

 <p>Kartverket</p>	<p>NHC 58th Meeting Helsinki 19-20 August 2014</p>	<p>NHC 58/B 5 National Report NORWAY</p>
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NATIONAL REPORT NORWAY

Executive Summary

This report gives the summary of the activities and events that has taken place within the Norwegian Hydrographic Service (NHS) since the last report given at the NHC57 Conference in Arkö, April 2013. Some highlights:

- *3 new survey launches in operation*
- *Continued high activity in the Mareano project*
- *Delivery of a new multibeam data processing software in progress*
- *A LiDAR pilot project for seamless coverage of the coastal zone*
- *Release of NtM online*
- *Ending traditional chart printing from 01.01. 2016*

1. Hydrographic Office

From 1 January 2014 the Norwegian Mapping Authority, included NHS, was transferred from the Ministry of Environment to the Ministry of Local Government and Modernisation.

The yearly audit related to the ISO certification has been accomplished with only a few minor deviations identified.

2. Hydrographic Surveys

Internal conducted surveying 2013

During 2013 R/V Hydrograf and its two survey launches have been working in the coastal waters of Norway and Svalbard. In addition R/V Hydrograf also surveyed at open sea for the MAREANO project.

The MAREANO project (see also item 9.1)

R/V Hydrograf worked about two months for the MAREANO project and a total of 4893 km² was surveyed. These areas are along the continental margin in the area between Stadt and Lofoten.

Norwegian coast

The surveying along the coast has been done with two survey launches equipped with EM3002D. In addition R/V Hydrograf has surveyed some deeper areas with its EM710. The surveying have been organised as 7/12 operations.

The primary survey area has been within the harbour areas of Egersund, Stavanger and Haugesund. Some areas near Stadt have also been surveyed.

The total area surveyed along the Norwegian coast in 2013 was 1020 km². Figure 1 presents the coverage of surveying within the territorial waters.

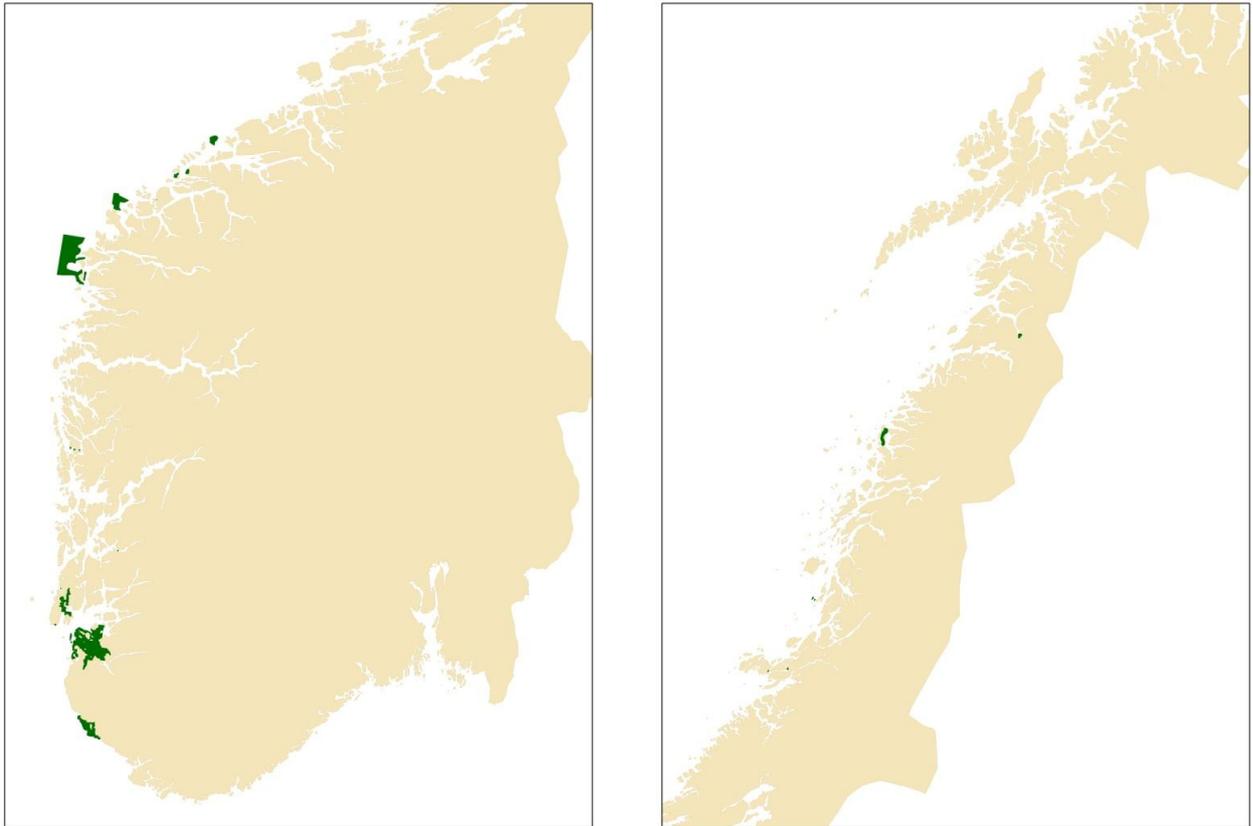


Fig. 1. Area survey in territorial waters during 2013

Svalbard

R/V Hydrograf and two survey launches operated at Svalbard for 10 weeks in 2013. A total of 505 km² was surveyed., see figure 2.

