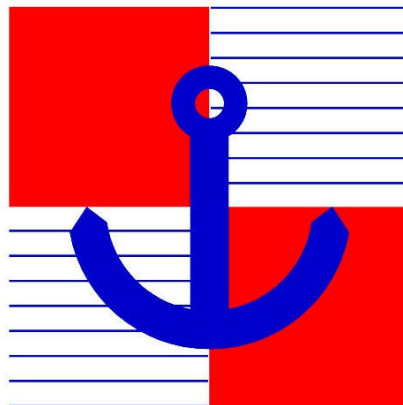


**MEDITERRANEAN AND BLACK SEAS
HYDROGRAPHIC COMMISSION**

XXII CONFERENCE

REPORT BY CROATIA

HRVATSKI HIDROGRAFSKI



INSTITUT

**27 - 28 May 2021
VTC Event**



**HYDROGRAPHIC INSTITUTE
OF THE REPUBLIC OF CROATIA**

**MEDITERRANEAN AND BLACK SEAS
HYDROGRAPHIC COMMISSION**

XXII CONFERENCE

REPORT BY CROATIA

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1. CROATIAN HYDROGRAPHIC SERVICE

Legal framework

In accordance with the provisions of SOLAS Chapter V (Hydrographic Service), that are implemented in the Croatian national legislation (Hydrographic Activity Act, 1998, 2003, 2014), Hydrographic Institute of the Republic of Croatia (CHI) carries out scientific and research work, as well as development and professional tasks relating to the safety of navigation, hydrographic-geodetic survey in the area of the national responsibility, marine geodesy, construction and production of charts and nautical publications, oceanographic research, submarine geology research, and finally publishing and printing activities. CHI is appointed National Coordinator for navigational warnings. Position of the CHI in the structure of Croatian (maritime) administration is shown in Annex 1. CHI is registered as a public institution of the Republic of Croatia in accordance with the Law on Public Institutions. For details see www.hhi.hr.

CHI structure and main tasks of departments

Organisational structure of the CHI is arranged into several departments. Hydrographic activities and data flow starts with the survey of the sea, in the internal sea waters, territorial sea and the Ecological and Fisheries Protection Zone (ZERP) of the Republic of Croatia, covering a total surface area of about 55,349 km² or 97.9 % of the Croatian land area (Fig. 1).

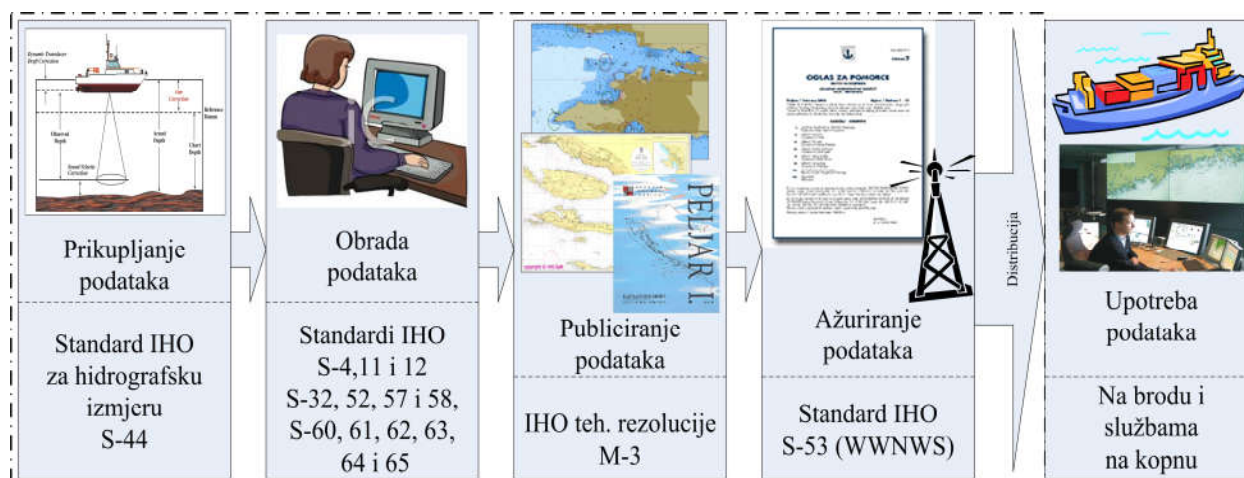


Figure 1. Data flow and working processes

Survey operations are carried out mostly by Hydrographic Department and Oceanographic Department, with the support of s/v Hidra and s/v Palagruža. All measured data are stored into databases with the support of Information System Department. Cartographic Department (Fig. 2) and Nautical Department are responsible for the production and maintenance of official nautical charts (paper and electronic ones), and other publications. The Notice to Mariners is issued on monthly basis for the paper edition and weekly for the ENC. Nautical Department as National Coordinator for Navigational Warnings monitors and complies daily all the navigational warnings important for the safety at sea. Reproduction Department is responsible for publishing and printing of paper charts and publications.



