NATIONAL REPORT OF SWEDEN

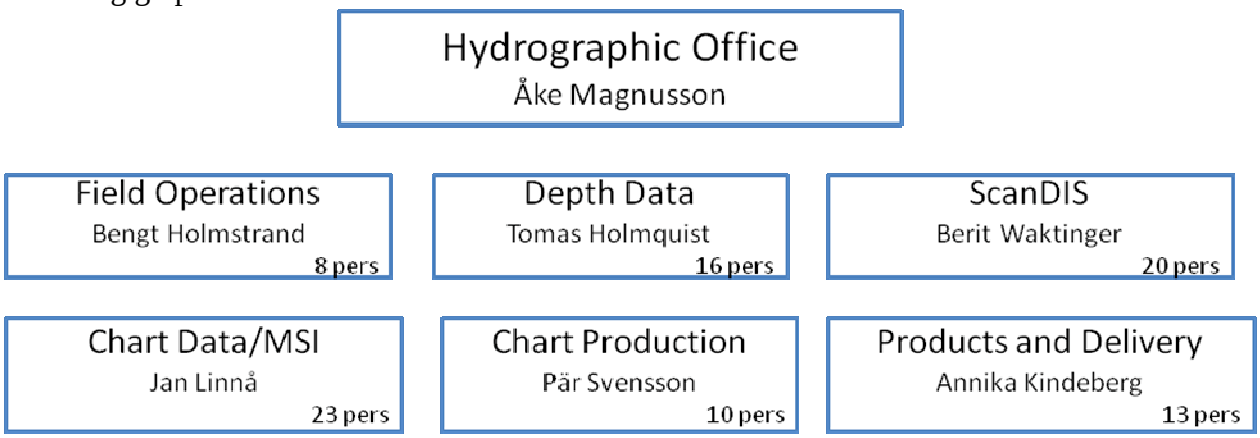
Executive summary

This report gives a summary of the main activities within the Swedish Hydrographic Office since the last BSHC meeting. The main issues are:

- Some minor changes to the organization of the Hydrographic Office have been performed
- Surveys are to a great extent conducted by external operators
- Old hydrographic survey data is converted and included in digital soundings data base
- New charts produced
- Production of preliminary and temporary (P/T) notices for ENC in operation
- The sale of ENCs has increased

1. Hydrographic Office

The Hydrographic Office employs nearly 100 people, crews on survey ships excluded. The operations are certified by Lloyd´s register quality assurance in accordance with ISO 9001:2008. Yearly quality audits are conducted by Lloyds and internal auditors. Since last meeting some minor changes have been done to the organization with the result shown in the following graphics:



Total budget (costs) for 2009 is 85 million SEK and the annual sales for 2008 were 30.8 million SEK.

2. Surveys

All Swedish waters are surveyed and most of the areas, especially fairway areas, to a high standard. The objective is however that all Swedish waters should be surveyed in accordance with the international standard, S-44.
The surveying fleet consists of two vessels JACOB HÄGG and NILS STRÖMCRONA.
Both vessels are equipped with multi-beam echo sounders and Nils Strömcrona has also bar-sweeping equipment.

2008

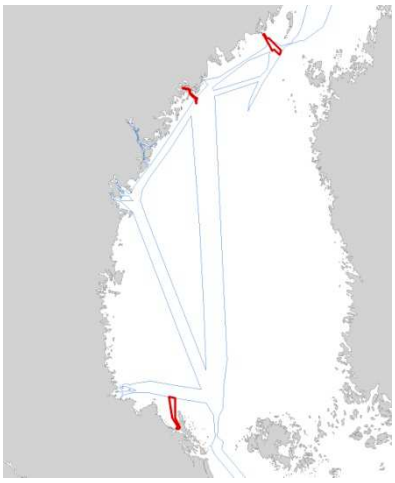
During the last 6 months 2008 surveys have been conducted in priority fairways and sea-areas. Surveys have been carried out on the Swedish east coast nearby Svenska Björn and some sections of the fairways to Iggesund, Luleå, Oskarshamn, Hargshamn and Södertälje.

