

NATIONAL REPORT OF SWEDEN

EXECUTIVE SUMMARY

This Report highlights the main activities and achievements of the Swedish Hydrographic Office since NHC Meeting in April 2023.

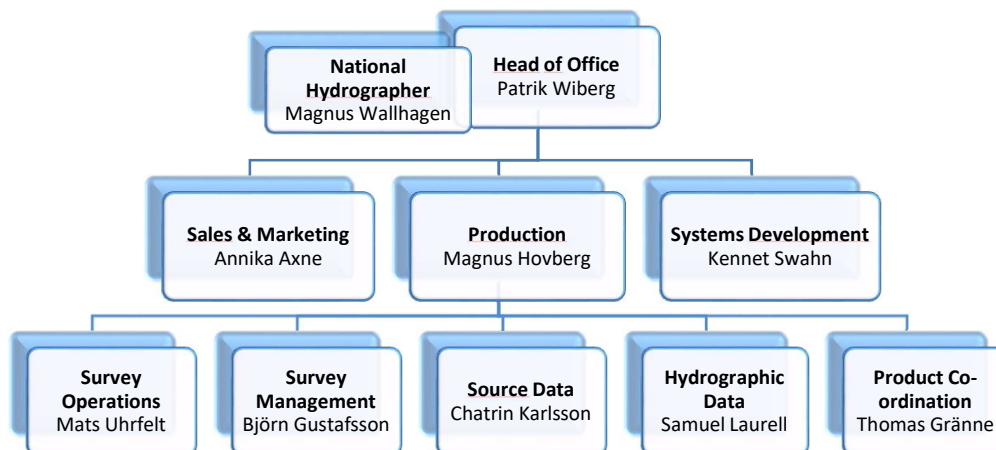
- Improvement of Survey-to-ENC Process using new tools for more efficient handling
- Paper Charts NE, new process to increase capability to produce more NE
- Upgrade of Depth Information System (DIS) – new ArcGIS software
- Automatic Sounding selection and contouring from bathymetric data

1. SWEDISH HYDROGRAPHIC OFFICE

The Swedish Hydrographic Office is organized within the Swedish Maritime Administration (SMA). Apart from hydrography, SMA is also responsible for other maritime services, such as Pilotage, Fairway Service, Icebreaking, SAR and VTS.



1.1 Organization



1.2 Improvement of Survey-to-ENC Process

The aim of this improvement work is to develop standardized criteria and instructions regarding the process of identifying and appointing significantly reduced depths discovered by recent hydrographic surveys. The process from survey to fully updated ENCs takes several months outside fairway areas. In order for significant depth deviations to come to the attention of seafarers, an identification of the most important depths is necessary.

The main purpose is to gain a unified approach and definition of “important depths” and thereby making the process more effective and the output more consistent and reliable. In addition, this will minimize the subjective evaluation of depth varieties and enable a future automation of the process. To achieve this, tools have been identified to be used in the decision making process: the AHP-technique, (analytical hierarchy process), as well as a graphic tool. These tools enable a clearer communication about how discovered depths have been handled by different departments.

2. SURVEYS

2.1 Overall status and surveys 2023 and 2024

Most Swedish waters are surveyed to some degree over the years, but the long term objective is that all Swedish waters should be surveyed in accordance with the IHO S-44 standard. Almost all areas used by SOLAS vessels are surveyed by modern methods, but shallower areas still need to be surveyed. Surveys and re-surveys until 2023 have been focused on shipping routes as defined as HELCOM Cat I and II areas in the HELCOM Re-Survey plan for the Baltic Sea. Cat I and II encompasses 118 000 km² out of totally 165 000 km² within Swedish waters.

