23rd TSMAD MEETING
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Paper for Consideration by TSMAD

Encoding of Mangrove Coast and Mangrove Areas on ENC

Submitted by:	Australia
Executive Summary:	Revised ENC encoding guidance for mangrove areas and the seaward edge of mangrove areas following revised specifications in IHO S-4.
Related Documents:	S-4; S-57 Appendix B.1, Annex A (Edition 3.0.0); S-58
Related Projects:	S-57 Maintenance; S-101 Development; S-58 Maintenance; ENC Encoding Bulletin Sub-WG

Introduction / Background

This paper is a re-submission of a paper submitted to TSMAD19 (TSMAD19-05.1), which was rejected on the grounds that the recommendations were on contradiction to a mandatory statement in the UOC Edition 2.1. This statement is no longer relevant in UOC Edition 3.0.0 and therefore the paper is re-submitted for consideration of TSMAD.

One of the primary objectives of the IHO Chart Standardisation and Paper Chart Working Group (CSPCWG) is to revise, develop and maintain IHO Publication S-4 – Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO. In April 2009, the IHO published Edition 3.006 of S-4, which included revised specifications for the depiction of mangroves on paper charts. This revised specification includes the option for the cartographer to depict mangrove areas within the intertidal area with both a defined seaward and landward edge. This revised specification is in conflict with the current ENC specification for the encoding of mangrove coast in S-57 Appendix B.1, Annex A, Edition 3.0.0.

Analysis / Discussion

The following is the revised specification for mangroves (S-4 – Version 3.006, April 2009):

B-312.4   **Mangroves.** The seaward limit of the mangroves must be a fine dashed line, backed by small mangrove symbols at intervals of about 10mm. The area of mangroves should normally be covered by intertidal tint. The landward limit of the mangrove area (where it is the high water line) must be shown as coastline, using C1 or C2 as appropriate. On smaller scale charts or if detailed information on the extent of the intertidal area is not available it may be sufficient to show the seaward limit only, with land tint on the landward side.

If the area is extensive, mangrove symbols may be spread across it spaced in a diagonal pattern about 10mm apart. Alternatively, a legend 'Mangroves' may be inserted within the area, repeated as necessary. The legend should be in upright type, as the actual mangroves are an above water feature.

C32
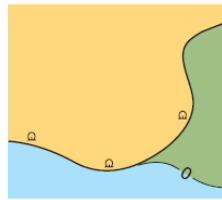
on small scale charts

Note that the seaward limit of the mangrove area may not coincide with the low water line (eg if mudflats extend further seaward), nor the landward limit coincide with the high water line. In such cases, the limits of the mangrove area must be depicted by a fine dashed line backed by mangrove symbols, as an isolated area within a larger intertidal area.

If it is required to show an individual mangrove tree, the symbol C31.2 should be used. If it is conspicuous, the legend 'TREE' should be inserted alongside the symbol.

A mangrove shore was formerly represented by one of the following symbols, with land tint extended to the seaward limit of the mangrove area as this represents the apparent coastline and the limit of navigation.
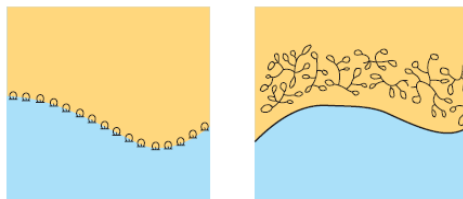
With the increasing use of charts for non-navigational purposes, it is now considered better to show the 'real-world' situation, ie areas of mangroves should be shown over intertidal tint, as mangroves only exist in intertidal areas. Therefore, the above symbols are now obsolescent.

The following is the encoding guidance for mangrove coastline and mangrove areas in S-57 Appendix B.1, Annex A, Edition 3.0.0:

4.1   Land area

Land areas that are never covered by the sea must be encoded using the object class **LNDARE**.

4.7.11   Vegetation (see S-4 – B-312.4, B-352.4 and B-354)

If it is required to encode vegetation, it must be done using the object class **VEGATN**.

Geo object: Vegetation (**VEGATN**)   (P,L,A)
Attributes: CATVEG   CONVIS   ELEVAT
                HEIGHT -   approximate altitude of the highest point of the top of the vegetation.
                NOBJNM   OBJNAM   ~~VERACC~~   ~~VERDAT~~   VERLEN   INFORM   NINFOM

If it is required to encode an isolated tree used as a landmark, it must be done using a **VEGATN** object, with attribute CATVEG = *13* to *21*.

If it is required to encode a mangrove area, it must be done using a **VEGATN** object, with CATVEG = *7* (mangroves).

The seaward edge of an encoded mangrove area should be encoded using a **COALNE** object, with attribute CATCOA = *7* (mangrove), and the mangrove area's spatial object should have the attribute QUAPOS = *4* (approximate). ….

Former conflicts between the revised S-4 specification and the guidance in S-57 Appendix B.1, Annex A (Edition 2.1) were as follows:

- Mangrove areas on paper charts can be depicted in the intertidal area, but for ENC the guidance (mandatory – use of "must" in clause 4.1) was that mangrove areas must be depicted as LNDARE;
- The seaward edge of a mangrove area on paper charts can correspond to the charted low water line or be within the intertidal area, but for ENC the guidance (recommended – use of "should") is that the seaward edge of an encoded mangrove should be encoded as COALNE.

