NATIONAL REPORT OF SWEDEN

Executive summary

This report gives a summary of the main activities within the Swedish Hydrographic Office since the last report given at the 62nd NHC meeting at Arkö Island in April 2018.

1. 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, where the main are Pilotage, Fairway Service, Icebreaking, Search and Rescue (SAR) and Maritime Traffic Information.

At the time of compiling this report the Hydrographic Office, including the hydrographic survey personnel, employs 117 persons. See also the organisation scheme in figure 1.

All operations are certified in accordance with ISO 9001 and the environmental standard ISO 14001. The quality management system covers all parts of the operations and supporting activities within the Swedish Maritime Administration.

During 2018, the Hydrographic Office has implemented a new management system with three management blocks, process-, information- and system management. The main reason has been to divide system management from information and process management, which previously were integrated.

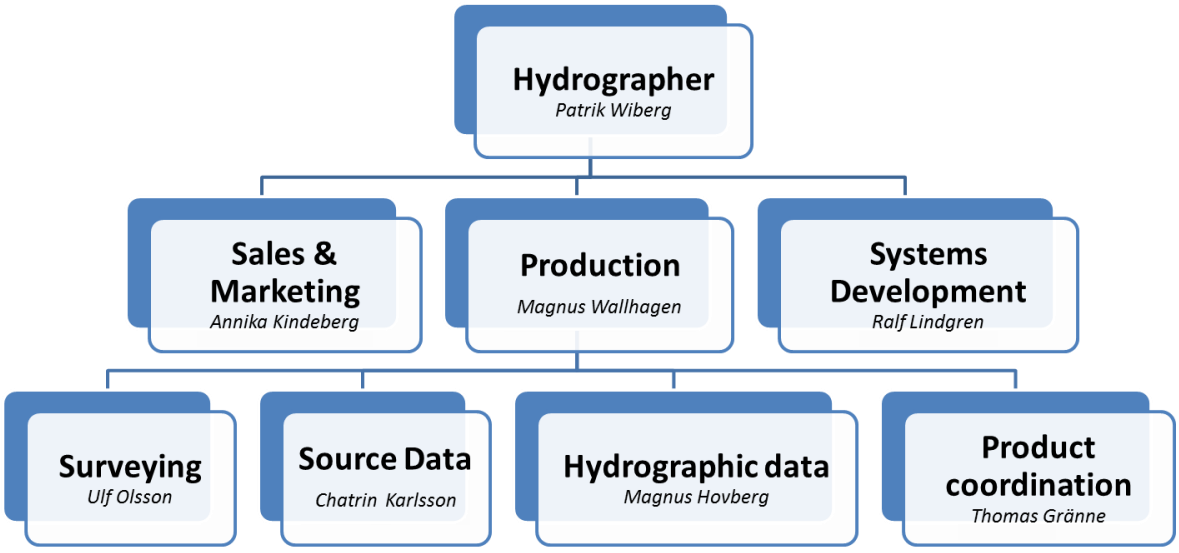


Figure 1 Organizational scheme of the Swedish Hydrographic Office

2. Surveys

2.1 Overall status and surveys 2018

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. Sweden and Finland have implemented a common Finnish Swedish realisation of S-44; named FSIS-44. There are still areas used by SOLAS vessels that needs to be surveyed by modern methods.

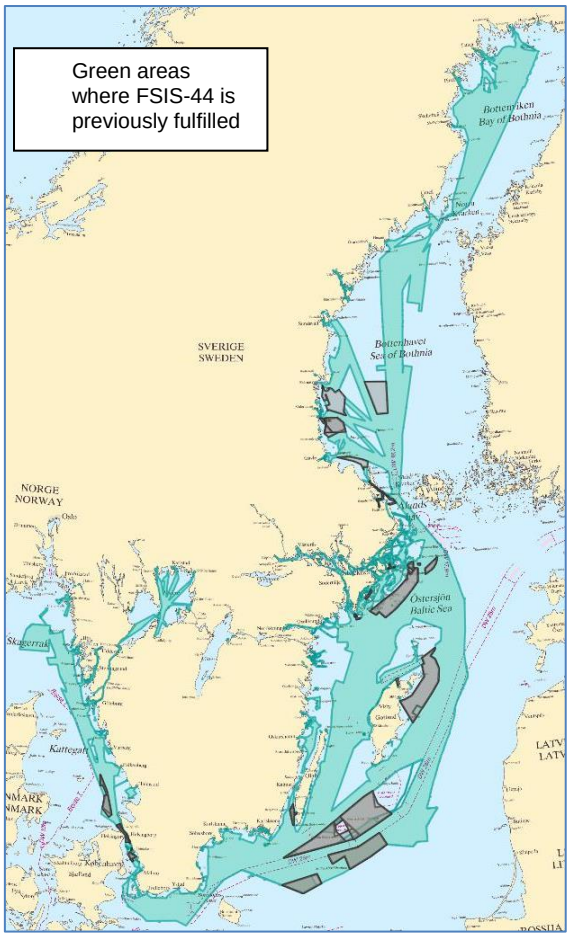
Surveys and re-surveys now and until 2020 are focused on shipping routes as defined as HELCOM Cat I and II areas in the HELCOM Re-Survey plan for the Baltic Sea. Cat I and II encompasses 118 000 km² out of totally 165 000 km² within Swedish waters. Sweden has targeted that the surveying of Cat I and II areas should be finalized 2020.