Figure 2. Structure in Cartographic department through various work process

2. HYDROGRAPHIC SURVEY

Hydrographic Survey Vessels

CHI has two survey vessels designed for the conduct of hydrographic survey, oceanographic measurements, marine geology research, magnetometric detection, and cartographic revision of the coastal and insular sea areas in the Adriatic Sea.

Smaller survey vessel HIDRA (Fig. 3) is used for survey operations in the coastal and inshore areas of the Croatian part of the Adriatic. Survey vessel PALAGRUŽA (Fig. 4), due to its size and equipment capable of operation in severe weather conditions, is used for the survey in the open sea. With an endurance of 25 days at sea, it is also capable of operating in the Mediterranean Sea.



Figure 3. s/v Hidra



Figure 4. s/v Palagruža

Status of hydrographic survey

Hydrographic surveys conducted along the Croatian coast since the XXI MBSHC Conference were focused to selective parts of the coastal areas and to principal ports and passages in accordance with defined priorities. Total surveyed area is 569 km². A considerable contribution to the increase in the number of bathymetric surveys and surveyed areas, especially smaller ports and newly constructed facilities and underwater installations, was achieved by introducing authorized bathymetric surveying legal entities into the official surveying system. By the end of 2020, six legal entities with authorizations to perform hydrographic surveying activities were registered in Croatia according to the new Ordinance (January 2019).

Annex 2 summarizes the status of hydrographic surveys in accordance with the criteria in the IHO C-55 publication. Annex 3 shows new hydrographic survey of marinas, small ports, shoals, and underwater rocks.

3. CHARTS

CHI produces official paper and electronic navigational charts (ENCs) covering the waters within the national responsibility (<https://www.hhi.hr/en/products-and-services/hhi-service-catalog>).

ENCs

In the period between two conferences the CHI produced 64 ENC cells based on the existing paper charts and new hydrographic survey.

As it was planned, the CHI achieved adequate coverage, availability, consistency, and quality of ENCs by 1 July 2012. An ongoing project was launched in 2014 to resolve observed cross-border inconsistencies between the ENCs of different usage bands and improve the existing ENCs. Status of the CHI ENC production is shown in the following table:

User band	Navigation al purpose	1 July 2008		1 July 2013		1 May 2017		1 May 2019		01 May 2021	
		No of Cell	Area coverage (%)	No of Cell	Area coverage (%)	No of Cell	Area coverage (%)	No of Cell	Area coverage (%)	No of Cell	Area coverage (%)
1	Overview	1	100%	1	100%	1	100%	1	100%	1	100%
2	General	4	100%	4	100%	4	100%	4	100%	4	100%
3	Coastal	15	100%	15	100%	15	100%	18	100%	18	100%
4	Approach	9	72%	13	85%	14	88%	19	91%	21	91%
5	Harbour	31	77%	37	84%	40	88%	44	91%	44	91%
6	Berthing	20	74%	24	85%	50	95%	121	98%	183	99%
TOTAL		80	87%	94	92%	124	96%	207	97%	271	99%

Annex 4 shows Croatian ENC 5-year ENC production priority plan based on new hydrographic survey - Overall. Annex 5 shows ENC 5-year ENC production priority plan based on new hydrographic survey – Regional. Annex 6 shows current ENC release status.

ENC distribution method

CHI distributes its ENCs through the PRIMAR RENC. The first Croatian ENCs were released in February 2007.

By the Navy Agreement, since the end of 2016 Croatian ENCs have also been available on Croatian Navy ships.

By the GMO Agreement through PRIMAR, since the March of 2021 Croatian ENC's have also been available on CHI ship and for office ECDIS use.

In the period between the two MBSHC conferences, the CHI produced 64 new ENC's, 25 ENC new editions, and 450 updates (ERs).