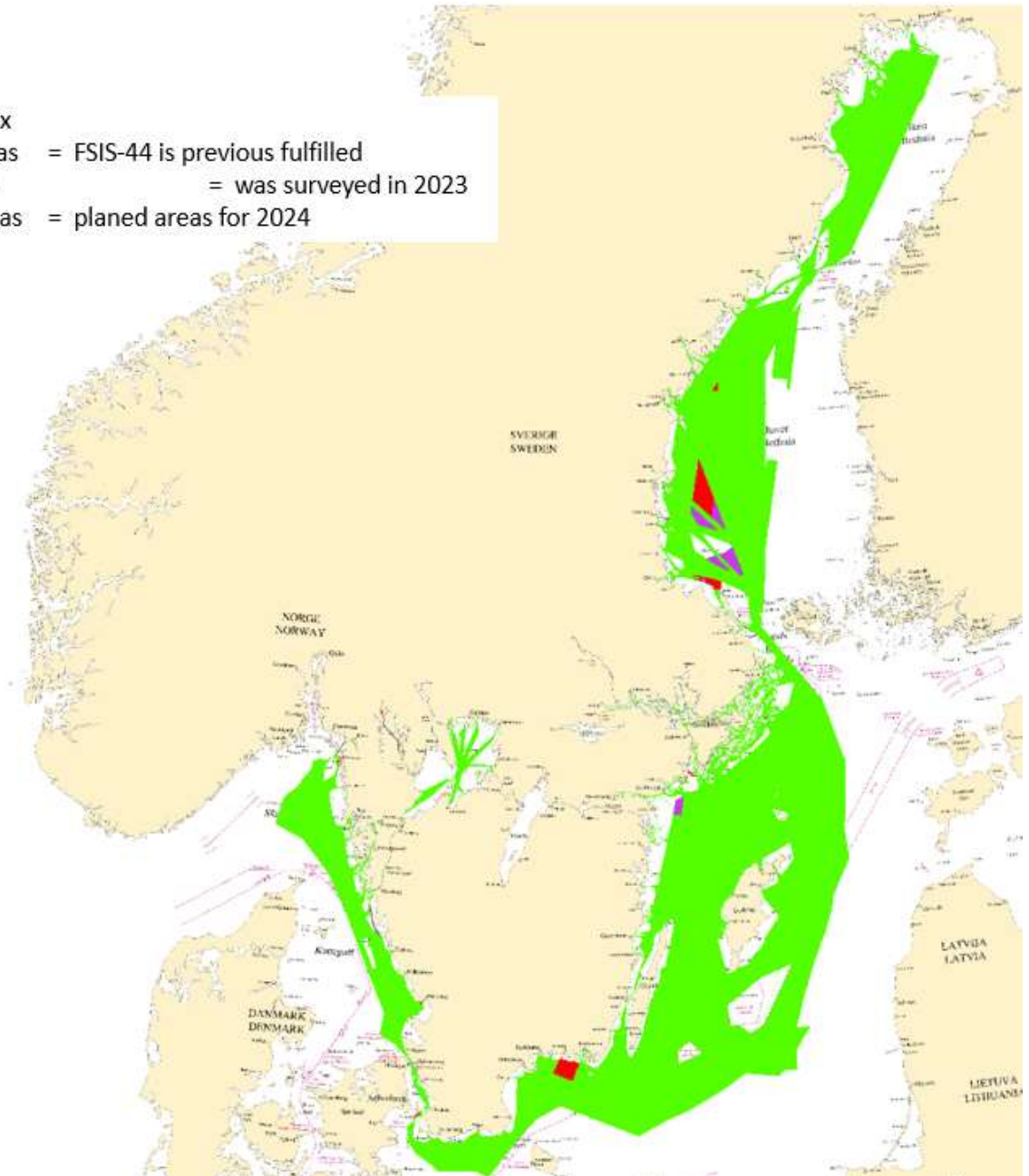
Sweden had initially targeted that the surveying of Cat I and II areas should be finalized 2020, but due to decreased co-financing from EU-programmes the last such areas is planned to be finalized 2024 instead. Although, Cat I areas has been finalized in 2022, and the remaining areas of Cat II is still planned to be surveyed 2024. From 2022 and onwards hydrographic surveying is also focused on surveying the shallower areas used for commercial shipping other than SOLAS vessels. These areas are also used by larger leisure crafts and national authorities such as police, coast guard and navy. In the HELCOM Re-Survey plan such areas are named Cat III High and Medium priority. The plan is to have finalized the surveying of these areas by 2036.

Four areas (Flintrännan, Ringhals, Halmstad och Hargshamn) have been surveyed in 2023 in the periodical re-survey program with moving seabed and critical under keel clearance. Seven specific wreck surveys have also been performed during the year within the environmental dangerous wreck oil clean-up program. For surveying of even shallower areas a national programme on coastal zone mapping is requested by the SMA and other mapping agencies in Sweden, but at present still no decision has been taken to fund such a programme. In 2023 a total amount of 1700 km² was surveyed in Swedish waters by SMA. Sweden is still using the implementation of S-44 originally created together with Finland; named FSIS-44. The implementation of the new

edition S-44 edition 6.1 is proceeding and will hopefully be finalized during 2024. The main deviations from S-44 in both versions are that full bathymetric coverage is required for all orders and for Special Order the size of features to be detected has been reduced. We also define depth ranges for when the respective orders should be applied in navigable waters. The table below summarize the total area of Swedish waters, surveyed in accordance with FSIS-44.