Since 2011 the Swedish HO, together with other Baltic Sea HOs, has received co-financing from the EU TEN-T and Connecting Europe Facility (CEF) programme for hydrographic surveying activities. The first phase FAMOS Freja was finalized 2016, but FAMOS has continued with the second phase FAMOS Odin 2016 – 2019 (30 June 2019). The HOs from Denmark, Estonia, Finland, Germany, Latvia Lithuania and Sweden is participating in FAMOS Odin. In addition to these HOs, there are also many other additional partners such as national authorities and institutes. Additional activities in this second phase are studies on route optimizing in the Baltic Sea in regards to bathymetry and squat. The project will also perform studies on better control of Under Keel Clearance, where the clearance is critical.

FAMOS
FINALISING SURVEYS FOR THE BALTIC MOTORWAYS OF THE SEA
Co-financed by the European Union
Connecting Europe Facility

In 2018 a total amount of 12 150 km² was surveyed in Swedish waters by SMA vessels and through contracted companies. The table below summarize the total amount of Swedish waters, surveyed in accordance with FSIS-44.

Category of SE waters	**Area**	**FSIS-44 fulfilled**	**Percentage FSIS-44 fulfilled**
Total area SE waters	165 000 km²	107 000 km²	65 %
Shipping routes HELCOM Cat I and II	118 000 km²	97 000 km²	82 %
Other waters HELCOM Cat III + inland waters	47 000 km²	10 000 km²	21 %



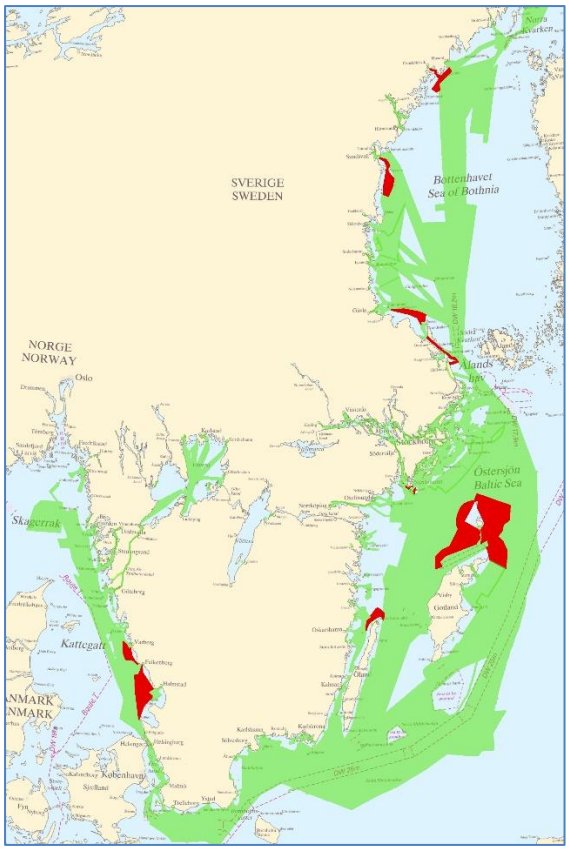
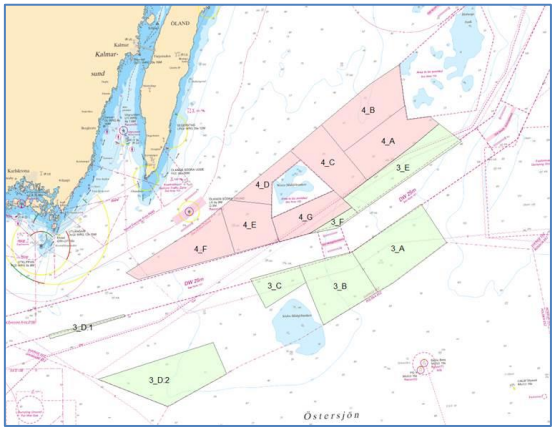