WMS for ENC's

CHI as a member of PRIMAR RENC actively participates in the project WMS for ENC's together with other PRIMAR member states. At the moment, CHI and a few Croatian maritime governmental organizations (MRCC, Maritime Directorate, HM Offices) and the Croatian Navy use WMS for ENC's for administrative purposes (Fig. 5).

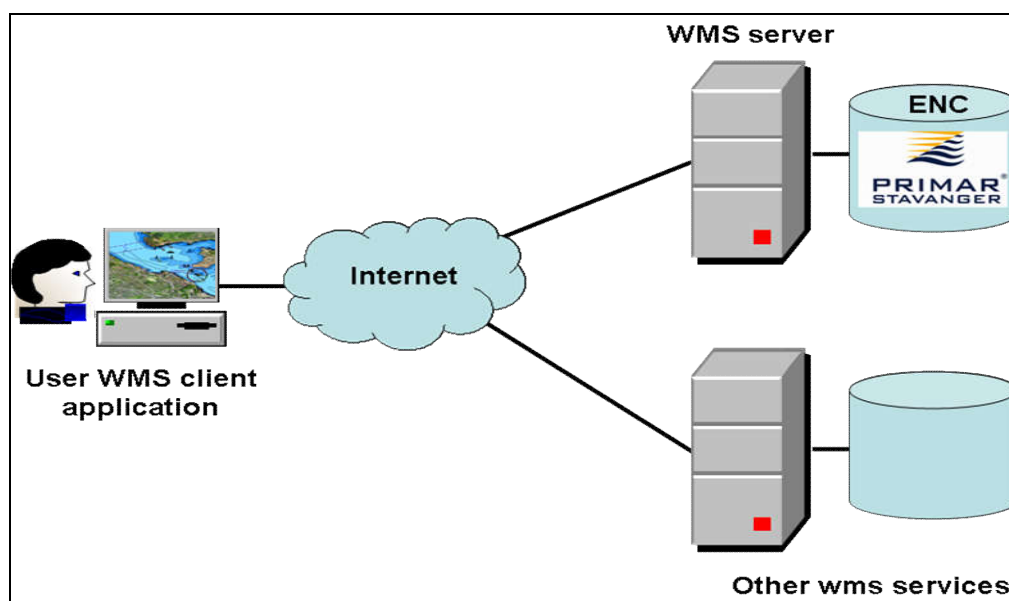


Figure 5. PRIMAR WMS for ENC's

INT ENC scheme

The current third draft proposal solution (ENC scheme for UB 1 and UB 2) for the Adriatic Sea area, which is based on HR first proposal presented during the XVII MBSHC Conference, is still under the process of harmonization between IT and HR, approaching the final solutions.

Some long-standing overlaps issue in UB3 between HR and IT is successfully solved through a perfect coordination and cooperation between two hydrographic offices.

An intensive communication is underway between CHI and Montenegro HO to resolve an overlap case in usage band 3.

RNCs

RNCs covering the Croatian area of responsibility are available from UK HO ARCS according to a bilateral agreement.

INT paper charts

HR status of INT paper charts is shown in the table in Annex 7 and in the figure in Annex 8. CHI made input of current INT Charts status (May 2021) using the IHO INTogIS manager (figure in Annex 9).

National paper charts

In the period between the two MBSHC Conferences the CHI published the following charts:

New charts Fig. 6, 7, 8, 9, 10:

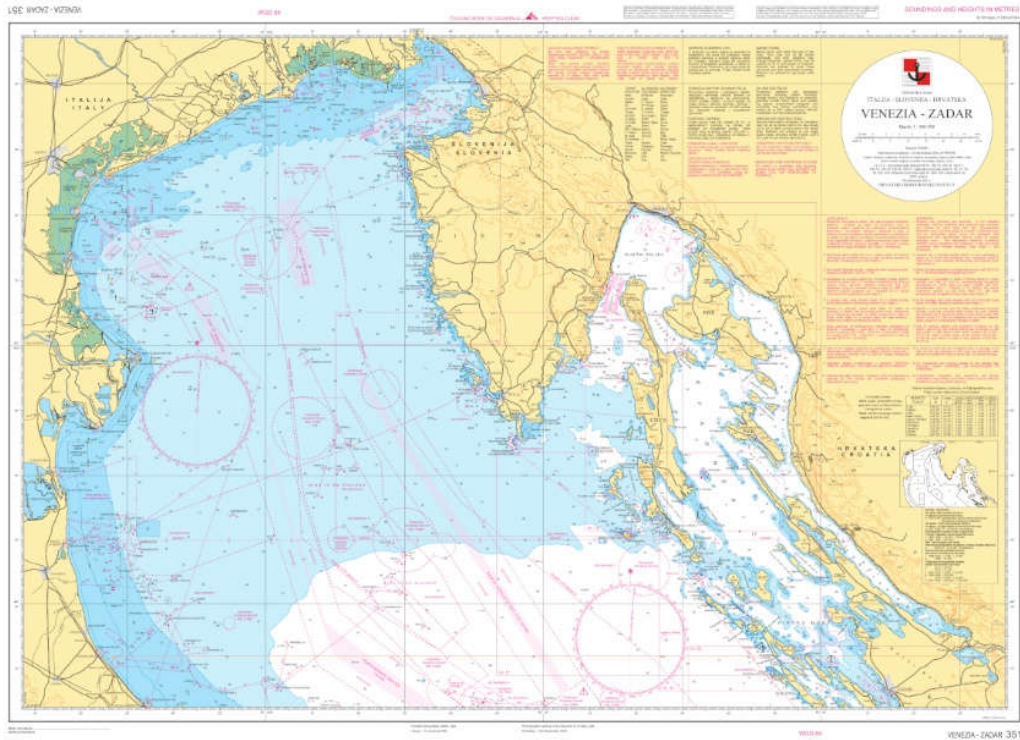


Figure 6. 351 VENEZIA - ZADAR, 1:350 000

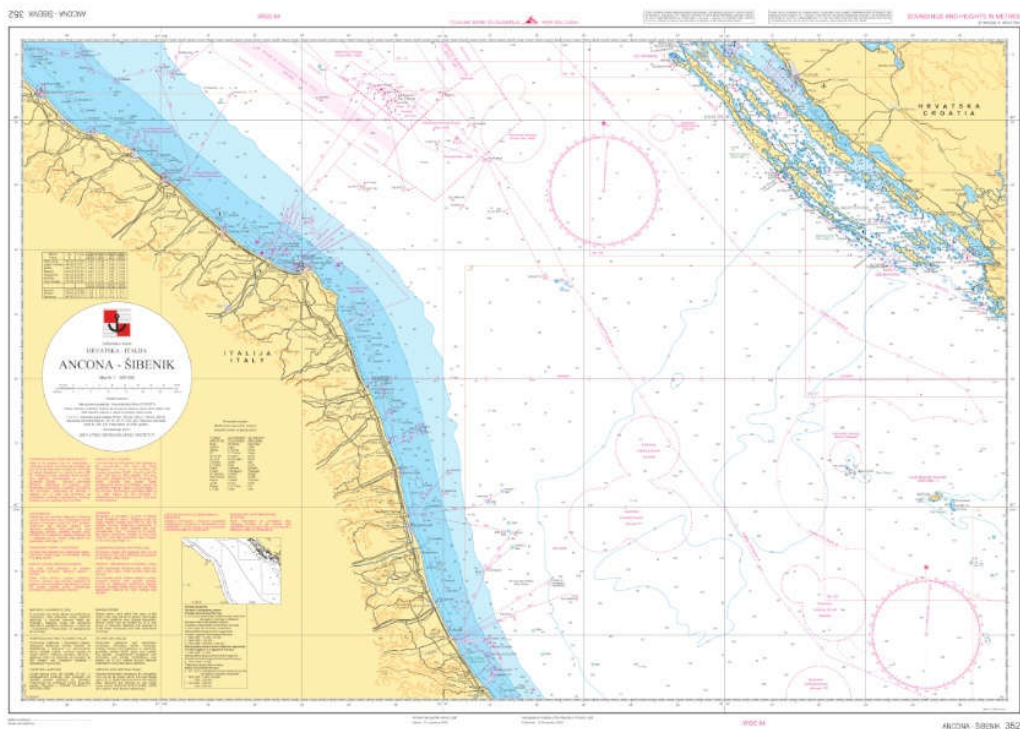


Figure 7. 352 ANCONA - ŠIBENIK, 1:350 000

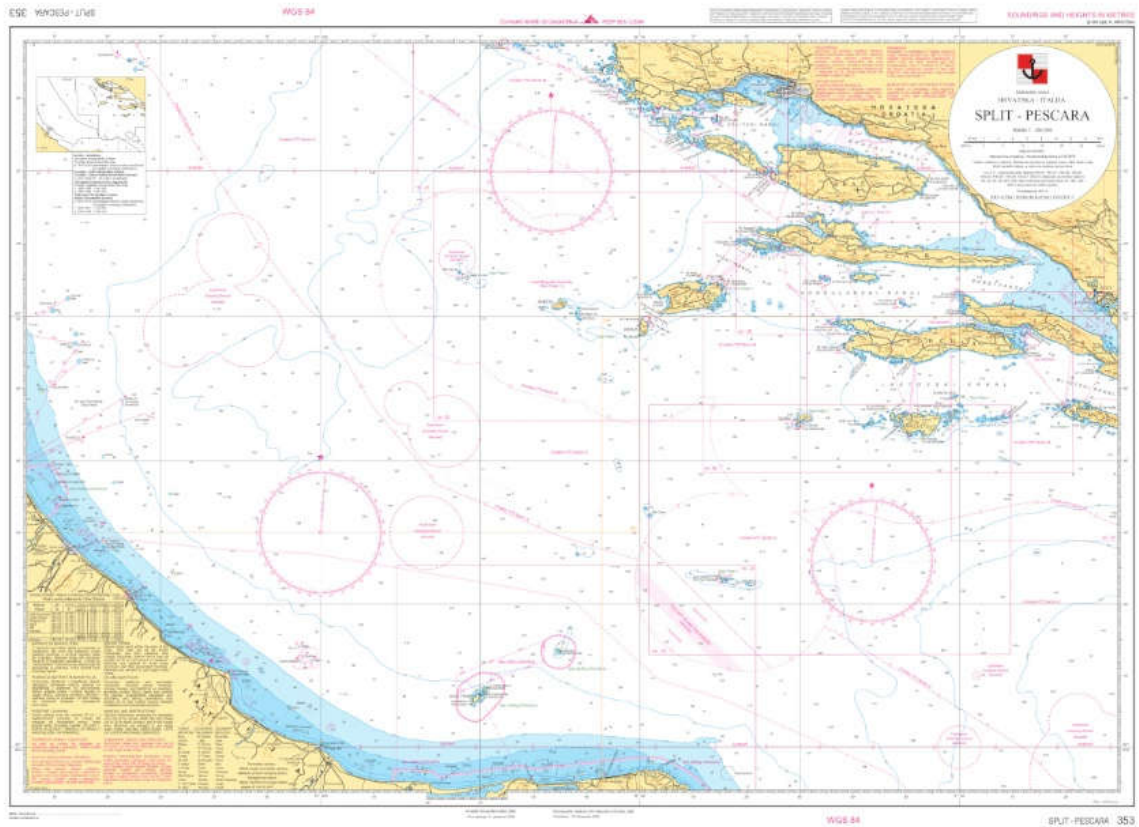


Figure 8. 353 SPLIT - PESCARA, 1:350 000

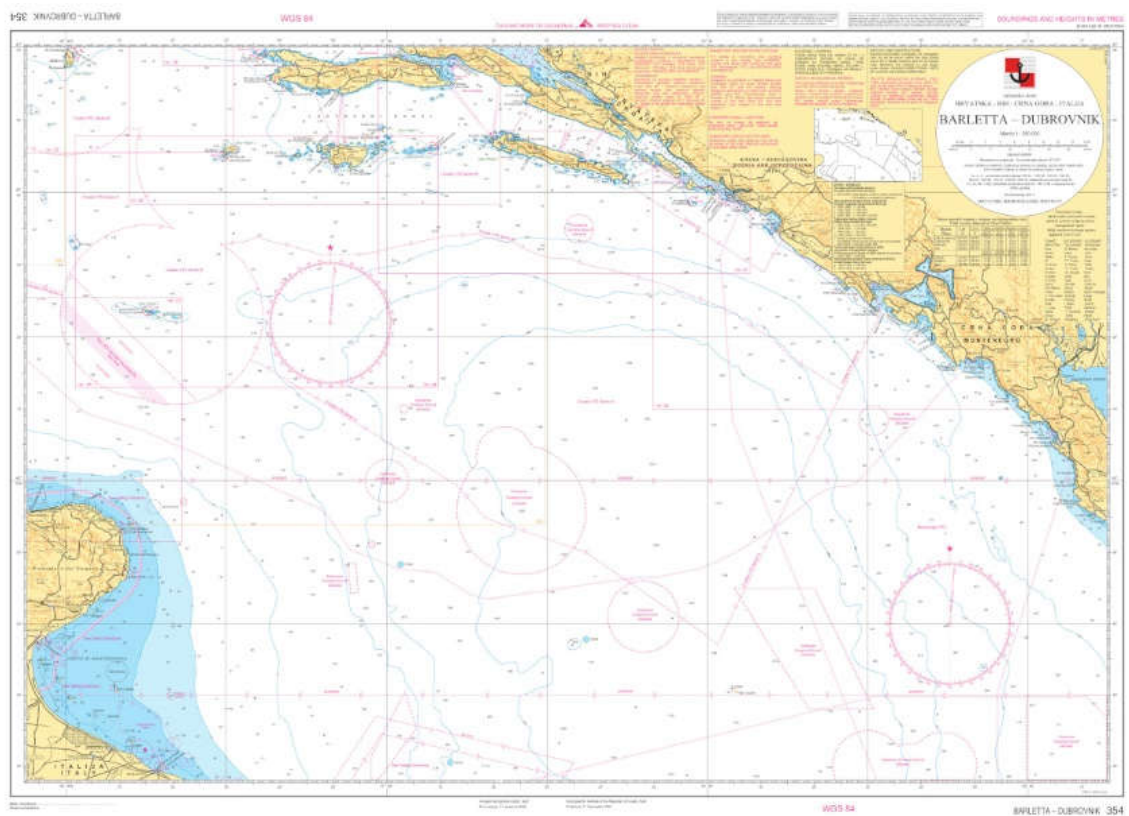