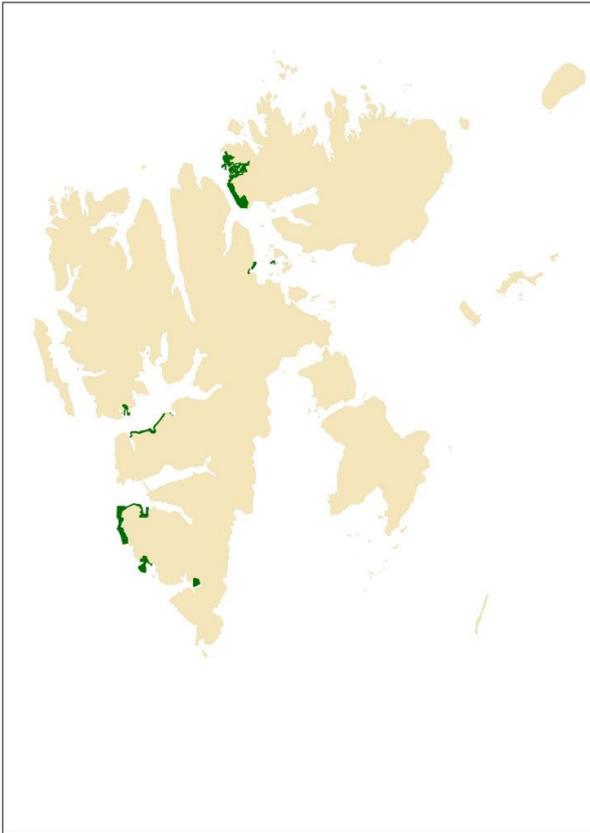


Fig. 2. Surveying at Svalbard during 2013 season

External conducted surveying 2013

For 2013 the German company Fugro OSAE has been awarded the contract for surveying for the MAREANO project.

New Survey launches

Three equal survey launches were delivered by Swede Ship Marine, Sweden, during the period December 2013 - May 2014.



Fig. 3. The launches delivered in March and May 2014

The main technical specifications for the launches are as follows:

Length: 11,15 m, breadth: 3,4 m, draught: 0,8 m, service speed: 25 knots, max speed: 28 knots, displacement: 12,5 tonnes, range (nautical miles): 300, main engines (2x): Iveco 350 HP, waterjets (2x): Ultrajet 340 HT, building materials: aluminium, Ice-strengthened reinforcements (bow and waterline), designed in accordance with the Nordic Boat Standard

All the launches have identical survey equipment which includes:

Multi-beam echo sounder: EM2040D,
Seapath 330+ motion sensor with MRU5+
SIS software
SAIV CTD SD204 velocity profile

3. Nautical Charts

3.1. Maritime Primary Database

The Maritime Primary Database consists of selected bathymetry, coastline, shoreline constructions, pontoons, lights and nav aids, submarine cables and pipelines, overheads cables, anchor berthing, marine farms, wrecks and obstructions, restrictions, precautionary area, traffic separation zones etc. The database has full coverage of digital data for the Norwegian coast and the west coast of Svalbard. Some areas are still based on rather old and insufficient survey information. In 2013 the production comprised replacing areas with older survey data with new survey data at Chart 24 Fensfjorden-Sognesjøen and two major harbours; Sarpsborg and Fredrikstad