Figure 2 Surveys performed 2018 **Surveys planned 2019**

The FAMOS Odin project, with the co-financing from the EU CEF-program, has given SMA possibility to procure external resources for surveying. In 2018 three separate contracts were awarded to Clinton, MMT and Meritaito. Clinton surveyed 2700 km² (South-eastern Baltic), MMT surveyed 2550 km² (South-eastern Baltic) and Meritaito 2100 km² (South-eastern Baltic and Sea of Bothnia).



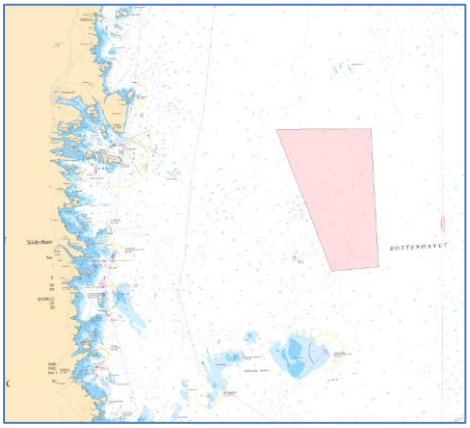


Figure 3 Green areas ware surveyed by Clinton and red areas by MMT and Meritaito

2.2 Survey Vessels

Figure 4- SMA Survey vessels equipped with multibeam. To the left the two survey vessels Jacob Hägg and Baltica where surveying is performed 24 hours per day and 7 days per week, weather permitted. To the right the two survey boats Petter Gedda and Anders Bure.

Figure 5 Bar sweeping survey vessel Gustaf af Klint. The bar is transverse across the stern and is here submerged into the water.

2.3 Depth Database

The depth database DIS (Depth Information System) is managed in an ESRI-system with some specialized tools developed by a Swedish GIS company specialized on ESRI tools. In March 2019 SMA celebrated 200 billion depths stored in the depth database.

3. New charts and updates

3.1 New ENC and 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 as well as a service to provide S-57 or raster data to end user service providers. To provide the manufacturers delivering electronic charts for the leisure market, the PRIMAR service "GeoView" is used.

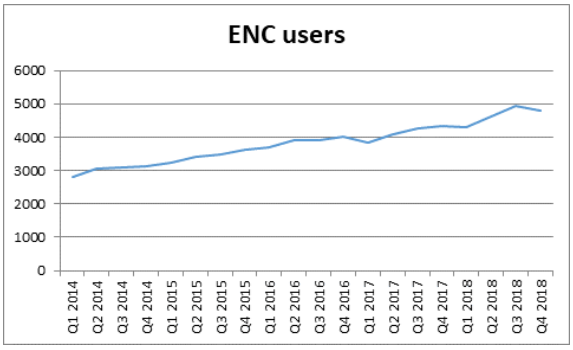
At the SMA website under the headline "Se på sjökort" a chart index showing Swedish charts is available at: https://geokatalog.sjofartsverket.se/kartvisarefyren/

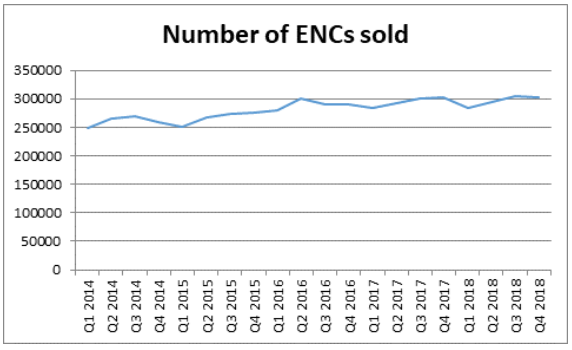
Under the headline "Djupinformationens kvalitet" the quality of depth data is presented: https://geokatalog.sjofartsverket.se/kartvisarefyren/

51 New Editions (NE) of paper charts were published 2018. The reason for the high amount of NE paper charts 2018 was that SMA has re-established its capacity to produce paper charts after the changes of production system to CARIS HPD. During a period, no paper chart production was possible and during that period many updates had piled up, which caused a need for NE paper charts when the capacity was re-established.

