THE BALTIC SEA HYDROGRAPHIC COMMISSION

BSHC WORKING GROUP FOR HARMONISATION OF THE CONVEYING AND PRESENTATION OF DEPTH INFORMATION (BSHDIWG)

REPORT TO BSHC 14TH CONFERENCE
SEPTEMBER 2009

Content

SUMMARY

The working group has analysed the current situation and practices for processing and presenting depth information on nautical products in Baltic Sea Hydrographic Offices.

There are two main aspects for the harmonisation of depth information. The first one is to follow the same depth contour intervals in the bordering area. The second one is that most of the countries are using very old and undefined survey data in areas with no danger to navigation and in that way it can also gives different presentation in the bordering areas.

In general to avoid inconsistency, the Baltic Sea countries should follow the recommendations made by The Baltic Sea Harmonisation Working Group (BSEHWG).

The following recommendations are made to the Baltic Sea Hydrographic Commission:

1. For future editions of paper charts and ENCs the neighbouring countries should, if possible, arrange to use the same contour intervals and the density of soundings in the bordering areas for both paper charts and ENCs. Include in the bilateral agreements that harmonization shall be discussed whenever a product in a bordering area is up for a new edition.

2. In order to give bordering countries the same conditions for producing new editions with same new source material, future resurveying in bordering areas should, if possible, be made on both sides of the borderline.

3. The BSHDIWG proposes to the BSHC 14th Conference to continue its work with the existing TORs.

BACKGROUND

In the report from The Baltic Sea Harmonisation Working Group (BSEHWG) in 2008 it was stated:

The BSEHWG proposes that the BSHC establishes a Working Group to study possibilities for Harmonisation of the Conveying and Presentation of Depth Information for both ENCs and paper charts.

The BSHDIWG working group was established at the 13th Meeting - Rostock, Germany (19 - 21 August 2008). All members (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russian Federation and Sweden) were invited to participate in the working group.

TERMS of REFERENCE

The terms of Reference for the BSHC Working Group for Harmonisation of the conveying and Presentation of Depth Information:

Identify and analyse existing depth related rules and recommendations used in populating databases and creating nautical products.

Identify existing and future user requirements for depth information.

Study possible [future] solutions and measures to avoid inconsistencies in the future.

Propose ways to convey and portray hydrographic data on products. Especially regarding to the density of soundings, contour intervals, and grid, TIN and dynamical models and their parameters,

Follow up development of S-100 based specifications.

Provide a Progress Report to the BCHC 14th Conference. [This should include an Action plan with specified time schedule for future harmonisation actions].

Send reports to relevant IHO and IMO bodies, if deemed appropriate.

Rules of procedure:

All BSHC Members and Associate Members are encouraged to participate to this WG and to contribute to the work of it.

The WG should be chaired by one of the Member state elected [at the BSHC Conference].

The WG should prepare its Work Programme [and forward it to the BSHC members for review].

The WG should work as far as possible in accordance with existing guidelines and recommendations issued by the IHO and the RENCs.

The WG should consult the CHRIS Committee and its working Groups or other relevant bodies, as deemed necessary.

The WG should liaise with BSHC ChartDatumWG regarding to the harmonisation of vertical datums.

The WG should liaise with the NSHC and the NHC for promoting the harmonisation with the North Sea nautical products as far as possible.

The work of the WG will be carried out primarily by correspondence (via e-mails). The members are strongly encouraged to reply without unnecessary delay.

MEMBER OF THE WG and MEETINGS

Members of the WG

Jens Peter Hartmann, Chairman	Danish Hydrographic Office (KMS)
Carsten Riise-Jensen	Danish Hydrographic Office (KMS)
Antti Porali	Finnish Maritime Administration
Holger Fasterding	Bundesamt fuer Seeschifffahrt und
Darja Fetissova	Estonian Maritime Administration
Mikus Ranka	Maritime Administration of Latvia
Marek Szatan	Hydrographic Office of the polish Navy (HOPN)
Anders Åkerberg	Swedish Maritime Administration
Alla Bira	Lithuanian Maritime Safety Administration
	Russia

Meetings

1st BSHDIWG Meeting in Copenhagen 2009-01-12
2nd BSHDIWG Meeting in Copenhagen 2009-05-25

ANALYSIS

The analysis has been focused on the harmonisation of the presentation of depth information along the borderline between adjacent national ENC's and paper charts in areas with more than one nationality represented.