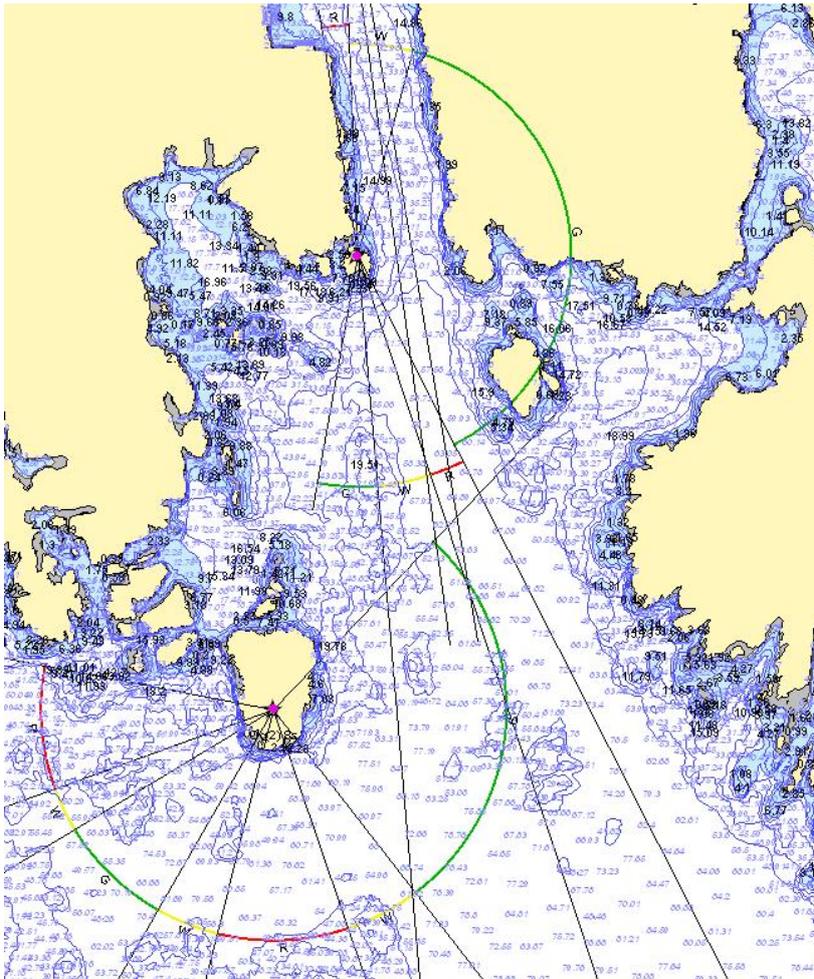


Figure 4. An example of information extracted from the Maritime Primary Database (From Chart 467: Egersund)

The information is organized in an Oracle database and formatted according to S57. The topology is also established according to the S57-format. The data is updated continuously with information from internal and external sources. The production of Notices to Mariners (Etterretninger for sjøfarende) and the production of all charts/ENCs are based on the information from the Maritime Primary Database.

The bathymetry, the coastline and shoreline constructions are also available for downloading from the national geospatial infrastructure *Norge Digital*. www.geonorge.no

Planned activities in 2014: In 2014 the NHS will continue the process of replacing older survey data with new survey data. The main focus area will on the west coast of Svalbard chart 536 and the harbour chart for Egersund.

3.2. Chart production

Since autumn 2008, when the NHS completed the major task of covering the Norwegian coast with ENCs and modernised paper charts, the production has been concentrating on replacing areas with old survey data (approx 11 000 km²) with new data. The NHS also has the objective to convert the remaining analogue paper charts (26 charts per Dec 31st 2013) to digital charts. The NHS outsources some of the production tasks.

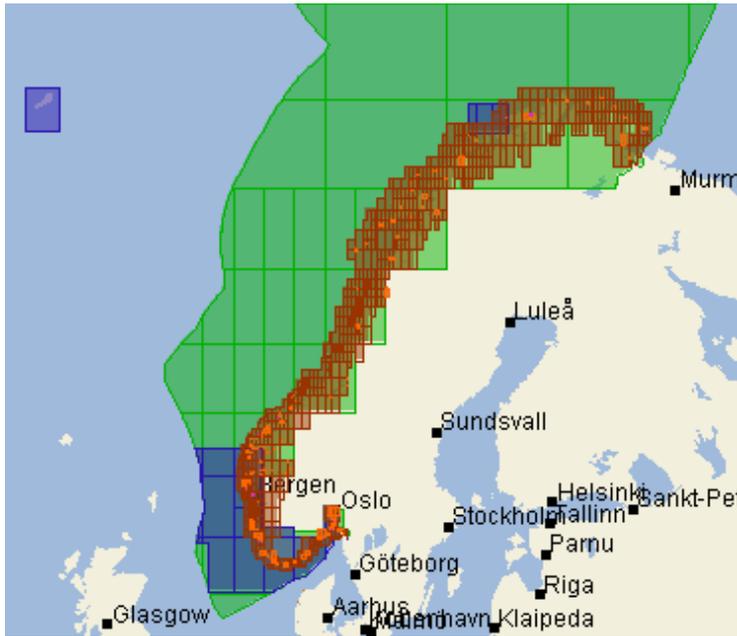


Figure 5. ENC coverage for the Norwegian coastal waters (ENCs in User Bands 2-6).

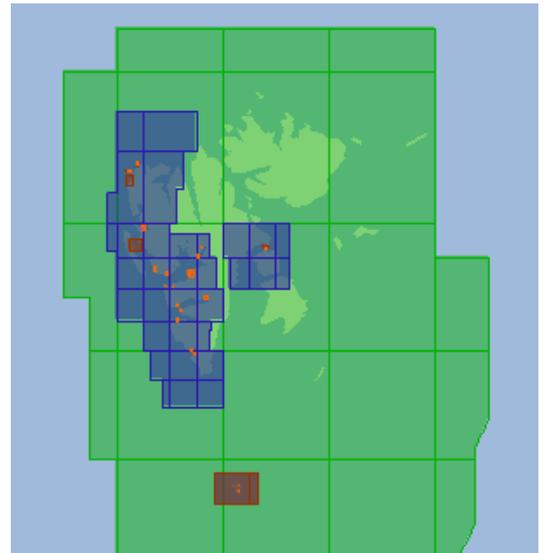


Figure 6. ENC coverage in the Svalbard area (ENCs in User Bands 2-6).

3.3. ENC production

In 2013 11 ENC's in the Approach, Harbour and Berthing user bands were produced along the Norwegian coast.

In addition 12 new ENC's in Coastal user band were published. Also 12 existing ENC's in the General user band were upgraded at the same time. See Figure 5.

At Bjørnøya 4 ENC's in the Coastal and Approach user bands were produced. See Figure 6.