The conflict described in the first bullet point above has been removed in UOC Edition 3.0.0 through the removal of the reference to mangroves from clause 4.1.

Tests in S-58 Recommended ENC Validation Checks relating to the encoding of mangrove coastline and mangrove areas are as follows:

1607	Check that any COALNE object adjacent to a VEGATN object with a value of (7) [mangroves] for CATVEG contains a value of (7) [mangrove] for the attribute CATCOA and that the mangrove area's spatial object has a value of (4) [approximate] for the attribute QUAPOS.	4.7.11	W

Communication with UKHO regarding the inconsistency of the revised S-4 specification and the current ENC encoding guidance (see Annex A to this paper) suggests the following encoding:

- Encode the mangrove area as a VEGATN area with CATVEG = *7* (mangroves) on top of the intertidal area;
- Encode the seaward edge of the mangrove area as COALNE with CATCOA = *7* (mangrove) and QUAPOS on the spatial edge(s) of *4* (approximate);
- Encode the landward edge of the mangrove area where it corresponds to the high water line as COALNE (no value of CATCOA and QUAPOS on the spatial edge(s) as appropriate).

From an ECDIS portrayal perspective, this encoding allows the seaward edge of the mangrove to be displayed on the Base and Standard display (there would be no ECDIS display if the seaward edge of the mangrove area is not encoded as COALNE), and both the seaward edge of the mangrove area and the mangrove area itself to be displayed on the Full display. The high water line will display as normal for a surveyed/unsurveyed coastline.

The above encoding will produce Warnings in current ENC validation software tools in regard to the COALNE encoded for the landward edge of the mangrove area where it corresponds to the high water line not having CATCOA = *7* (mangrove) in accordance with S-58 Test 1607.

The major issue with the above encoding is the departure from the former mandatory requirement to encode mangrove areas as LNDARE. It is likely that this encoding was developed to comply with the original S-4 (M-4) specification for the depiction of mangroves on paper charts, which has now been superseded. One of the reasons for the revised specifications for depicting mangroves in S-4 is the preference to portray mangroves to reflect their existence in the real world. This is also one of the key objectives for encoding in ENCs, and as such it is suggested that the departure from the mandatory encoding guidance in S-57 Appendix B.1, Annex A (Clause 4.1) is necessary.

For the paper chart portrayal option for smaller scale charts, or where the landward extent of the intertidal area containing the mangrove cannot be determined from the source, it is suggested that the existing guidance of encoding the seaward edge of the mangrove as COALNE bounding LNDARE be retained.

Recommendations

1. The revised encoding guidance for mangrove areas and mangrove edges as outlined above be adopted;
2. An ENC Encoding Bulletin be compiled advising encoders of the revised guidance;

3. The S-58 Sub-Working Group to evaluate the revised encoding guidance for possible amendments to the Recommended ENC validation Checks, in particular Test 1607.

Justification and Impacts

Adoption of the above revised encoding guidance will align ENC encoding with the general cartographic principles for the depiction of mangroves as described in S-4 Edition 3.006. In addition, the revised encoding better reflects the real world situation. The revised guidance will have no impact on existing published ENC cells, and there is no impact on existing ECDIS portrayal.

Further discussion may be required in S-101 development, particularly in respect to encoding the seaward edge of an intertidal mangrove area as coastline.

Action required of TSMAD

TSMAD is invited to:
    a. Discuss this report.
    b. Provide instruction regarding the Recommendations above.

E-mail from UKHO (15 May 2009) regarding possible encoding option for mangroves to comply with revised S-4 specification:

UNCLASSIFIED

Jeff

I have had an enquiry from our database team on how to the capture the revised depiction of mangroves.
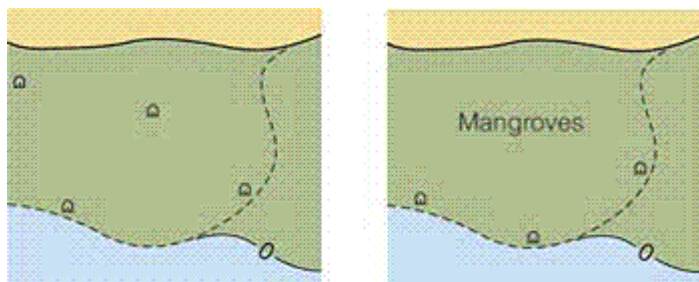
My thoughts are to capture as follows
Outer limit
COALNE, CATCOA = Mangrove, QUAPOS = approximate on spatial edge
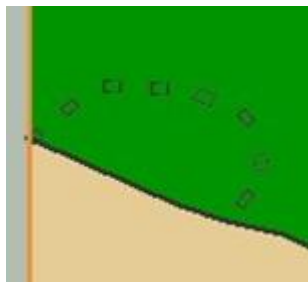Landward limit
COALNE
Area between limit & landward limit
VEGATN, CATVEG = Mangrove

This method of capture will generate validation warnings "LG0065 coastline without land area" for the outer limit & "LG0118 mangroves without 'catcoa:7' or 'quapos:4'" for the inner limit.

The S-52 display in dKart using this method of capture is consistent with the paper chart.

Base & Standard   Full

Please comment on the above.
Is there a requirement for an encoding bulletin?

Neil Nation
EP Quality, Standards & Consistency
United Kingdom Hydrographic Office

Tel: +44 (0) 1823 337900 x3926
www.ukho.gov.uk

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