Some areas are more affected of inconsistencies than other areas.

As an example in the Gulf of Bothnia between Sweden and Finland (Fig. 1), you will see a distinct different use of depth contours and how the presentation will be in an ECDIS.

In another case (Fig. 2) you will see how differences can be handled by agreements between the neighbouring countries Sweden and Denmark in the Sound. There are no differences in the use of depth contours in the bordering areas and it has also been agreed to use an additional 15 metre depth contour in the bordering area.

The two questionnaires sent to the HOs and the discussions in two meetings form the basis for the analysis. The results of the questionnaires (see Annexes 1 and 2).

In spite of the difficulties in harmonisation of the presentation of old depth information data, the working group has tried to find some few recommendations which could satisfied the way to present depth information in the bordering areas in the future.

Depth related rules to create nautical products

Depth contours

All the countries in the Baltic Sea are following the recommendations given in Chart Specifications of the IHO and Regulations for International (INT) Charts S-4 (B-411).

As written in B-411:

B-411 DEPTH CONTOURS AND SHALLOW WATER TINT

The standard series of depth contour lines *to be charted is: drying line (where tides are appreciable), 2, 5, 10, 20, 30, 50, 100, 200, 300, 400, 500, 1000, 2000m, etc. The 2 and 5m contours may be omitted where they serve no useful purpose. It is not necessary for the complete sequence of contours to be shown, eg on steep slopes and around isolated pinnacles.*

Supplementary contours*, eg at 3, 8, 15, 25, 40, 75m and multiples of 10 or 100m may be shown, if the available data permit, to delineate particular bathymetric features where soundings would otherwise be the only depth information over a large area, or for the benefit of particular categories of shipping. The 2500m contour may be required for measuring continental shelf limits (see UNCLOS Article 76)*

Other contours*. In waters where the 4 or 6 metres contours have been surveyed and charted these contours may be shown in place of the standard ones, provided they are labelled with their values (even where otherwise defined by a shallow water tint).*

In spite of that all countries are following these recommendations with only some few exceptions. There are differences in the way each country have chosen their individual depth interval. In this way it seams that the HOs are following the IHO recommendations in different ways or they are only following different parts of the recommendations.

A distinct different use of depth contours between Finland and Sweden. The Swedish cell is showing 15 metre contours and the adjacent Finish cell is showing 20 metre contours.

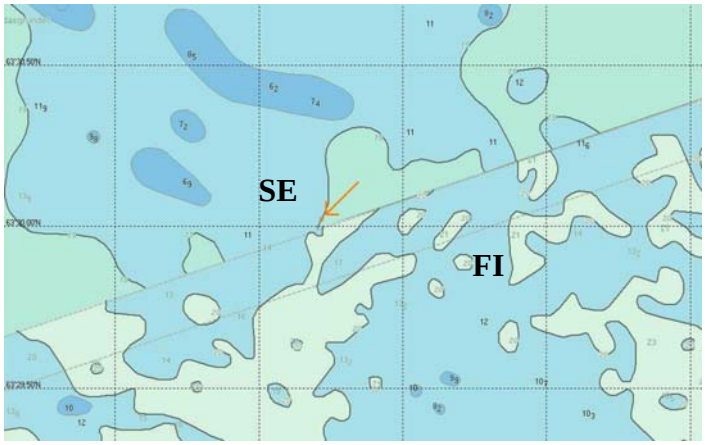

Fig. 1

No differences in the use of depth contours in the bordering area between Denmark and Sweden. By agreements of data exchange and the use of depth contours, the bordering area between the Swedish and the Danish cell In the Sound looks homogeneous.