Figure 9. 354 BARLETTA - DUBROVNIK, 1:350 000

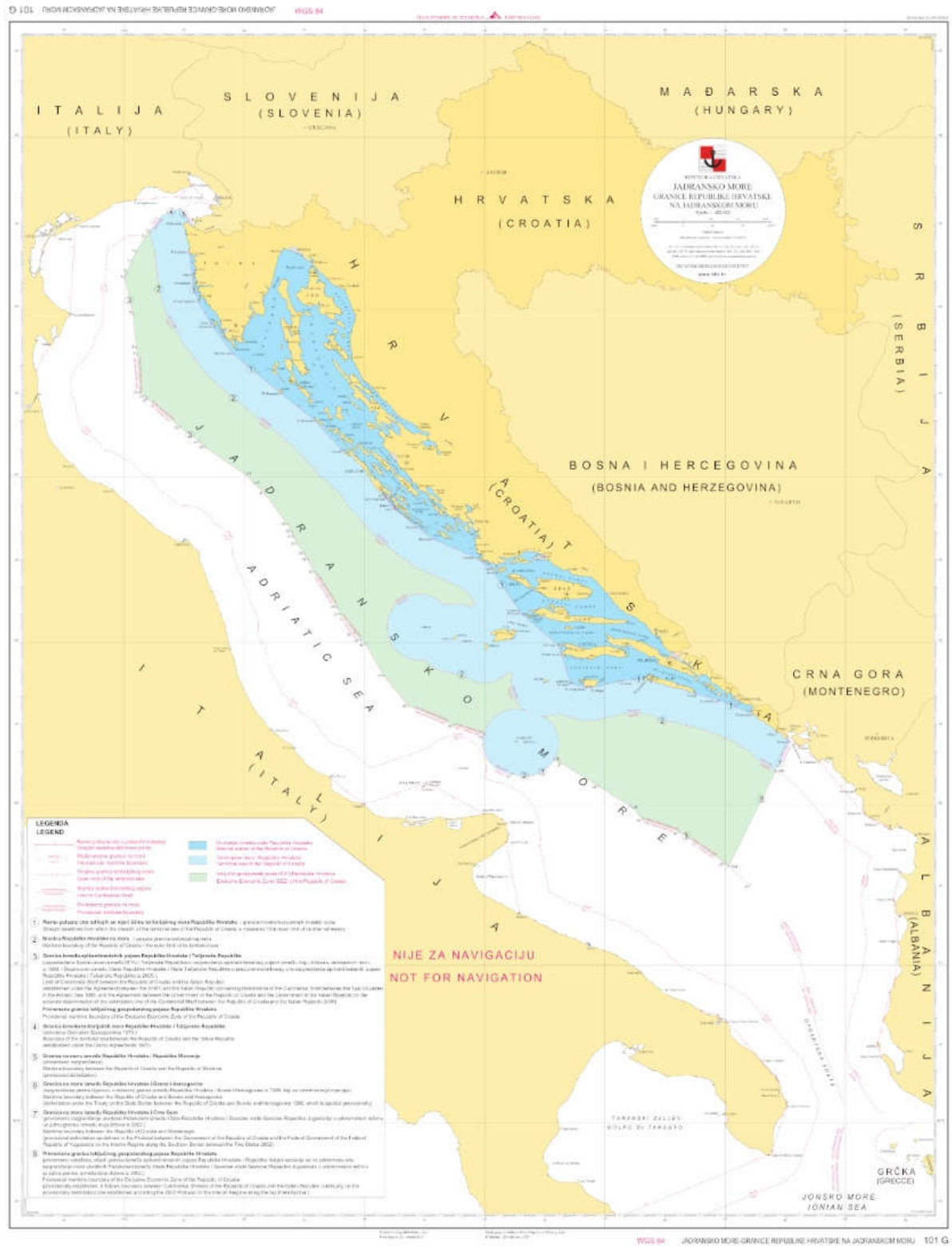


Figure 10. 101G Granice RH na Jadranskom moru - Maritime boundaries of the Republic of Croatia on the Adriatic Sea – in the final stage of preparation

New edition (Fig. 11.):