Category of SE waters (30 June)	Area	FSIS-44 fulfilled	Percentage FSIS-44 fulfilled
Total area SE waters	165 000 km ²	127 650 km ²	78 %
Shipping routes HELCOM Cat I and II	118 000 km ²	116900 km ²	99 %
Other waters HELCOM Cat III + inland waters	47 000 km ²	10 800 km ²	23 %

Chart index
Green areas = FSIS-44 is previous fulfilled
Red areas = was surveyed in 2023
Purple areas = planed areas for 2024



Survey status 2023 and planned surveys 2024.

2.2 Survey Vessels



All SMA Survey vessels are equipped with multibeam and Applanix POS-MV INS-systems. Above the survey launch Petter Gedda. In the middle the two vessels Anders Bure and Johan Månsson. Below the survey ship Jacob Hägg where surveying is performed 24 hours per day and 7 days per week, weather permitted.



Left: Bar sweeping vessel Gustaf af Klint. The bar is transverse across the stern and submerged into the water. Right: Autonomous survey craft "Skräddaren", intended for shallow water with troublesome bottom vegetation, four singlebeam echosounder mounted 0,5 meter apart.

2.3 Depth Database

The SMA Depth information database (DIS) is managed in an ESRI-system with some specialized tools developed by a Swedish GIS company specialized on ESRI platforms. DIS is currently undergoing a migration from ArcMap to ArcGIS Pro. The database stores depths and contains information about wrecks and other bathymetric objects and, in addition to this, SMA produces different types of bathymetry products. The database is constantly updated with the latest bathymetry data, received from completed hydrographic surveys. In March 2024 there were 311 176 123 247 (312 billion) depths stored in DIS.



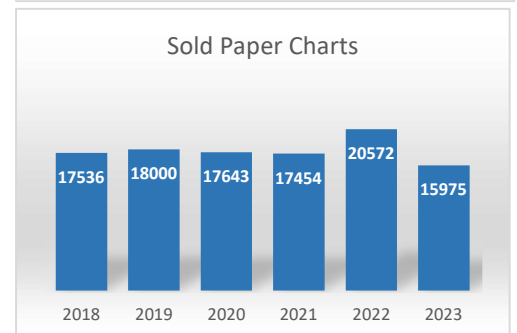
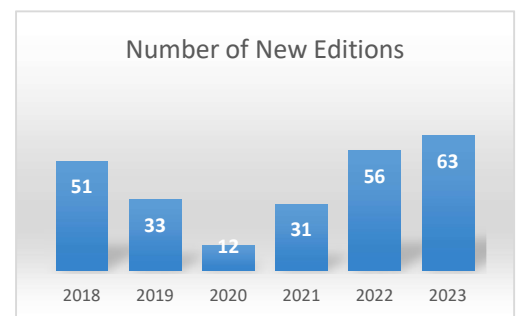
3. NEW CHARTS AND UPDATES

3.1 Paper Charts

The Swedish paper chart portfolio consists of 117 paper charts and 16 series of small craft charts. Special charts, tailored to the customer are also available.

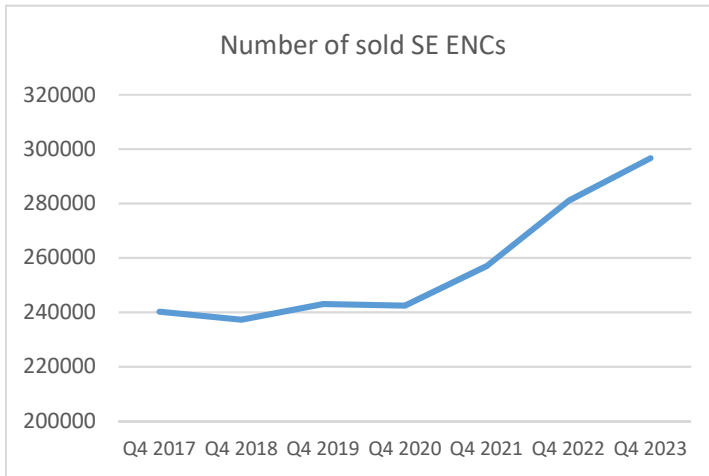
The SMA has improved the process for planning and producing New Editions for paper charts. Result of this is better timing of needed NE and possibility to produce more when needed.

At the [SMA chartviewer](#) under the headline *Se på sjökort*, a chart index is available. Under the headline *Djupinformationens kvalitet* the quality of depth data in the depth data base is presented.