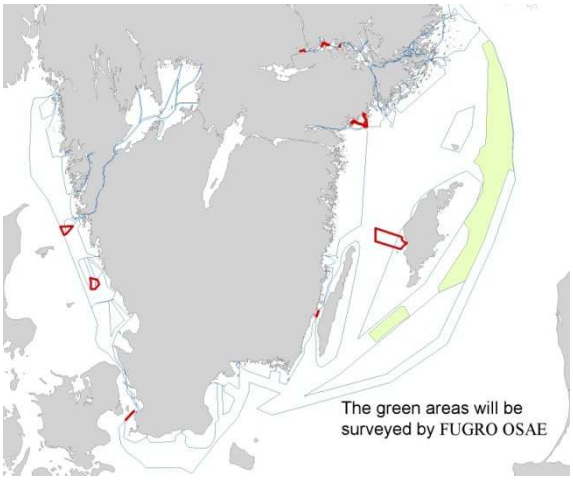
During 2008 a total amount of 492 km² was surveyed by our own vessels.
This limited volume of production was due to that the surveys were conducted in very shallow waters (~10 – 20 m).

2300 km^2 was surveyed in HELCOM areas in the southern Baltic Sea by the contractor, Marin Mätteknik AB.

2009

Plans for 2009 in the following graphics



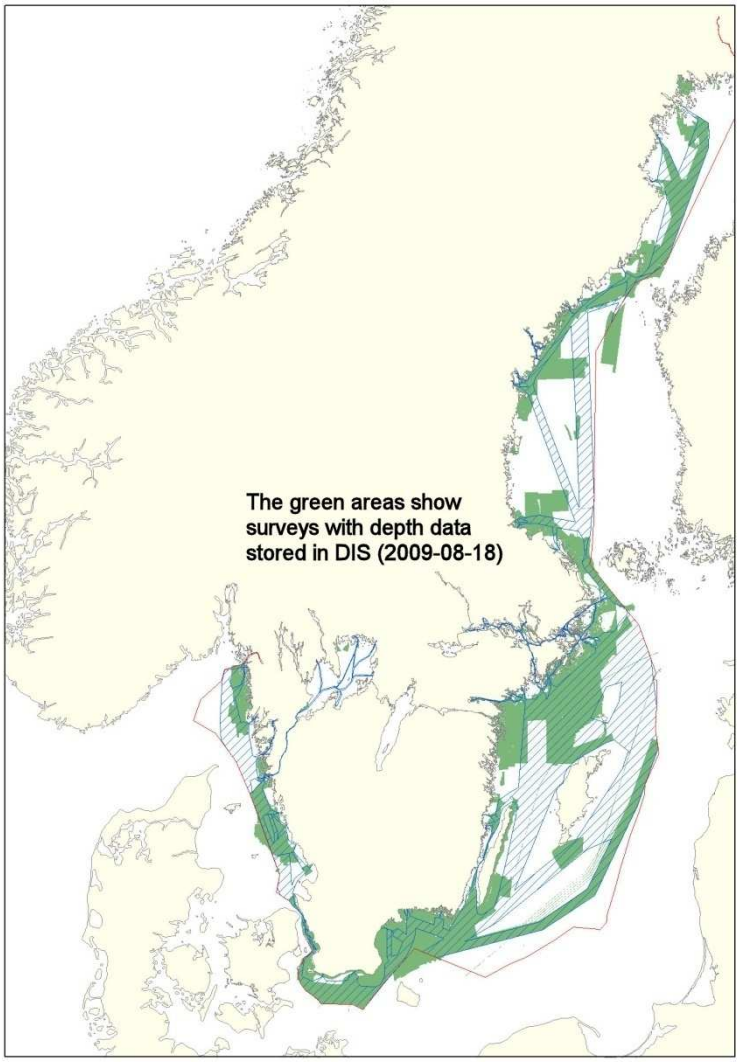


During the first 6 months 2009 773 km² was surveyed. The surveys have been conducted in very shallow areas. On the Swedish west coast the area near Lilla Middelgrund has been surveyed. On the Swedish east coast, surveys have been carried out in the area near Gotland and some areas in the entrance of Oxelösund and Studsvik.

The remaining surveying of 2009 will be conducted at Örnsköldsvik, Forsmark, Ringhals, Umeå, Kalmarsund and Mälarleden.

FUGRO OSAE GmbH has been awarded a survey contract for the Swedish Maritime Administration. The survey assignment for the project BASH-09 will be conducted within HELCOM areas in the Baltic Sea (total 8240 km²).
The assignment started in March and will be finalised before the end of the year.

The picture below shows the coverage of digital depths (about 20.5 billions) stored so far in our database DIS (Depth Information System).