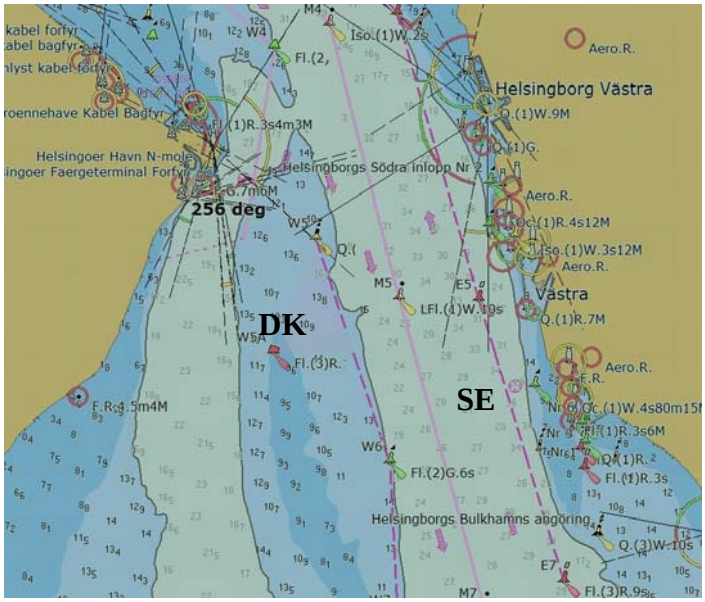

Fig. 2

The density of soundings

In some bordering areas the density of soundings differs mainly due the following reasons:

Old source material (to few selected soundings taken from very old source).

The ENC's in most of the countries are produced on the basis of paper charts, which comes from different scales and are put into a fixed compilation scales without any kind of generalisation.

Different views how to present soundings from the cartographer point of view. What is important in special areas (many or few soundings)?

Different rules and tools are used for the selection of soundings.

Use the same rules for SCAMIN (some hasn't implement the SCAMIN in its ENC products).

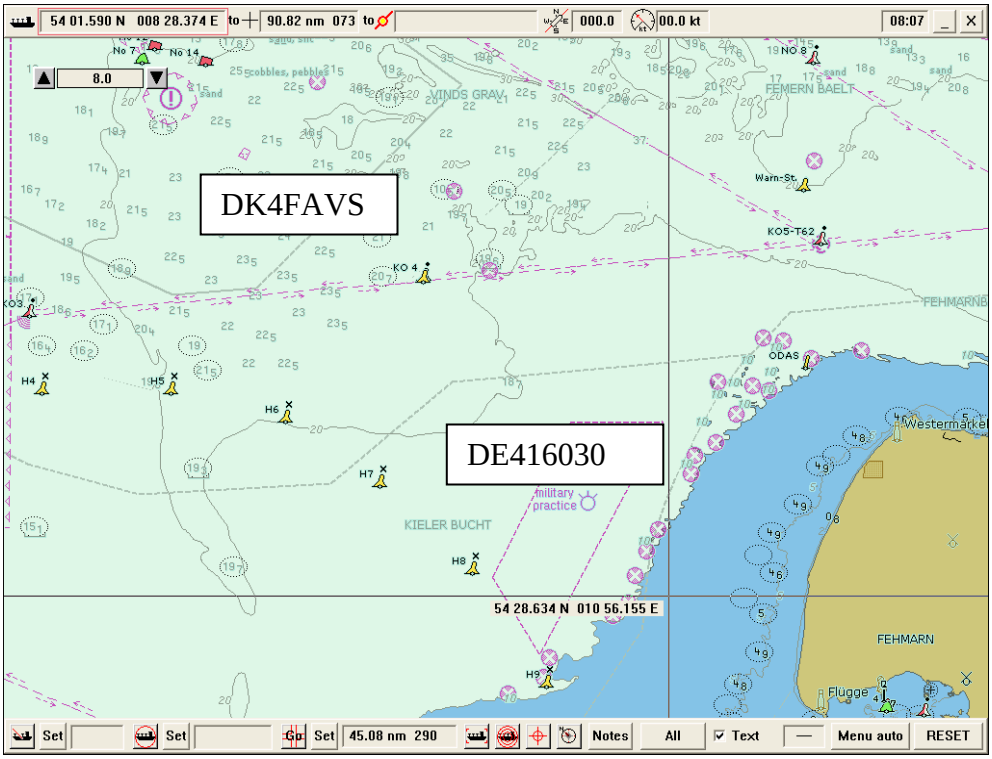

Fig. 3 The density of soundings with SCAMIN issue gives inconsistency.

