

4th CSPCWG MEETING
Monaco, 13-15 November 2007

EN on Portrayal of mangrove trees and areas on paper charts

Submitted by:	AU (Roberts)
Executive summary:	The existing mangrove coastline symbol is very poor for depicting small mangrove ‘islands’. The use of buff colour for intertidal mangrove areas is inconsistent and contrary to M-4 specifications. This report sets out reasons to allow the use of green for such <u>areas</u> if charted. There is no mangrove tree symbol available within the specification and for consistency with ENCs, should be considered for addition to the M-4 specifications and the supplementary INT1.
Related documents:	M-4 B-312.4, B-413, INT1 C32, S-32 Hydrographic Dictionary, S-57 E3.1 Appendix A and B Object and attribute catalogues, ENC Product Specification UOC clause 4.5.1.
Related Projects:	Future approved work program – current review of B-400 and future review of B-300.

Introduction / Background:

AU has charted extensive mangroves in tropical areas of Australia and Papua New Guinea for many years. The symbol INT 1 C32(b) is very poor for depicting small mangrove ‘islands’. Once AU started preparing ENCs in these areas, S-57 requires the encoding of ‘real world’ features and for mangroves, these are really intertidal areas and accordingly should be indicated in green using traditional paper chart colours (B-413), not buff. The current M-4 does not have a symbol for a mangrove tree. This paper raises issues and makes some suggestions for consideration by the CSPCWG for changes and additions to M-4 and INT1.

Analysis/Discussion:

Definitions of coastline: traditionally, the seaward edge of mangroves has been portrayed as a type of coast (see M-4, B-312.4 and INT1 C32). and S-57 has an attribute category of coastline = 7 (mangrove).

S-32 defines (850) coast as: “The edge or margin of the LAND next to the SEA; the SEASHORE. Sometimes defined as the meeting of the LAND and SEA considered as the BOUNDARY of the LAND.”

From this definition the coast appears to be the high water line.

S-32 defines (2635) land as “The solid portion of the EARTH's surface, as opposed to SEA, water. A part of the EARTH's surface marked off by natural or political BOUNDARIES.”

From this definition some inrtertidal areas certainly are not solid, again inferring the high water line as the boundary of the sea.

S-32 defines (4551) sea as: ”great body of salt water in general, as opposed to LAND; OCEAN.”

This definition adds weight that the sea includes intertidal areas which are covered by salt water.

S-32 refers to 'shoreline' for 'coastline' which is defined (4695) as "The line where SHORE and water meet. Although the terminology of COASTS and SHORES is rather confused, shoreline and *coastline* are generally used as synonymous."

Again, it may be concluded that the shoreline or coastline is the high water line.

S-32 defines (4692) shore as: "The narrow strip of LAND in immediate contact with any body of water including the area between HIGH and LOW WATER lines."

This term is defining the intertidal area, and should not be confused with 'shoreline'.

S-57 Object catalogue defines coastline as: "The line where shore and water meet. Although the terminology of coasts and shores is rather confused, shoreline and coastline are generally used as synonyms." - an adaptation of S-32 4695 *and I would suggest a very poor definition for what is a very important charted feature.*

M-4 B-310 (CSPCWG Draft) on coastline states: "The coastline should be referenced to Mean High Water Springs (MHWS) or Mean Higher High Water (MHHW) – depending upon the plane of reference for heights (see B-302). **On many sources (e.g. topographic or ice maps) the plane of reference for heights is referenced to Mean Sea Level (MSL). Where this occurs, and in the absence of any other source for the coastline, this should be adopted for the Chart as MHWS or MHHW.**

S-32 defines (3064) mangrove as "One of several genera of tropical trees or shrubs which produce many prop roots and grow along low-lying COASTS into SHALLOW WATER."

Clearly defines the area as intertidal (shallow water).

Most coastlines on charts originate from topographical maps, or when not available, from satellite imagery. Most of these 'coastlines' are referred to as being at Mean Sea Level (MSL) (draft B-310 quoted above in red). In areas where the mangroves are quite extensive, they may extend for more than a kilometre from the true high water level and are mainly intertidal areas containing channels (known by some nations as tideways). In places where the mangroves are extensive, there is often a high water line (or MSL) indicated as a coastline behind the mangroves on source documents. Many HOs ignore the true coastline and traditionally chart the seaward edge of the line of mangroves and adopt this as the boundary for the buff colour on paper charts and RNCs.

When compiling ENCs from source, it is possible to capture the true high water line (coastline) as well as the edge of the mangroves, and in some cases the extent of the low water line further offshore again. According to S-57, all intertidal areas must be encoded as depth areas.

S-57 defines a depth area as: "A depth area is a water area whose depth is within a defined range of values." The accompanying remark states that intertidal areas are encoded as depth areas.

It is an agreed cartographic practice to colour all intertidal areas green on metric charts (B-145), and the existing specification B-413 states that intertidal areas '**must be distinguished by being portrayed with colour tint (usually green).**' For an unspecified reason, mangroves have traditionally been made an exception to this specification and have been shown as buff, as for land areas (B-143). This may be because the chart is in effect a picture of the region as visualised from seaward and of course the mariner in vessels with a low bridge or navigating at some distance from the coast, will not see the true coastline, but the seaward edge of mangroves. However many of the SOLAS vessels have much higher bridges permitting them to see over and beyond the line of mangroves when there is deeper water relatively close to the mangroves.