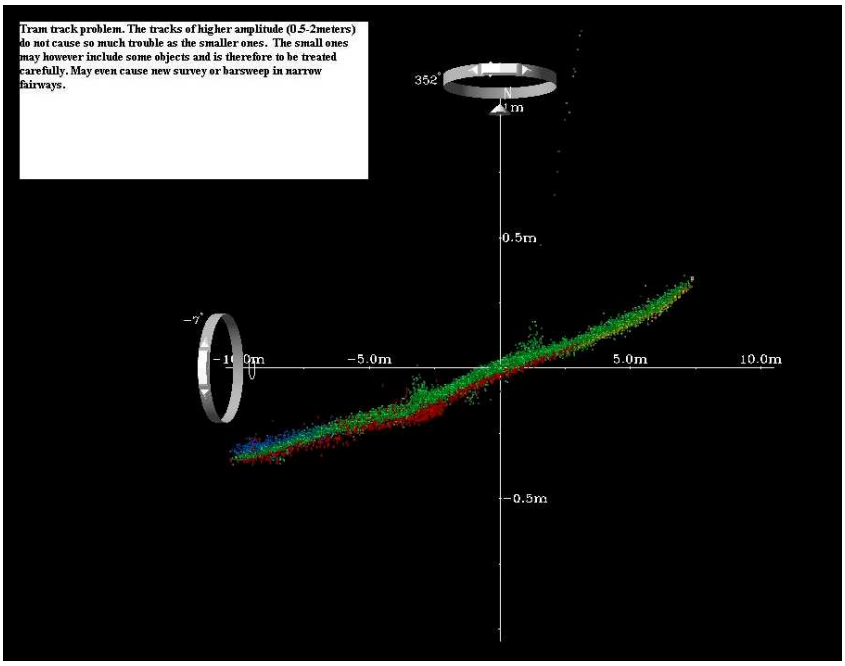


Problems encountered

Hydrographic office uses the Reson 7125 multibeam sonar on survey vessel Tjb096 since spring 2006. During this time there has been some major and some minor problems regarding the sonar surveys. We encountered a major improvement with the release of Maintenance Release MR5, mostly regarding previously low ping rate. (One minor negative change when upgrading from MR4 to MR5 was the excluded possibility to visualize the TVG curve which was a help if you were experimenting with absorption and spreading settings).

During 2008 the remaining problem is the “Tram track”. The Reson 7125 sonar has a very high accuracy in major part of the swath and it is therefore highly annoying that this problem causes so much extra work. The MR6 has not improved this situation.

The pictures are from IVS Fledermaus and show the characteristic “Tram tracks” collected during normal survey in Lake Mälaren close to Södertälje. There has been a lot of experimenting with the sonar settings to minimize the “Tram tracks”.
Most common setting in this area of shallow fresh water and common depth of 4-20 meters with mostly clay bottom has been: Power: 219dB; Gain 20dB and Pulse Length ca 40-50 µs
As for now we have been using Absorption/Spreading settings of 60/40 dB instead of normal 60/30 dB.