382 New Editions (EN) and 1082 Revisions (ER) of ENCs were published 2018.

The sales of Swedish ENCs for the last five years is shown in the table below. The number of ENC users are increasing with approximately 15 %.





Usage Band	Compilation Scale	No of SE ENCs
2 General	1:350 000 – 1:4 999 999	11
3 Coastal	1:90 000 – 1:349 999	81
4 Approach	1:22 000 – 1:89 999	230
5 Harbour	1:4 000 – 1:21 999	153
6 Berthing	>1:4 000	105
		580, total number of SE ENCs

3.2 The Chart Improvement project – Sjökortslyftet

Within the BSHC it has been agreed upon that all chart products within the Baltic Sea should be adjusted to a common vertical reference level; Baltic Sea Chart Datum 2000. As part of the commitment made in BSHC the SMA started the Chart Improvement project (Sjökortslyftet) 2015 in order to adjust the chart products to this new reference level. Apart from amending existing depth contours and depth figures,other quality improvements will be made at the same time such as:

- New surveyed coastline, from the Swedish land survey agency (Lantmäteriet), will be implemented
- Navigational aids will be adjusted to geodetically surveyed positions
- 15 and 30 m depth contours will be included as standard depth contours

As a consequence of the project, 22 New Editions of paper charts have been published in March 2019 with equivalent 80 New Editions of ENCs. Also New Editions of the Small Craft Chart series, covering the Swedish coast of Bay of Bothnia and Northern Sea of Bothnia, have been published in March 2019. The new vertical reference level will be implemented in all Swedish chart products (117 paper charts and 580 ENCs). There are some challenges with the timeline for the project due to lack of resources. At the time of writing this report the timeline is recalculated. The SMA will not reach the original goal to have finalized the project 2021. In March 2019 the geographical area from the SE – FI border to Hudiksvall, in southern Sea of Bothnia is finalized.

3.3 Small Craft Charts

The sales of Swedish small craft charts is very important for the SMA net result. In 2018 six New Editions of small craft charts were published covering Stockholm archipelago, Hanöbukten, Lake Vänern and Bay of Bothnia. Bay of Bothnia was the first small craft chart totally produced with Baltic Sea Chart Datum 2000. For the 2019 season another six New Editions of small craft charts have been published. These small craft charts cover the Swedish West Coast, the proper Baltic Sea East Coast and Sea of Bothnia.

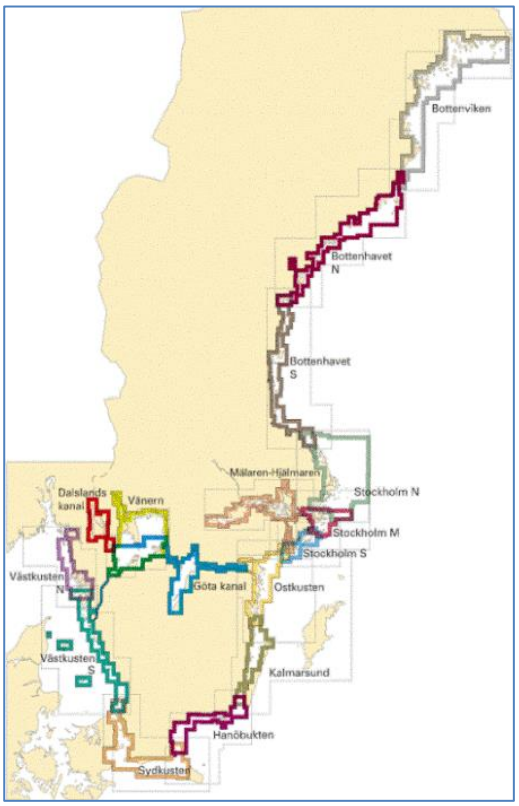


Figure 6 Small craft chart series in Sweden

4. New publications and updates

4.1 NtM and other publications

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 http://www.sjofartsverket.se/en/Maritime-services/Hydrographic-Information/NtM---Notices-to-mariners/Search-the-database/
- Each week one Swedish and one English PDF-file are published on the website www.sjofartsverket.se/ufs and www.sjofartsverket.se/ntm respectively.
- 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. The printed version has been withdrawn andfrom 2018 it is only published as a pdf version available both in Swedish and in English at the SMA website. The link to the English version is http://www.sjofartsverket.se/upload/Ufs/Ufs%20A_EN_20190206.pdf. It is easy to print the pdf version for the customers and having only a digital version will make it easier to keep the information updated. 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. See http://www.sjofartsverket.se/upload/Pdf-Gemensamma/Sj%C3%B6kortskatalog%202019.pdf