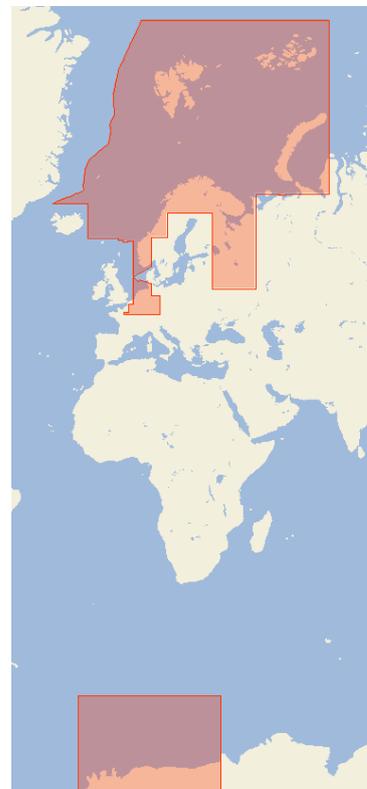
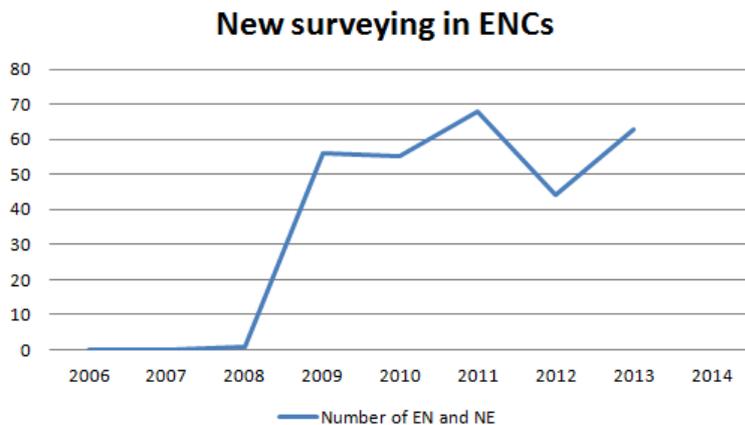


Figure 7. NO1A3000 Norwegian Sea and NO1A5500 Queen Maud Land

66 ENC's in user bands 2-6 have in addition been upgraded with new multibeam surveys in limited areas, and published as New Editions (NE) or new ENC's (EN). 11 of these are new ENC's produced in accordance with pilot sketches.

The graph below shows an increasing trend of this task in recent years.



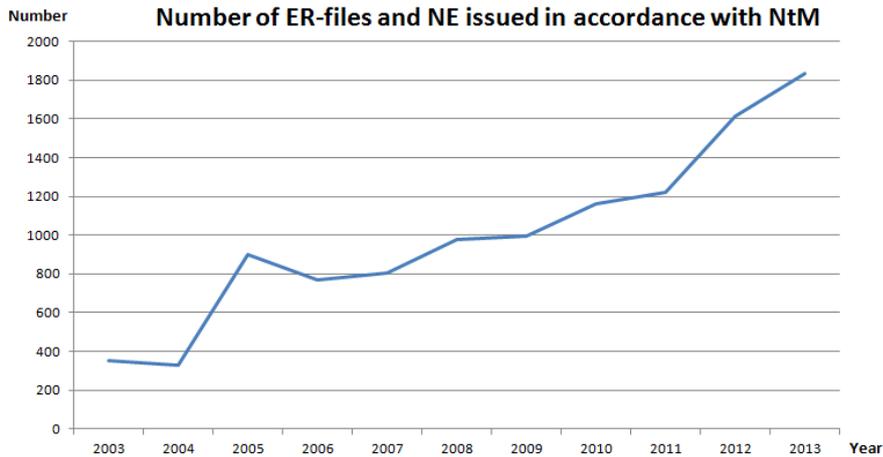
The total number of ENC's was 1084 at the end of 2013.

	Usage Band	Compilation scale	No of ENC's
1	Overview	< 1:1 499 999	2
2	General	1:350 000 – 1:1 499 999	68
3	Coastal	1:90 000 – 1:349 999	55
4	Approach	1:22 000 – 1:89 999	735
5	Harbour	1:4 000 – 1:21 999	193
6	Berthing	> 1: 4 000	31

Table above: Number of ENC's in each usage band per 31 Dec. 2013

Updating via ER profiles were issued in accordance with the Notices to Mariners (NtM) and distributed through Primar. A total of 1831 ER files and NE were issued as part of the continuous maintenance of the ENC's. Temporary (T) and Preliminary (P) notices were also published as ER files. They are included in the numbers.

The graph below shows the trend in recent years. The number has increased gradually, especially after NHS started to publish T/P notices in 2011.



In connection with the transfer of ENC's to the new chart production system, a review of all ENC's are currently being undertaken in order to improve the quality of the data. New Editions of 60 ENC's were published in 2013 as a result of this effort.

Planned activities in 2014:

In 2014 the NHS will continue the production of new editions of existing ENC's with main focus on the Harbour and Approach ENC's corresponding with the charts 464, 465, 24, 488 and 467. The production of new Coastal ENC's and upgrading of General ENC's covering chart 308 will be completed in 2014. In addition a new overview ENC in Antarctica covering INT 909 will be finalized.

New editions and new ENC's in connection with new survey data will proceed.

Updating via ER profiles in accordance with the NtM will be continued.

The review of ENC's in connection with the transfer of ENC's to the new chart production system will also proceed in 2014.