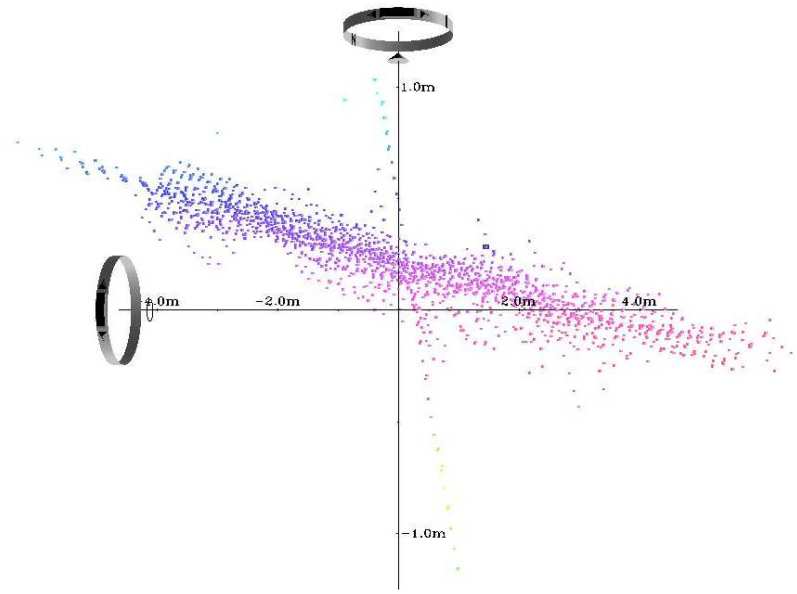
The EM3002D On R/V Jacob Hägg

The system was installed late 2007 and SAT was first carried out early 2008.
The SMA has still not accepted the SAT due to the problems below.
Since late 2008 KM (Kongsberg Maritime) and the SMA have been performing tests with improved firmware and a number of minor problems and a few larger ones have been solved.
KM is presently working on improving the outstanding two problems below and we hope to soon be able to test a new release that cures or minimizes them.
According to KM the problems have been tested and are fixed with a patch. A public release is scheduled to come out in early September.

One thing to note for users of EM systems is that even though the SIS software is set to use minimum possible filtering there are still some internal filtering and selections of echo candidates made internally in the processing unit, due to the automatic beamforming-, bottom detection -and bottom tracking algorithm used in the system

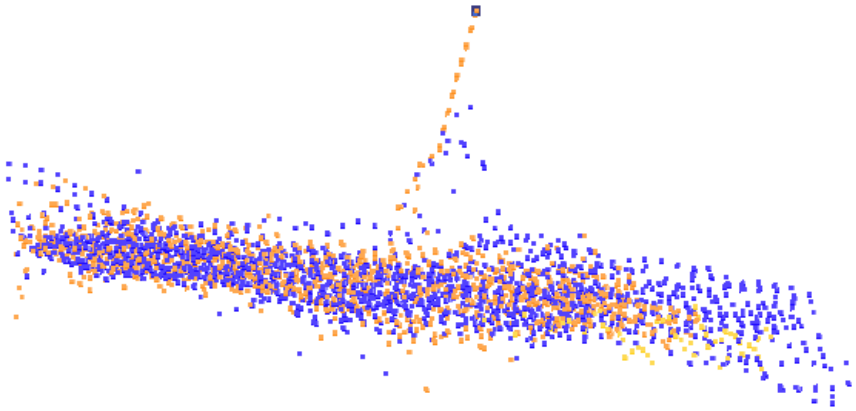
Regarding the EM3002 system we basically have had three major problems.

The first one is that solid objects on soft bottom cause side lobes to be detected as echoes by amplitude instead of phase detection. This results in what we call “needles” with false echoes both above and below the true bottom, *se picture below*. It is a tedious work to clean the dataset from these errors. We have also noticed this when we have been surveying along pipes. When the pipes are more than 20 degrees from nadir a piece of the bottom gets “turned over” and it looks like the pipe is used as “hinges”. The same problem is also reported from Ireland, but their complaint is more focused on that these spikes cause holes in the data (insufficient coverage) especially along boundaries between seafloors with different reflectivity (mud/gravel).



Another EM3002 artefact that can be seen in our data is false detections that appear on top of objects arising from the seabed high enough to give a significant shadow effect on the seafloor. The system picks up side lobe echoes that are closer in depth (travel time) with the previously detected neighbour beam (closer to nadir) instead of looking much further away on the true bottom return after the shadow. This occurs due to the fact that Amplitude has too

high priority when selecting echo candidates in the system. These false echoes are fairly easy, but tedious, to manually clean from the dataset, se picture below.



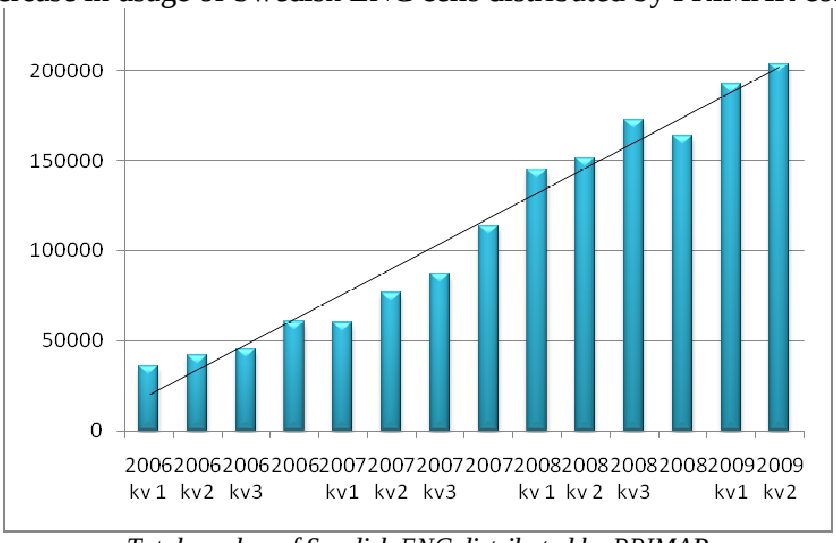
The biggest problem, which was solved by KM in early spring, was discovered late in 2008 and consisted of that large boulders were filtered out by the filtering procedure in the system. A trial version was tested by the SMA and a public release of the firmware was sent out around Easter.