3.2 ENCs

- The Swedish ENC portfolio consists of 581 cells.
- 598 New Editions (EN) and 954 Revisions (ER) of ENCs were published 2023.
- There are approx. 10 minor Gaps and Overlaps between ENCs from Sweden and neighboring countries, however one overlap between SE/DK (approx. 25 m) should be investigated.

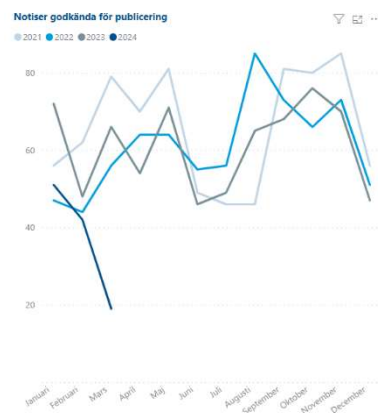
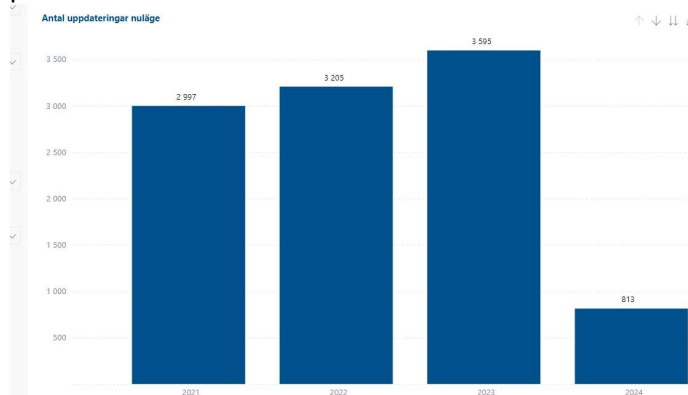


The sales of Swedish ENC's increased 22% during the last 3 years.

4. NEW PUBLICATIONS AND UPDATES

4.1 NtM

The Swedish Notices to Mariners (Ufs) are available on the SMA web site. A daily updated database in which NtM information can be searched in many different ways, e.g. all notices published for a certain given area and published during a given period time period. See Search the database. Each week one [Swedish](#) and one [English](#) PDF-file are published on the SMA website.



Number of updates in chart database (yearly) and Number of Notices to Mariners (monthly)

4.2 Other publications

Swedish pilot publications in printed version have not been produced in several years. Important nautical information is published at the SMA website. To secure more harmonized nautical information and utilize for harbors to more easily contribute, an improved web service is planned to be developed.

General nautical information (about MSI, regulations, ENC and paper charts, fairway information, etc.) needed for safe navigation in Swedish waters is available in Ufs A. It is published as a pdf version available both in Swedish and in English at the SMA website. [Link to the English version](#). The ambition is to update the information at least once per year.

The Swedish Chart Catalogue is published yearly. It is available as a printed version as well as published at the SMA website.

5. MSI


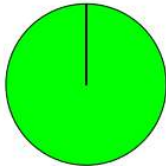
In Swedish waters, MSI is broadcast via VHF and/or Navtex, as well as MF. All navigational warnings and meteorological warnings are broadcast from the Sweden Traffic center, operated by the Swedish Maritime Administration. The Sweden traffic center is operated 24/7, contact: Phone +46 771 63 06 85, e-mail: swedentraffic@sjofartsverket.se.

Weather information, meteorological warnings and forecasts is provided by SMHI (Swedish Meteorological and Hydrological Institute).

The Baltic Sea area is a sub-area to NAVAREA I. UK is responsible for MSI transmissions for NAVAREA I. Sweden is the coordinating country for the Baltic Sea area's MSI management, and is responsible for NAVTEX broadcasts for all countries in the Baltic Sea area. The NtM office of the SMA Hydrographic Office has the role "Baltic Sea Sub-area Coordinator".

6. C-55

The latest update regarding Sweden in the C-55 database was delivered to the IHO Secretariat in March 2023.

Survey coverage Couverture hydrographique Cobertura hidrográfica	Depth < 200m Profondeur < 200m Profundidad < 200m			Depth > 200m Profondeur > 200m Profundidad > 200m		
	■ Adequately surveyed Correctement hydrographié Adecuadamente levantado ■ Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento ■ Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente	78	22	0	100	0
						

7. CAPACITY BUILDING

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

8. OCEANOGRAPHIC ACTIVITIES

8.1 Tide gauge network and S-100 oceanographic services

The SMA is responsible for a number of water level stations but it is the Swedish Meteorological and Hydrological Institute (SMHI) that has the main responsibility for the Swedish oceanographic activities. The SMA and the SMHI have a close cooperation on water level information. To be able to setup S-100 services for water level information in S-104 and surface currents S-111 it will be necessary for SMHI to develop its models to fulfil the requirements for high precision navigation. Initial discussions have started between SMA and SMHI how to cooperate to develop these future S-100 services.