3.4. Paper chart production

In 2013 a total number of 33 charts were published as new charts or new editions for areas with new survey data available: 7 harbour charts, 22 main charts and 1 coastal chart, 2 charts for Svalbard and 1 military chart.

New charts/ new editions with new survey data published 2013:

Chart No.	Title	Scale
1	Oslofjorden. Færder – Hvaler – Halden	1:50 000
3	Oslofjorden. Fulehuk – Filtvet – Rødtangen	1:50 000
16	Tananger – Stavanger – Skudenes	1:50 000
35	Hustadvika	1:50 000
36	Kristiansund – Tyrhaug	1:50 000
39	Trondheimsfjorden. Agdenes – Thamshamn – Buvika	1:50 000
59	Dønna – Lurøya	1:50 000

Chart No.	Title	Scale
73	Ure – Gimsøystraumen – Svolvær	1:50 000
76	Stokmarknes – Sortland – Malnes	1:50 000
81	Nordmela – Andenes – Dverberg	1:50 000
83	Dyrøya – Gibostad	1:50 000
84	Gibostad – Rystraumen – Hekkingen	1:50 000
87	Rystraumen – Tromsø – Grøtsundet	1:50 000
89	Sørfugløya – Torsvåg	1:50 000
91	Grøtsundet – Lyngstuva – Kågen	1:50 000
92	Karlsøy – Flatværet – Gåsan	1:50 000
93	Fugløya – Arnøya	1:50 000
109	Nordkinn – Tanahorn	1:50 000
113	Hamningberg – Vardø	1:50 000
128	Kristiansund – Sunndalsøra	1:50 000
130	Trondheimsfjorden. Trondheim – Skogn	1:50 000
142	Narvik – Skjomen – Rombaken	1:50 000
307	Stavanger – Florø	1:350 000
461	Narvik havn	1:10 000
462	Svolvær – Kabelvåg	1:10 000
464	Fredrikstad havn	1:10 000
465	Sarpsborg havn	1:10 000
478	Flekkefjord havn med innseilinger	1:20 000
479	Florø havn	1:10 000
480	Larvik havn. Sandefjord havn	1:10 000
501	Bjørnøya	1:100 000
533	Storfjorden. Freemansundet – Heleysundet – Sørporten	1:100 000
600	Haakonssvern	1:10 000

Revised Reprints published in 2013:

30 charts were revised and reprinted (out of these 27 were updated through our Digital Production Line based on changes in the Primary Database).

Planned activities in 2014

The chart production for 2014 will be focused on production of 1 Harbour charts (467), 4 main charts (1, 26, 27, 28), two coastal chart (305, 308) and one chart in Antarctica (549 [INT 909]).

We also plan to do reconstructions of 1 Harbour charts (488).

Print On Demand (POD)

At the end of 2013 there was 197 charts offered as POD.

143 charts from the main chart series, 42 Harbour charts and 12 charts from the main chart series of Svalbard.

The number of charts in the POD service is expected to increase with approximately 2 charts in 2014.

NHS has recently decided to phase out the ordinary chart printing no later than 1.1.2016 and only operate a service based on POD.

3.5. Technology

TopoBathy pilot

The NHS is conducting a pilot test in 2014 using latest generation of a Riegl shallow water topo-bathy lidar system. The goal is to verify that a topo bathy lidar system is capable of seamless data acquisition in the depth range from land down to approximately 5 meters.

The PLECO Project

The NHS is running a project to replace the existing multibeam data processing tool. NHS has chosen Caris as the vendor of the system, which will have its final delivery in late 2014. The first part of the delivery, based on existing software, took place in January 2013.

4. Nautical Publications

The Norwegian Ministry of Local Government and Modernisation has passed a motion to make the Norwegian Pilot Guide (sailing directions), «Den norske los», available free of charge. The Norwegian Pilot Guide is to be revised and more customized for the professional users.

Until the revised editions of the sailing directions «Den norske los» are published, the current updated pdf versions of the Norwegian Pilot Guide will be available for download from The Norwegian Hydrographic Service's homepage: www.kartverket.no from 1 of March 2014.

Later corrections will be reported in the Notices to Mariners «Efs».

Notices to Mariners (Etterretninger for sjøfarende)

Totally 24 editions were published in 2013. The publication is available both as printed version and in PDF-format for distribution by e-mail. Notice to Mariners is also published on <http://www.statkart.no/efs/>.

As a supplement to the NtM a tracings service is fully operationally.

A digital NtM service free of charge was launched 12 June 2014. The new NtM service is available at kartverket.no/efs

5. MSI

The Norwegian Maritime Directorate is the responsible body for MSI in Norway.

6. C-55

Update of C-55 was sent to IHB in March 2013.

7. Capacity building

Norway participated in the annual meeting of the IHO Capacity Building Sub-Committee in May 2014. The IRCC and the CBSC encourage Member States from the most developed regions to be involved in capacity building by assisting CBSC activities or by other means.

Norway has in the period December 2013- April 2014 assisted Montenegro in converting paper charts to ENC's.

8. Oceanographic activities

New web-pages with tidal information were launched in 2012, <http://sehavniva.no>, and response from the users are important in improving the pages. Based on 23 permanent tide gauges and discrete tidal zoning the users can search for a location and get tidal predictions and water level from most of the Norwegian coast. A figure with different tidal levels relative to Chart Datum and levels with return periods up to 1000 years are also shown for each location.