A number of suggestions in order to enhance the sonar performance and the functionality of the SIS software have also been discussed with KM during tests and we hope they will further improve the system. Several meetings have been held to discuss problems and future improvements.

3. New charts and updates

ENCs and paper charts are produced from a common database. This database is continuously updated.

Swedish waters are completely covered by ENCs and the total number of cells are 531 (2009-03-31). The increase in usage of Swedish ENC cells distributed by PRIMAR continues.



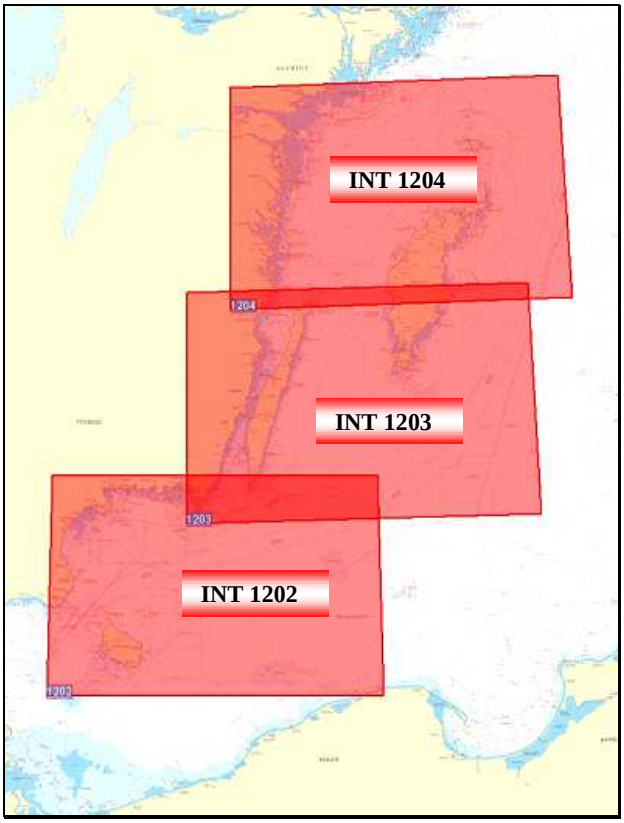
Total number of Swedish ENC distributed by PRIMAR

In late 2008 an improved production environment for ENC was developed. This facilitates the delivery of changes/updates to ENC that are of temporary or preliminary nature and corresponding to P/T notices in NtM. During 2009 this service will gradually be taken into full operation.

The Swedish paper chart portfolio consists of approximately 120 charts and 14 series of charts for small craft. Another series of small craft charts covering Bay of Bothnia will be produced and on the market 2010, see image 4 below. Special charts, tailored to the customer, such as "print on demand" charts are also available as well as a service to provide chart images to mobile phones and PDA's. There is also a growing demand for chart data and bathymetric data for environmental use.

During the period the following new (or totally renewed) charts have been issued or will be issued during the autumn 2009:

General	SE 2		1:1 600 000	Östersjön, Baltic Sea
	SE 8		1:1 600 000	Balic Sea Entrance
Coastal	SE 62	INT 1204	1:250 000	Gotland Sea, Western Part
	SE 63	INT 1203	1:250 000	Gotland Sea, South Western Part
	SE 71	INT 1202	1:250 000	Bornholm Sea, Northern Part
Archipelago	SE 619		1:150 000	Sea of Åland
	SE 937		1:50 000	Strömstad - Idefjorden
Special	SE 7413		1:25 000	Karlskrona - Ronneby