4.2 Swedish Pilot

Swedish pilot books in paper format have not been produced in several years. Critical nautical information, traditionally published in the pilot books, has been published at the respective SMA Pilot Area's website. To secure more harmonized nautical information and utilize for harbours to more easily contribute, a web service called Svensk Lots/Swedish Pilot is under development.

5. MSI

All Swedish navigational warnings are drafted and broadcasted by the station **SWEDEN Traffic**. This station also performs the NAVTEX broadcasting of MSI for the entire Baltic Sea with exception of area "U", which is covered by Tallinn Radio.

The station is operated H24 all days of the year. Contact information: Tel: +46 771 63 06 85
E-mail: swedentraffic@sjofartsverket.se

The NtM section of the Hydrographic Office maintains the role "Baltic Sea Sub-area Coordinator", including the role of international coordinator of MSI in the Baltic Sea area.

6. C-55

The latest update regarding Sweden in the C-55 database was delivered to the IHO Secretariat in July 2018.

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

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. The network has been modernized through extra financing from the FAMOS Odin project. From 3 June 2019 all water level information from SMHI and SMA will be presented in Baltic Sea Chart Datum 2000 instead of Mean Sea Level.

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

8.2 Seabed 2030 – RDACC in Stockholm

The GEBCO Seabed 2030 project will facilitate mapping of the ocean floor by the year 2030. The Nippon Foundation will contribute US$ 18.5 million for the first ten years of the project. The aspiration is for Seabed 2030 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. This will be performed by four Regional Data Assembly and Coordination Centres (RDACCs) and a Global Data Assembly and Coordination Centre (GDACC). One of the RDACCs is the Department of Geological Sciences, Stockholm University, Sweden, which is responsible for the North Pacific and Arctic Ocean.

9. Marine Spatial Data Infrastructure in Sweden

Marine data is used by many different stakeholders in Sweden. Apart from navigation it is crucial for many different purposes such as marine environmental mapping, flooding prediction (climate change related) and marine spatial planning. In Sweden there is no specific initiative to establish a geodata portal for only marine data. The Swedish land survey agency – Lantmäteriet – is the coordinator for all geodata in Sweden including marine data. At www.geodata.se marine spatial data is available together with all other geodata.

The Swedish Agency for Marine and Water Management has an overall responsibility for Marine Spatial Planning in Sweden, but the coastal municipalities are responsible for their waters one nautical mile outside the limit of baseline. For Marine Spatial Planning specifically the municipalities have expressed that the lack of marine data in the coastal region is problematic and hinder them to perform their planning.

10. Innovation

ADAPT – Assure Depth of fairways for Archipelago Public Transportation

The overall objective of the ADAPT-project has been to develop and implement safe, time-saving and fuel-efficient routes for the transportation of passengers and goods in the Åland and Stockholm archipelagos. SMA has been lead partner in the project, including SMA hydrographic surveys in fairways used by public transport where no S-44 surveys previously were performed. Subsequently the official ENCs and paper charts will be updated with the new survey data. The project started 2016 and will be finalized in August 2019.