In addition to observed water level and predicted tides we present a 5 days water level forecast from models run by the Norwegian Meteorological Institute (NMI). Near real time water level observations are transferred from NHS to NMI and are used to adjust the output from the model.

We have are very active with short term measurements, one month or more, of water level. The pressure gauges are spread around the coast and used for reduction of soundings, improving the tidal zones and transferring land levelling datum to islands. We are working on better methods to control the accuracy.

One big task has been to enhance the accuracy of short term water level observations, measured with pressure sensors. We are working on better procedures for calibration, installation of the equipment and processing of the data. These measurements are used for the reduction of soundings, better tidal-mapping of the coast and transferring land levelling datum to islands.

With our new program for processing, storing and distributing water level measurements we are able to analyse more series than we used to when part of the process was manual.

9. Other activities

9.1. The MAREANO Programme

Background: MAREANO is a multidisciplinary marine mapping and documentation programme aiming at providing the foundation for ecosystem based sustainable management of the Norwegian coastal and sea areas. The primary focus has been The Management plan for the Barents Sea and the management plan for the Norwegian Sea (see figure 8 below). The aim is to bridge the knowledge gap in poorly mapped but very sensitive areas. High quality multibeam bathymetry is regarded as a premise for further geological and biological investigations. The NHS is responsible for bathymetric data acquisition (including backscatter and water column data), and effective data management and distribution of survey data, derived products and services. An important facet of the programme is the web-based geodata distribution, and distributed data management as part of a National Spatial Geodata Infrastructure (NSDI)

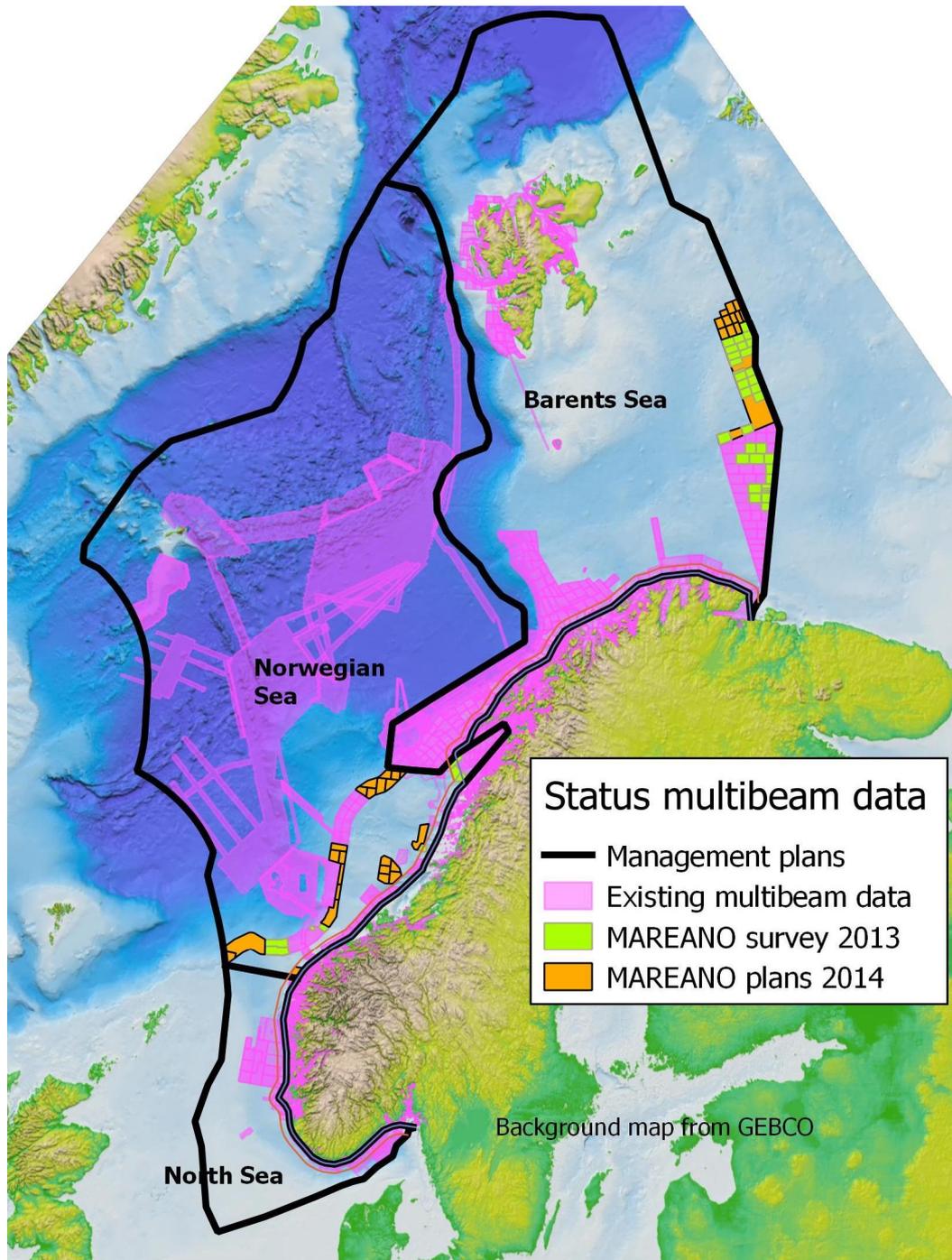


Figure 8. The Management plan areas and coverage of multi beam echo sounder data.