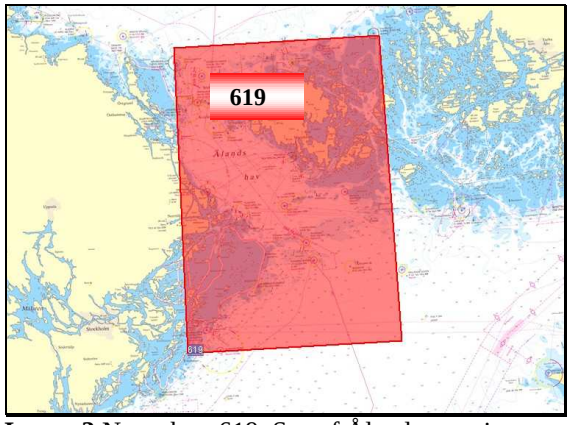


Image 3 New chart 619, Sea of Åland, covering new TSS

Image 2 New INT charts in the Baltic Sea

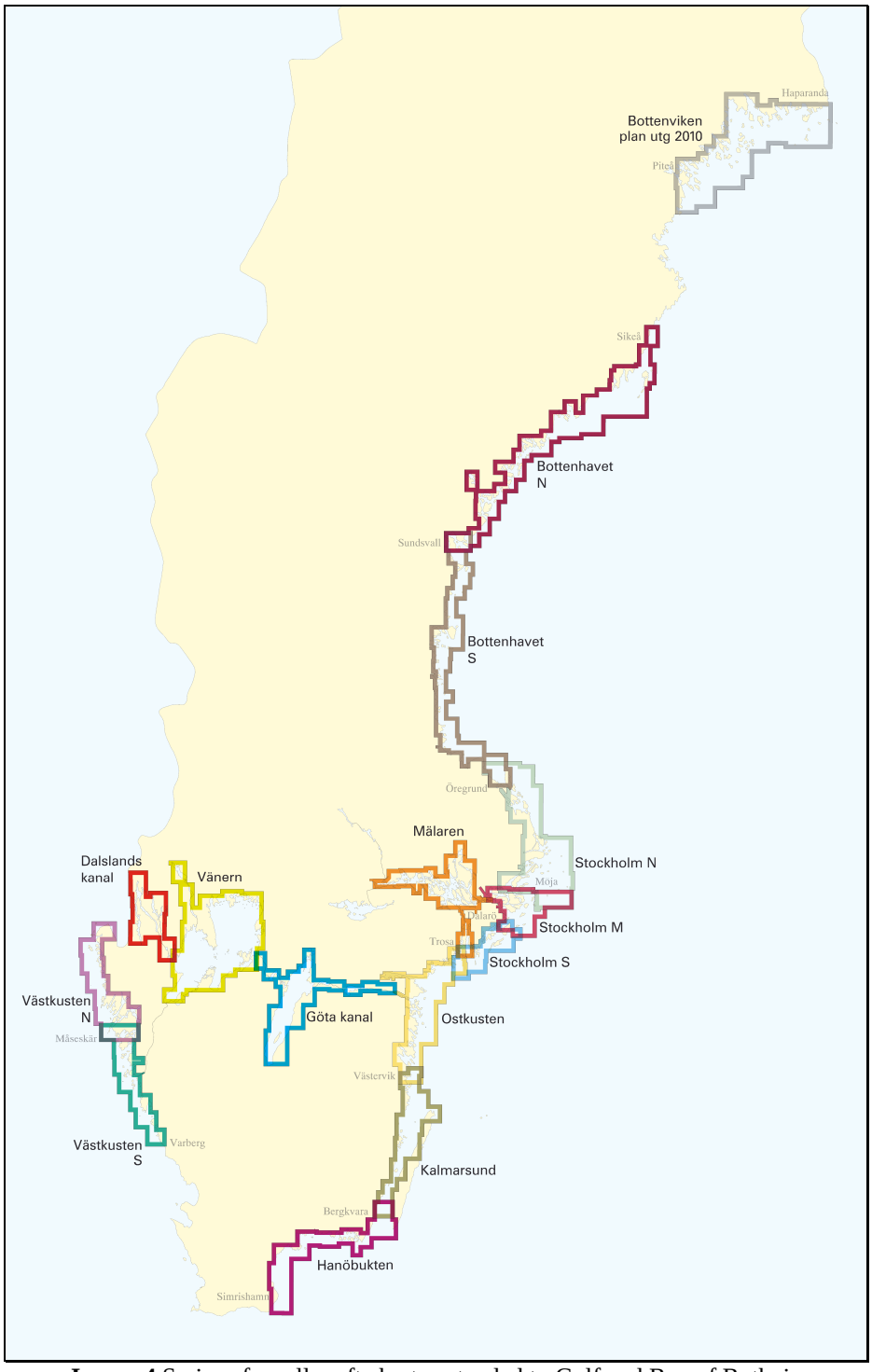


Image 4 Series of small craft charts extended to Gulf and Bay of Bothnia

4. New publications and updates

The Swedish List of Lights as well as sailing directions have not been reprinted for many years. A working group is however presently studying how this additional information, which traditionally has been published in sailing directions, in the future will be compiled and presented to the mariners.

It can be noted that the area of digitally publishing the information corresponding to sailing directions etc is problematic. How to present this information to the mariner still needs testing and development.

Notices to Mariners (NtM) are published daily on the Internet via an on-line and searchable database solution. Although prepared for English versions of the notices it is still an embarrassing fact that presently only notices in Swedish are available in the database solution. We hope to solve this during the autumn 2009. On a weekly basis a printed version of NtM is issued and also published as a PDF-version on the web.

5. MSI

Sweden is the Baltic Sea Sub-area Coordinator within the international Navigational Warning Service as well as NAVTEX co-ordinator within the Baltic Sea area. The table below shows the number of handled navigational warnings during 2008.

Originating country	**Number of warnings received**	**Number of warnings transmitted on Navtex**	% of received warnings transmitted on Navtex
2008			
Sweden	484	97	20
Finland	15	13	87
Russia, Petersb.	19	16	84
Russia, Kaliningr.	32	32	100
Estonia	9	5	56
Latvia	23	22	96
Lithuania	44	34	77
Poland	87	72	83
Germany	103	71	69
Denmark	314	105	33
TOTAL	1130	467	41

6. C-55 (formerly S-55)

The information concerning Sweden in C-55 has recently (March 2009) been updated although the changes are limited.

Hydrographic Surveying

	A	B	C
Depths < 200m	16	83	1
Depths > 200m	100	0	0

Comments:

- Contributes to the HELCOM harmonised resurvey programme
- 50% of the area encompassed in column B is surveyed at close to S-44 standard
- Only a very limited area of Swedish waters is deeper than 200 m.

Nautical Charting

Purpose/Scale	A	B	C
Offshore passage/Small	100		100
Landfall and Coastal passage/Medium	100		100
Approaches and Ports/Large	100		100
Percentage of Group A showing depths in metres	100		