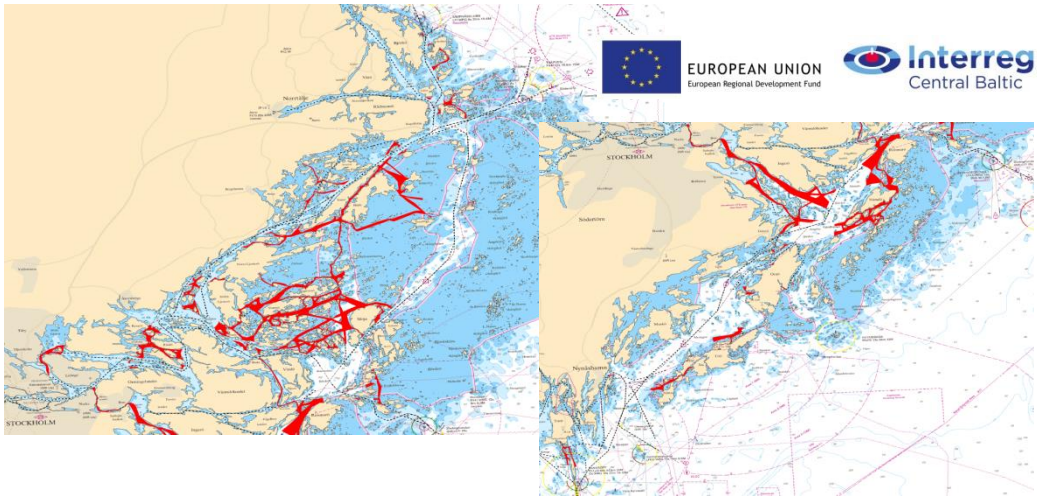


Figure 7 Areas surveyed in Stockholm archipelago in the ADAPT project

Apart from SMA the Stockholm County Council (Department for Transport Administration), who is responsible for waterborne public transports in Stockholm, and the Government of Åland (Infrastructure Department, Waterborne Traffic), who is responsible for similar public transports in the archipelago of Åland, are partners in the project. The project is supported with 75 % co-financing by the EU INTERREG Central Baltic Programme, which aims to stimulate co-operation between regions within the central parts of Sweden and Finland (along with Åland) and Estonia and Latvia. Exceptional differences compared to the original chart have been discovered. Below an example of a passage where the 3 m depth contour had to be extended and a depth figure had to be changed from 5 to 3.4 m.

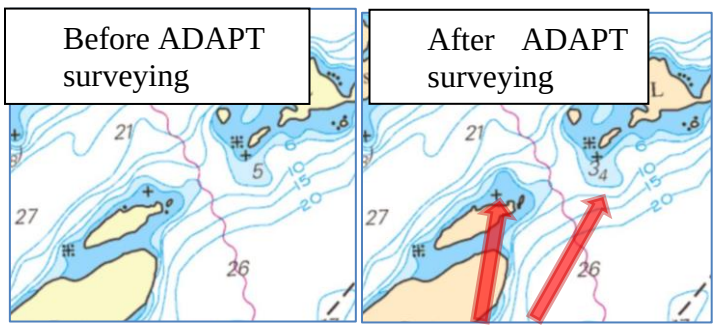


Figure 8 Corrections in the chart after ADAPT

It is obvious that the routes for these passenger ships have become safer after surveying. Around 50 Notices to Mariners have been published as a result of the surveys. Beside improved safety, the project has also resulted in more time saving and fuel- and cost efficient routes. Surveying has made it possible to find new shorter routes. See examples below.
One of the greatest improvements was identified in the archipelago of Åland **(see fig 9)**. The traveling time of the original route (dotted red line) is 2 hours and 40 minutes. The new suggested route identified, after hydrographic surveys in ADAPT, will save 35-40 minutes. Part of the new route is planned over land and the western part of the new route will be operated by a CO^2 neutral ferry.