Other oceanographic actors are the Swedish Geological Survey, universities and research institutes.

8.2 GEBCO and Seabed 2030

The EU Commission has taken the initiative to implement the EMODNet Bathymetry portal to make bathymetry available for European waters. These bathymetry data are used for the Seabed 2030 project and the GEBCO bathymetric model. SMA has coordinated the provision of bathymetric data in the Baltic Sea Region for the EMODNet Bathymetry portal for several years now.

To compile all available and newly collected bathymetric data into a high quality, high-resolution digital model of the ocean floor and to promote international efforts to collect new data in the Seabed 2030, project international centres are established. One of these centres is the department of Geological Sciences, Stockholm University, which is responsible for the North Pacific and Arctic Ocean.

9. MARINE SPATIAL DATA INFRASTRUCTURE

The SMA is, together with 14 other national agencies, part of the Swedish Council of Geodata. The Council is led by the Swedish Land Survey Authority (Lantmäteriet). One of the proposed future programs is the *Survey of shallow waters* though not approved to be funded yet by the Swedish Government.

10. INNOVATION

10.1 Upgrade of Depth Information System (DIS)

DIS is SMA's data management system for bathymetric survey data, which consists of a nationwide bathymetric database and various extensions for data management developed by ESRI Sweden. DIS is built on ESRI's ArcMap Desktop platform and as "Desktop" reaches end-of-life in 2026 an implementation project has started to transform the underlying platform to ArcGIS Pro by mid-2024.

10.2 Automatic Sounding selection and contouring from bathymetric data

In 2018 a set of cartographic guidelines was developed by SMA's senior cartographers.

In 2020, a procurement was launched to find an on-the-shelf software that could be used as support in the process where soundings are selected and contours are generated from bathymetric survey data to later be used in various chart products. Teledyne Caris Base Editor was selected as the winning tool from the procurement. During implementation of Base Editor, a collaboration started with the Canadian Hydrographic Service (CHS) that was using Base Editor since many years. SMA and CHS started to exchange configurations for Base Editor, which now have resulted in that Base Editor is used by SMA to create an automatic sounding selection. During 2024, SMA is hoping to start using Base editor to automatically create depth contours. We hope that the use of Base Editor can cut 70 % of the existing manual work with sounding selection and contouring.

11. OTHER ACTIVITIES

11.1 International Committees and Working Groups

Committee/WG	Delegates from Sweden *Head of delegation
IHO Assembly	Magnus Wallhagen*, Annika Axne, Benjamin Hell
IHO Council	Magnus Wallhagen*, Annika Axne
HSSC	Benjamin Hell*, Magnus Wallhagen (Chair)
S-100WG	Benjamin Hell
S-101PT	Klas Östergren
S-102PT	Per-Olof Seiron, Anna Wall
ENCWG	Klas Östergren
NCWG	Klas Östergren
DQWG	TBD
TWCWG	Thomas Hammarklint
HSWG	Hans Öiås
NIPWG	Caroline Johansson
MASSPT	TBD
IRCC	SE
WWNWS-SC	Johan von Bülzingslöwen
S-124 PT	Johan von Bülzingslöwen
WENDWG	Annika Axne
IENWG	Annika Axne
BSHC	Magnus Wallhagen*, Annika Axne
CDWCWG	Thomas Hammarklint* (Chair), Lars Jakobsson, Henrik Tengbert
MWG	Anders Åkerberg
BSMSIWG	Johan von Bülzingslöwen (Chair)
BSICCWG	Elisabeth Farrington, Stefan Cederberg
NHC	Magnus Wallhagen (Chair), Annika Axne
NCPEG	Thomas Gränne
NSEG	Ulf Olsson, Anders Åkerberg



NSHC	Magnus Wallhagen (Chair), Annika Axne
NSICC	Elisabeth Farrington, Stefan Cederberg
TWG	Thomas Hammarklint (Acting Chair)
PAC	Annika Axne, Magnus Wallhagen (Vice Chair)
PMG	Annika Axne (Chair)
PFWG, PSWG	Annika Axne
TEWG	Klas Östergren

11.2 Other Projects

Several projects in the aim of improved Military and Civil Defense are on-going at the SMA. This includes a substantial work package for the Swedish Armed Forces.

The project *Baltic Sea E-navigation* is described in NHC67 D.4.