Percentage of Group A referenced to a satellite datum	100		

7. Capacity building

Sweden has not been active in the area of capacity building during the period.

8. Oceanographic activities

Tide gauge network

Implementation of quality assurance system for the SMA tide gauge network in corporation with the Swedish Meteorological and Hydrological Institute (SMHI) in progress. Including treble the number of sensors at each site, establish connection between the used reference level (MSL for the current year – remember the land up lift) and the national height system and additionally monitoring system integrated with the SMHI tide gauge network.

9. Other activities

Converting fair sheet archive (ScanDIS)

The Swedish HO has for some years been running a project named ScanDIS with the objective to digitise soundings from fair sheets and similar maps in our archive. This operation is

financially supported by the government as a part of a special Baltic Sea programme. Since this will continue for still some years the operation is made more permanent in our organisation. We cooperate with the Swedish Enviromental Protection Agency (Naturvårdsverket) in planning and prioritising the project.

The overall aim is to create national coverage in the soundings database (DIS) and for the Swedish HO specifically thus enable new and more efficient production of chart information. Metadata and quality information are essential for future use.
The present estimation is that the ScanDIS project will take 5-7 years to finalize. During 2009 about 20 employees are involved in the project along with slightly more than 2000 hours of consultancy.

INSPIRE and related activities

On a national level the SMA is involved in ongoing activities to improve the spatial data infrastructure in order to meet the requirements of the INSPIRE directive. A project to establish a national geodata portal has started, lead by the National Land Survey, and the project is scheduled until 2010. An internal project to begin the implementation of INSPIRE has started and personnel from the HO are involved. It has been noted that data specifications from Inspire are delayed and that all the detailed information necessary to proceed subsequently is not complete at the moment.

The Swedish National Geodata Advisory Board, in which the SMA has a delegate, has been operating since 2006 and produces a national geodata strategy which is updated yearly.