA Hydrographic Systems and Technology Branch (HSTB)
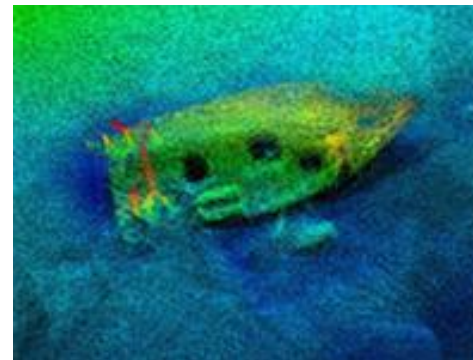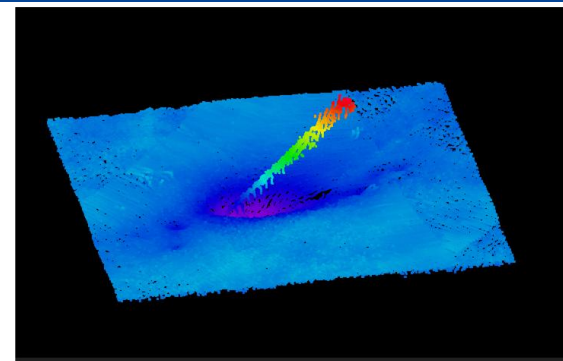
Thank you for your attention!

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