Organization: The NHS is a programme partner with the Institute of Marine Research (IMR, programme management) and the Geological Survey of Norway (NGU).

Results 2013: The MAREANO program received NOK 90.5 mill in total through earmarked funding. NHS received NOK 38.2 mill. 26 800 km² was surveyed in 2013. See overview of surveyed areas in figure 9 below.

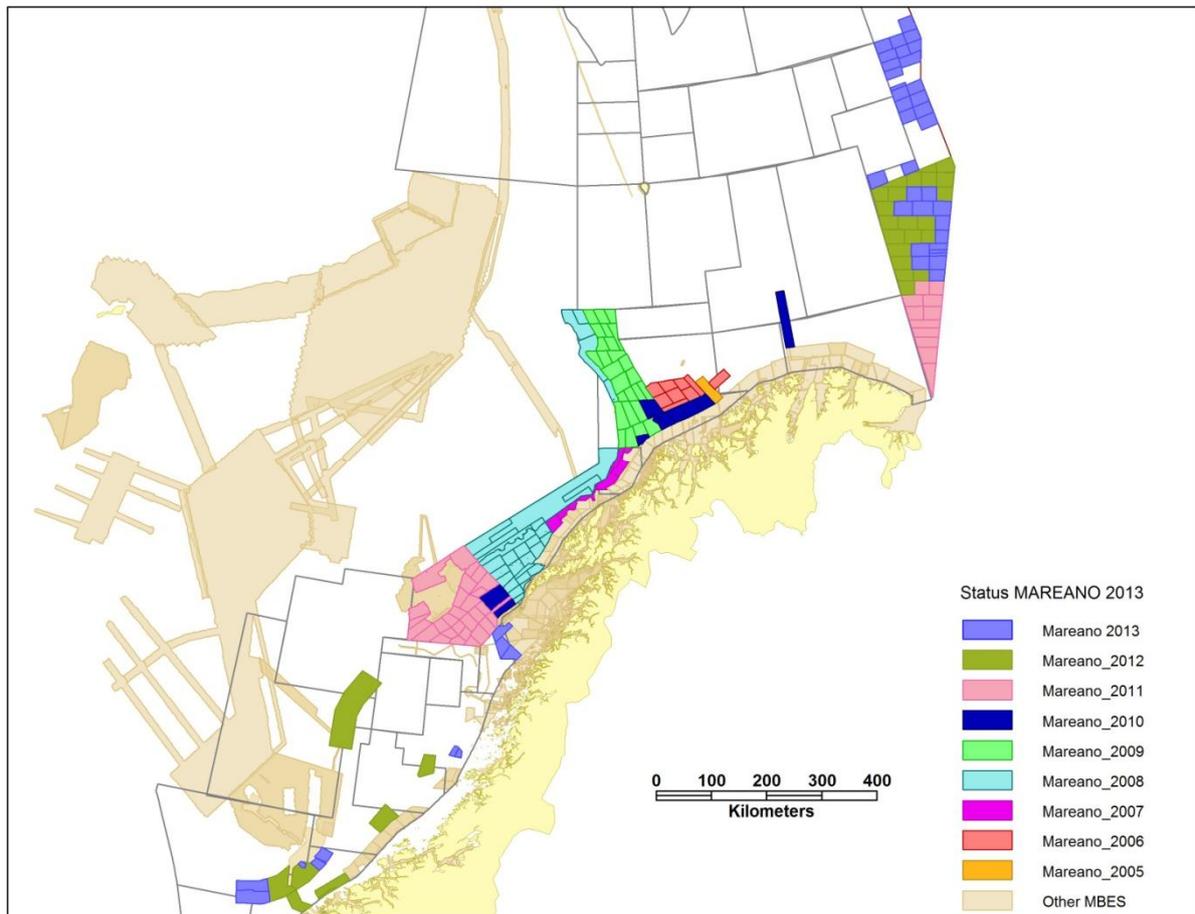


Figure 9. An overview of the surveyed area each year for the period 2005 - 2013

Data distribution: All NHS multibeam data north of Lofoten has been modeled in grids of various resolutions, and visualized through shaded relief maps as a Web Map Service included in the map services on the MAREANO webpage. Further overview bathymetry map services have been produced, also showing the coverage of all surveys in the NHS data management system. Further information and results is available on www.mareno.no. This website is a portal for knowledge dissemination mainly through effective map services and documentation aimed at both government decision-makers and the general public. The web service is a joint effort among the program partners, but the project is managed by the Institute of Marine Research.

NSDI: According to the MAREANO data policy all geodata from the MAREANO programme will be published in the Norwegian spatial data infrastructure; *Norge Digitalt*.

MAREANO will be a major undertaking for the NHS in the years to come, and is mainly aimed at non-navigational purposes.