The first issue of this paper is that when the extent of mangroves is charted, it should be possible to encode such features as per the 'real world', that is portray such **areas** as intertidal with the true coastline behind, as specified in B-413. This does not need to be mandatory, but allowable, however AU would prefer it to be mandatory when the extent of the area is charted. Mangrove areas are becoming quite an important feature on AU charts, especially in areas under surveillance for illegal boat people. Vessels often use the mangroves to try and hide from patrol vessels and planes.

The second issue is that the current symbology for the limit of the mangroves (INT1 C32(b)) is unsuitable for small mangrove islands as the actual limit is not clearly depicted. These limits can be very important as under UNCLOS they can be used to determine maritime claims such in determining straight Territorial Seas baselines, etc. AU has adopted the inadequately surveyed coastline (INT1 C2) together with the mangrove tree symbol (INT1 C32(b)) spaced at intervals along the back edge of the coastline. This provides a much clearer limit of these intertidal areas, especially for small mangrove islands. AU does not support the alternative mangrove symbol INT 1 C32(a) BSH version.

The third issue is that there is no mangrove tree symbol in M-4 B-354.2. This is permitted in S-57 (attribute CATVEG 21 = mangrove tree) for ENC's and in fact there are such features as conspicuous mangroves in AU waters. They sometimes occur on very low sand cays often in offshore coral areas of the Great Barrier Reef., the start of a new island.

Conclusions: It is the opinion of AU that the symbolisation of mangrove areas in not consistent within M-4 and that when charted, they should be indicated by green (intertidal colour). Furthermore, the existing symbology for small mangrove islands is very poor and could be improved for paper charts (section B-312.4 applies). A mangrove tree symbol would be useful especially when conspicuous.

Similar issues may apply to marsh and swamp (INT 1 C33) but AU does not have the same experience with such areas to know if this a similar case to mangroves.

Recommendations:

1. that the CSPCWG amend the specifications to allow extensive mangrove areas and mangrove 'islands' to be charted as green intertidal areas. If agreed, section B-312.4 would need to be removed or at least cross referenced to section B-400, possibly as B-413.4. If agreed, INT 1 C32 be moved or at least cross referenced to I23 as new symbols with green colour.
2. that CSPCWG consider removing optional symbols for mangroves and adopt the AU proposal to use the unsurveyed coastline symbol (C2) which is also consistent with C33, together with mangrove tree symbols placed at intervals of about 10 mm, possibly adopting J23 as a suitable location in INT1.
3. That a new mangrove tree symbol be adopted for B-354.2 (with a green background) and be cross referenced to the proposed new B-400 section in 1) above. If agreed, INT 1 be updated accordingly.

Justification and Impacts:

Benefits: Improved consistency in the portrayal of mangrove areas and mangrove trees between paper charts, RNCs and ENC's and between the M-4 specifications and the S-57 standard.

Improved portrayal of small mangrove islands to permit a more accurate determination of the low water line for determining UNCLOS limits and boundaries.

The proposed change to the mangrove seaward extent symbol is still recognisable, so there is no requirement for HO's to alter every mangrove boundary on charts, however it would be expected that the new mangrove symbol would be used for new paper charts and possible new editions of existing charts.

Removes the optional mangrove symbology (currently 2 choices) and provides one way to portray mangrove coasts providing more consistency to paper charts.

Provides symbol specifications for chart software companies to adopt (if required).

Drawbacks: Initially the impact on compilers may be quite high, but if issued with a detailed explanation via IHO CL, and change pages to INT1, it would be manageable.

Resources: This issue may be addressed at the actual CSPCWG3 meeting or could be addressed in the review of M-4, B-300, however the B-400 review is already underway. Additional resource implications for M-4 are minimal, but more resources would be required for HO MS who have their own INT1s and of course there are implications for altering software to accommodate any

updated symbols. There are also resource implications for HOs in altering mangrove areas from buff to green on paper charts.

IHO Working Groups. If CSPCWG agrees to prepare updated specifications and symbols for mangroves, it is suggested that these should be forwarded to the Chairmen of the CSMWG and TSMAD before adoption, so that any symbol and ENC encoding conflicts between the paper and electronic charts can be sorted out before final adoption by the IHO MS. The S-52 Presentation Library already has a mangrove point and area symbols (symbols SY(TREPNT05 – see graphic below) and AP(VEGATN04)) which are single mangrove trees and it may be relatively easy to amend the line symbol for ECDIS to accommodate this if agreed by CSPCWG.

Target completion date. Mid 2007.

Priority: low

Related activities and dependencies: current review of M-4, B-300 and B-400 by the CSPCWG

Action Required:

The CSPCWG is invited to:

1. consider this paper as part of the review of M-4 specifications for the portrayal of mangrove areas and trees on paper charts;
2. adopt suitable or updated symbol(s) for M-4 and INT 1 (if required).
3. discuss with the IHO CSMWG and TSMAD before referral to IHO member states for final approval.
4. if adopted, promulgate this issue via IHO CLs and in the CSPCWG section of the IHO website.

CSR 18 Oct 06

S-52 TREPNT05 symbol