Comparison between S-44 and S-57 (CATZOC)

To assign the attribute CATZOC to the quality of the sounding data depends of different criteria, but it also depends of the year of the surveying. For some countries a big part of the surveying coverage is more than 50 years old.

At the 18th CHRIS meeting 2006 it was agreed that the Data Quality Working Group (DQWG) should be re-established.

The procedures for the working group:

a) The WG should:

i. Review ISO 19113 Geographic Information-Quality Principles, ISO 19114 Geographic Information-Quality Evaluation Procedures, and ISO 19115 Geographic Information - Metadata and propose relevant enhancements and amendments for incorporation in S-100;

ii. monitor and further develop quality indicators for hydrographic data;

iii. review and revise as needed existing S-57 quality indicators, including the education of both the mariner and the cartographer, and the development of documentation, and;

iv. Propose new data quality topics and other applications for consideration by CHRIS.

b) The WG should work by correspondence, group meetings, workshops or symposia. Permanent or temporary sub-working groups may be created by the WG to undertake detailed work on specific topics such as: quality indicators for hydrographic data, tidal information, etc. The WG should meet as necessary.

c) The WG should liaise with other relevant CHRIS WG's and other IHO bodies, such as S-44 WG, and international bodies as appropriate and as instructed by CHRIS.

In the beginning of 2009 *The Nordic Data Quality WG* was established under Nordic Hydrographic Commission (NHC).

The Nordic DQWG should contribute with comments and proposals to the work of the HSSC DQWG and ensure that the Nordic opinions and proposals will be duly recognised by the DQWG. It was agreed that this Nordic DQWG will concentrate on the quality issues of bathymetric (depth areas and contours, soundings, rocks,) data. The main focus should be on the how to clearly transfer the quality information on navigational products to mariners.

The following quality issues or developing items were noted:

- *The problems with current specifications should be studied and analysed*
- *Further studies to enhance current quality specifications and presentations are needed*
- *Further studies for more simple presentations of quality information are needed*
- *Further studies and brainstorming for new approaches for presentation of quality are needed.*
- *Further studies and brainstorming for new approaches for alarms are needed.*
- *Further efforts for educating and informing of mariners on quality related issues are needed*

The Nordic DQWG will report to the BSHC/14 and the relations between those BSHC members which are not NHC members should be agreed at the Conference.

Some countries in the Baltic Sea have already made their own comparison between S-44 and CATZOC. Two examples of different national comparison tables produced and used by Germany and Denmark (see Annexes 3 and 4)

Storage of depth data

The storage of the depth data are handled more or less differently from country to country in the Baltic Sea. Some countries have a central database from where they produce both its paper charts and ENC's. Other countries have databases which are simpler. They store their data in a grid and from where there they produce their products in more than one production systems. The volumes of depth data also differ from area to area depending of the year and the technique of surveying.

However, to efficiently update the nautical data information, it is essential that there is a database populated with depth data for generating contours and soundings.

Frequency of surveying

In general the frequency of surveying is more or less the same for most of the countries. All countries are following the recommendations for maintaining and surveying the HELCOM routes through the Baltic Sea. Besides these HELCOM routes the frequency of surveying depends on the importance for resurveying. In general most of the used bathymetric data which are less critical are taken from surveys which could be more than 100 years old. If the areas along the border line are of less importance for the safety of navigation, the used data could then be old data and in that way the presentation of depth information could give some inconsistency between the countries.

The 3 examples (see Annexes 5, 6 and 7), from Sweden, Germany and Denmark show the coverage of depth information in its waters. In addition to the coverage the German paper also shows the frequency of the survey.

Datum

For new surveys, all the countries have a well defined datum. But for some of the old surveys it has been difficult or even impossible to identify which datum the data refer to.

The ChartDatumWG was establish at the 12th BSHC conference to study the possibilities and plans to move to a common vertical reference system in Baltic Sea countries.