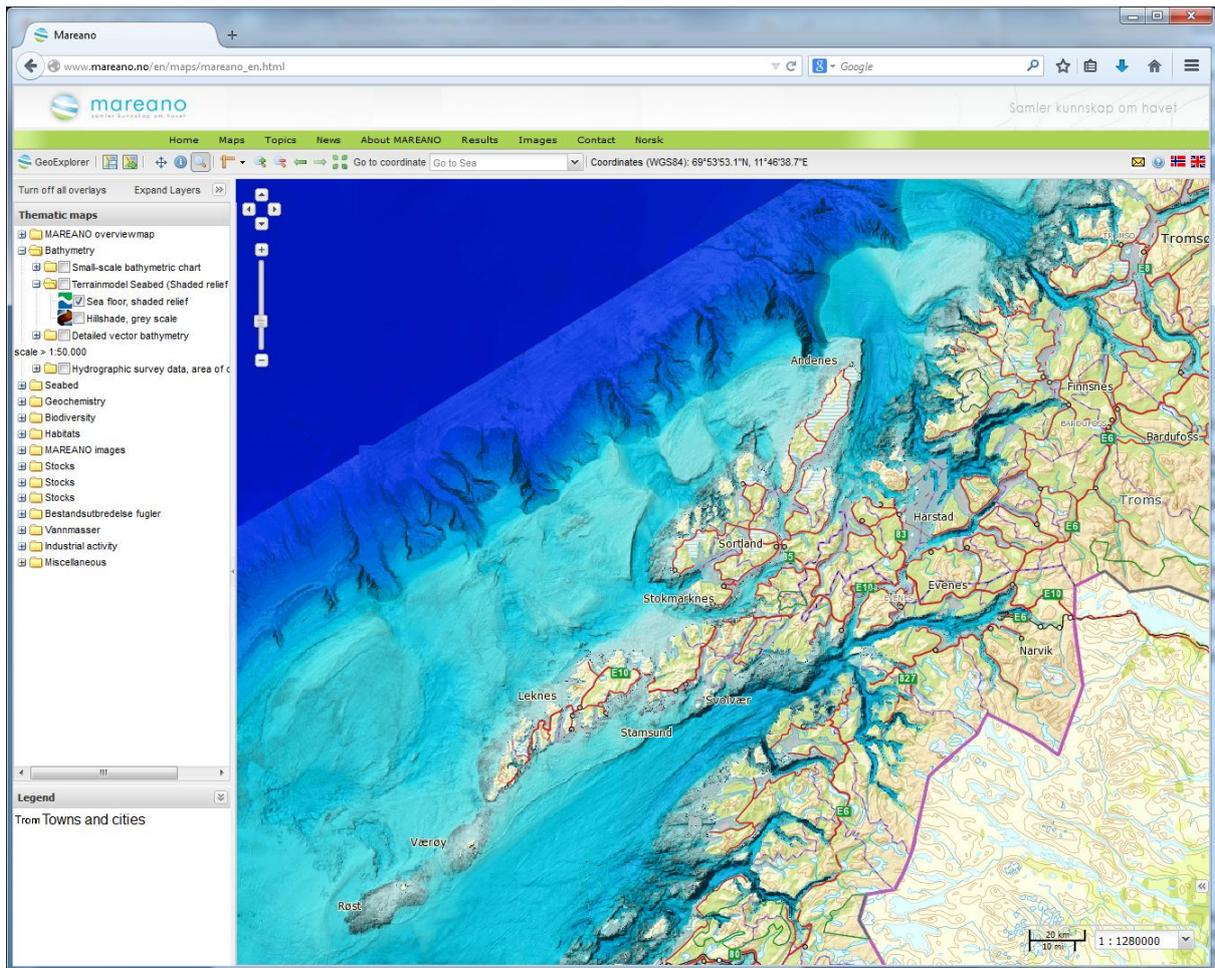


Figure 10. An example from the WMS shadow relief map service showing spectacular submarine canyons and slide scars on the edge of the most narrow part of the Norwegian shelf north of Lofoten and west of Andøya (screendump from map service on www.mareano.no)

9.2 Nordic INSPIRE Network

The Nordic mapping agencies have established a common network, focusing on sharing cross-border data and services, and exchanging knowledge on data harmonization and implementation of the INSPIRE specifications. Access to harmonized cross-border services will be of benefit within e.g. crisis management and emergency. A common project is under establishment, outlining objectives and targeting practical outcomes.

9.3 BarentsWatch

The Norwegian Mapping Authority are participating in an intergovernmental cooperation on developing and establishing a general Information and surveillance system, covering the High North and the Norwegian coastal and sea areas. BarentsWatch aim to offer integrated knowledge and information services to the public, and will also support efficient coordination

between governmental services through a common information picture. A core part of the system consists of map services, based on geographic information services from official sources. So far, the cooperation counts 30 national partners. Ref.:

<http://www.barentswatch.no/en/om/>

9.4 International activities

The NHS is involved in several Working Groups, Committees and Commissions related to IHO. Norway has representatives in the following Working

Groups: TSMAD, CSPC, DIP, SNP, MSDI, DQ, TWL and WEND. We have participated in the HSSC meeting in 2013 and the IRCC meetings 2013 and 2014. Norway is actively participating in 5 Hydrographic Commissions: ARHC, HCA, NHC, NSHC and SAIHC. The NSHC EU2MP Working Group has been quite active last couple of years. Norway has been represented at all meetings.

As operator of Primar we participate in all related meetings.

During the last few years we have contributed with a substantial part of high resolution bathymetric data, obtained through the Mareano project, to the GEBCO database. We have also delivered a substantial amount of data to the EU project EMODnet.