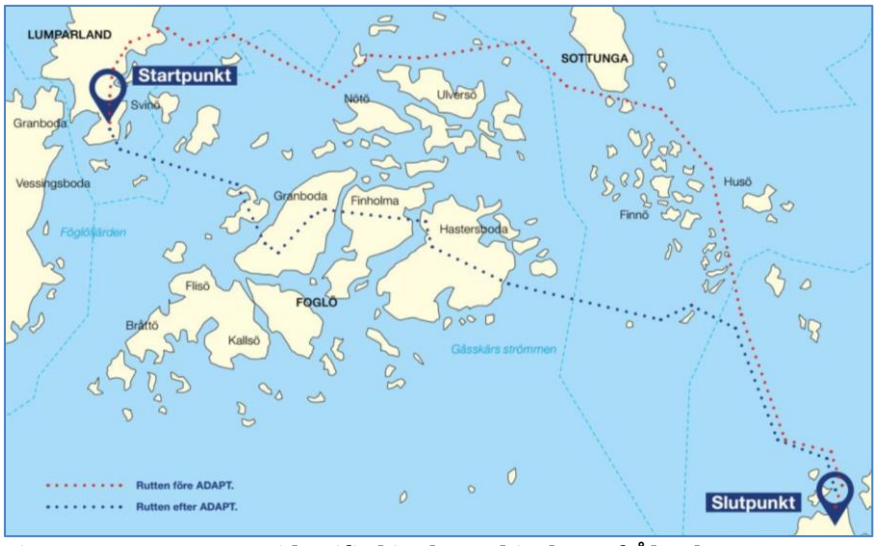


Figure 9 Improvements identified in the archipelago of Åland

Another example is in Stockholm archipelago where a new route was identified (see fig 10). The route was surveyed since taxi boats used the route, but it was identified that also larger vessels could use this shorter route. The new route is 25 minutes shorter, energy consumption is reduced with 35 kWh/person and CO^2 emissions is reduced with 8,3 kg/passage.

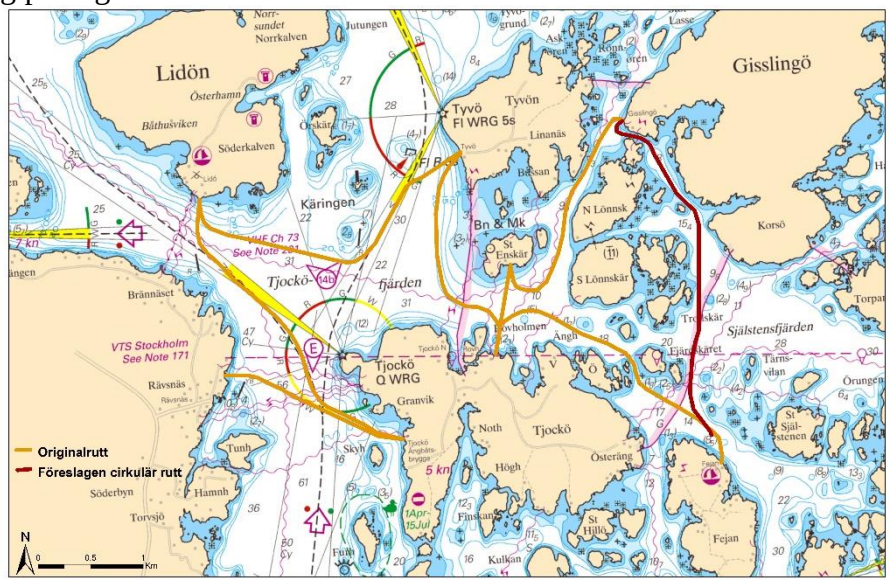


Figure 10 A new route identified in Stockholm archipelago.

This project is a good example of hydrographic surveying actually leading to safe, time saving and fuel- and cost efficient routes. The results are of great importance for the public transport systems in the archipelagos and over 100 safety issues have been addressed in Stockholm archipelago and time savings can be as high as 40 minutes on one single trip in the Åland archipelago. The developed routes are all contributing to the optimization of the public transport in the archipelagos. 34 corridors in Stockholm and 7 in Åland have increased the safety level. Furthermore, 6 corridors in Stockholm and 5 in Åland have reduced their emissions of greenhouse gases. With an optimized transport system, the positive outcome is immeasurable.

There are also other environmental parameters taken into regard in the analyses with benefits such as reduced erosion as a result of the proposed adjustment in one corridor. The benefits are also of great general benefit to the society. Leisure boaters also benefit from the updated navigational charts and an optimized transport system enable the travellers to spend less time on the ferries and simultaneously reduce their ecological footprint. ADAPT has been awarded by the EU Commission DG REGIO as “Best Practice Project 2018”, which the SMA and the other participating partners are very proud of.

11. Other activities

11.1 Category B Hydrographic Surveyors Program established in Sweden

The SMA has been involved in the establishment of a Category B Hydrographic Surveyors Program in Sweden. This Cat B program has been certified by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC). The University of Gothenburg is overall responsible for the program, but to be able to deliver the program a consortium of academia, industry and government organizations has been established. This is the first certified Hydrographic Surveyors program established in any of the Nordic countries. As head of the program, the well-known hydrographic expert David Dodd has been recruited by the University of Gothenburg. Preparations are also ongoing for the establishment of a Hydrographic Surveyors Cat A program. The first Cat B course started in Gothenburg 6 November 2018 and the first students were examined 22 March 2019. Three of the students are SMA employers and one is from the Dannish Geodata Agency. The program welcomes of course participants from all IHO member states.