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Paper for Consideration by DQWG

Swept areas - Changes to S-101 DCEG

Submitted by:	S-100WG (S-101 Project Team)
Executive Summary:	S-100WG comments on DQWG proposals relating to swept areas and underlying bathymetry in S-101.
Related Documents:	1. TSMAD29-DIPWG7-CSPCWG11/NCWG1-TWLWG7-INF 2. TSMAD29/DIPWG7-10.6A 3. S-101 DCEG
Related Projects:	S-100; S-101;

Introduction / Background

After having updated the data quality model for S-101, the Data Quality Working Group made some proposals to TSMAD29/DIPWG7. Most of these proposals were agreed by TSMAD, but others relating to swept areas were rejected. This paper explains the point of view of the S-100WG (that has now replaced TSMAD) on this issue.

Analysis/Discussion

In the paper in reference 1. above, the DQWG made various proposals to adapt the S-101 DCEG to the new data quality model. Most of these proposals were agreed by the TSMAD, to the exception of the following:

*"- **Unsurveyed Areas** must be placed under **Swept Areas** if no survey data exists below the swept depth.*

- *This means that you must have a **Swept Area**, a **Depth Area**, and a **Quality of Bathymetric Data** in the same area all with **depth range maximum value** set to the same value.*
- *Also this means that below that set of objects you will have another **Quality of Bathymetric Data** and an **Unsurveyed Area**.*
- *What this really means is that an **Unsurveyed Area** and a **Depth area** can overlap.*
- *This is the only way we see right now to encode an area that is just swept and still follows the rules that would drive the display for data Quality."*

S-100WG does not agree with the above DQWG proposal for the following reasons:

- S-44 (IHO standard for hydrographic survey) states that sweeping systems, whether mechanical or acoustic, may be considered sufficient for Special Order and Order 1A surveys.
  So, an area that has been swept, whatever the technique used, is considered to be surveyed from a hydrographic perspective and there would be an inconsistency in encoding a feature "Unsurveyed Area" under a swept area.
- Depth Area and Unsurveyed Area both belong to the skin of the earth (Group 1) in S-101 and such objects must not overlap. Having both Depth Area and Unsurveyed Area in Group1 is a rule that has not been questioned in S-57 and consequently has not been changed during the passage from S-57 to S-101.
- The S-100WG considers that the DQWG proposal would create many practical issues, such as how overlapping Group 1 features would behave within Navigation Systems, without any real benefit to the end user.

Where an area has been swept to a known depth but no other survey data exists below the swept depth, the S-100WG recommends to keep the current rule in the DCEG: "*that a Depth Area be encoded under the Swept*

Area, with depth range minimum value set to the swept depth and depth range maximum value set to empty (null)."

Within ECDIS, the mariner set safety depth contour is displayed in relation to the depth range minimum value (in S-57 ECDIS the DRVAL1 value) of the depth areas encoded in the ENC dataset. Applying the above rule would result in the ECDIS indicating to a mariner that sets their safety depth contour value to a deeper value than the depth range minimum value for the area covered by the Swept Area that the area is not safe to enter. Additional information regarding the quality of bathymetry at the varying depth ranges within the water column can be supplied using the now allowable "vertically overlapping" Quality of Bathymetric Data features, as agreed at DQWG8 and included in the current modeling described in the S-101 DCEG. Additional consideration may also be given to portrayal within S-100 ECDIS whereby specific symbology is developed as an indication of areas where the depth range minimum attribute for an encoded Depth Area feature is populated with an empty (null) value.

S-100WG studied the opportunity to remove Swept Area feature in S-101. There are many cases where a swept depth has been guaranteed by a survey and additional "spot" seabed penetration has been achieved. In such cases, it may be useful to use a Swept Area feature (for a clear indication to the mariner of the minimal depth in the area), jointly with the complete bathymetry (soundings + depth contours + depth areas) as it may differ significantly from the swept depth. This is why S-100WG is in favor of keeping Swept Area feature in S-101, but not adding this object to the Group1.

NOTE: The S-100 Working Group recognizes that the originating DQWG paper did not ask for Swept Areas to be a part of the skin of the earth. This was captured as part of the discussion where it was suggested that if Swept Area were part of skin of the earth, that it might solve the problem. However, as it was pointed out above, where there is additional depth information under the Swept Area, then it would preclude it from being part of skin of the earth as you would need a depth area to capture the information.

Conclusions

The S-100WG confirms that:

- encoding Depth Area feature over Swept Area feature in S-101 must not be allowed if both features belong to the Group 1.
- Swept Area should not belong in Group 1.
- Depth Area and Unsurveyed Area features must not overlap, preserving the current rule that Group 1 features must not overlap.
- it is not in favour of allowing the encoding of Unsurveyed Area feature under Swept area feature.

In addition the S-100WG confirms that the only issue with the Quality of Bathymetric feature was with the above encoding issues and not with the modelling of the feature.

Recommendations

S-100WG wishes to maintain the S-101 DCEG as it is for the parts relating to swept areas and asks DQWG to reconsider the Data Quality Model encoding to consider the thoughts of S-100WG position. If the DQWG still wishes to pursue breaking the rule of skin of the earth, then it would need to propose that as an official paper to the S-101 Project Team and not via making changes to the DCEG as it is the main part of the S-101 Product Specification that contains this rule.

Action Required of DQWG

DQWG is invited to:

a. take note of this paper

b. reconsider the DQWG position of allowing overlapping Group 1 features in S-101 so as to provide an indication of data quality within swept areas in regard to:

   - retaining the current DCEG modelling, which allows "vertically" overlapping Quality of Bathymetric Data features; and

- the possibility of an additional indication in the ECDIS where the depth range maximum value for an encoded Depth Area feature is populated as empty (null).