The ChartDatumWG report states:

The future work of the WG shall be divided to three successive phases.

Phase 1: *Detailed analysis of the existing chart and geodetic datums and accurate estimates of the differences between them.*

Phase 2: *The present survey, chart production and water level information processed shall be studied in order to determine uniform processes for presentation and publishing depth and water level information for mariners, other users and also for our bi-lateral data exchange.*

Phase 3: *The final phase is the adoption of the common geodetic chart datum for the whole Baltic Sea. This would be the most convenient solution for mariners and other users of the hydrographic data, but have to be prepared that this will take some time and lots of efforts by us.*

Proposals for further actions to Chart Datum Working Group

Immediately:

− All to agree that Baltic Levelling Ring (BLR) (or its improved version in the future) is the common reference for comparisons between the existing chart datums and for determining the height of the existing chart datum from the well known and well defined reference frame.

For Phase 1:

− All to define differences between their national datums and BLR.

− All to specify the relations of the earlier survey data and datums of the present charts to national datum and/or BLR. The differences should be analyzed in terms of accuracy and reliability.

− Especially Finland and Sweden (with a long coastline and the effect of land uplift) to study and describe their national datums in more details.

− Chair to collect a database (file) on these differences.

For Phase 1 and simultaneously also for Phase 2:

− All to specify which mareographs and possibly other equipment and methods are used for water level observations for hydrographic surveys and for information to mariners. Special attention have to be put on ensuring that the height of the index of the measuring equipment is always measured and maintained in reference to common geodetic frame and chart datum. This is valid for all the existing and future systems and should be studied also for equipments which have been used in earlier surveys, which are still used in chart production.

These tasks are ongoing and a Progress Report to the BSHC 14th Conference will be given by the Chart Datum WG.

CONCLUSIONS

General

For most of the countries, the inconsistencies in the presentation of depth information are usually due to old bathymetric data. It's difficult or even not possible to harmonize the different use of depth contours and the density of soundings base on old and insufficient data capture. With new bathymetric data on both sides of the bordering areas, it should be possible to harmonize new edition of paper charts and ENC's. Surveying are very costly so, planning of new surveying in the bordering areas could be done in corporation with the neighbouring countries e.g. by surveying on both sides of the borderline. As an alternative to ship surveying, in some areas with no danger to navigation, airborne surveying (LIDAR) could also be a way to cover big areas and the costs could be spilt up in several national parts.

Following the recommendations from the BSEHWG regarding the SCAMIN rules could be a way to avoid some differences in the presentation of the density of soundings.

In general it seems to be very successful to discuss and try to harmonise the depth contour intervals and density of soundings in the bordering areas when a new edition of a paper chart or ENC is planned.

FUTURE OF THE BSHDIWG

The BSHDIWG has analysed the current situation and found some practical recommendations for harmonising some depth presentations in future editions of paper charts and ENCs.

However, the BSHDIG has not dealt with all the Tasks of its TORs. There is no analysis on the future user requirements, the use of grid, TINs, and dynamic depth models and their parameters. It is noted that the HSSC and its WGs are working on these issues. Also the BSHC ChartDatum WG, Nordic DQWG are working on related issues.

The BSHDIWG proposes to the BSHC 14th Conference to continue its work with the existing TORs/following main tasks:

RECOMMANDATIONS

Recommendation 1:

For future editions of paper charts and ENCs neighbouring countries should, if possible, arrange to use the same contour intervals and the density of soundings in the bordering areas. Include in the bilateral agreements that harmonization shall be discussed whenever a product in a bordering area is up for a new edition.

Recommendation 2:

In order to give bordering countries the same conditions for producing new editions with same new source material, future resurveying should, if possible, be made on both side of the borderline.

Recommendation 3:

The BSHDIWG proposes to the BSHC 14th Conference to continue its work with the existing TORs.

ANNEXES

1. BSHDIWG Questionnaire and the replies
2. BSHDIWG Questions and the replies.
3. Comparison S-44 (5th Ed.) with S-57 (CATZOC)
4. S-44 versus CATZOC - DENMARK
5. Swedish Digital Depth Data
6. German Digital Depth Data
7. Danish Digital Depth Data