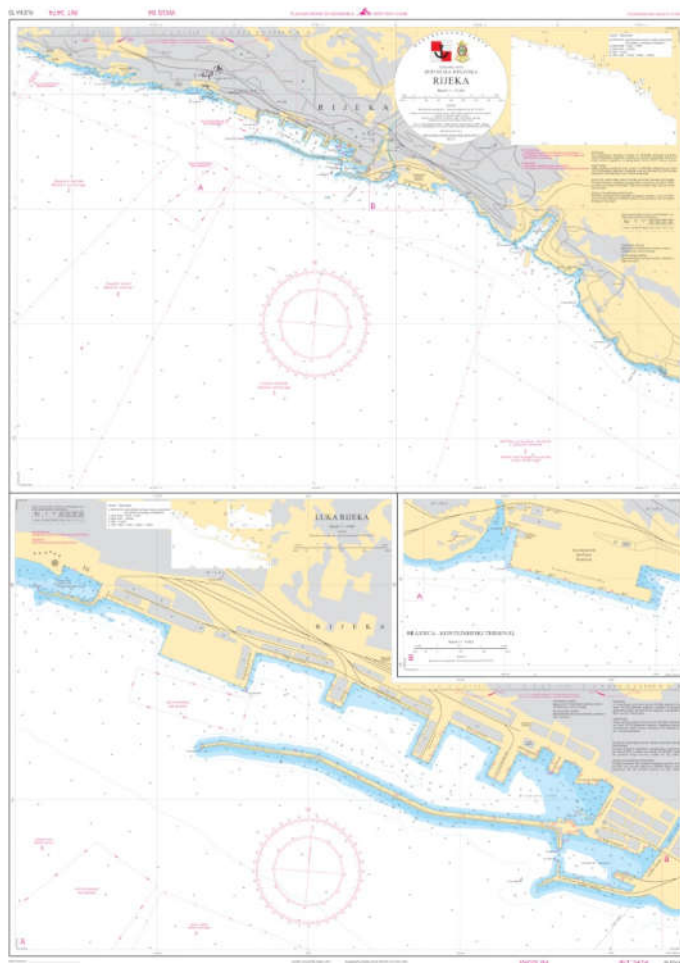


Figure 11. 15 (INT3474) Rijeka, 1:15 000,
Luka Rijeka, 1:4 000, Brajdica-kontejnerski terminal, 1:4 000

New printing

100-15 Grado – Rovinj	1:100 000
100-16 Pula – Kvarner	1:100 000
100-17 Lošinj – Molat	1:100 000
100-18 Rijeka – Kvarnerić	1:100 000
100-19 Silba - Pag	1:100 000
100-20 Dugi otok – Zadar	1:100 000
100-21 Šibenik – Split	1:100 000
63 Ploče	1:8 000
83 Dubrovnik	1:15 000

In addition to official nautical charts, 6 plans (harbour and port usage band) and 6 cells of the ENC of some military ports. All these plans are plotted on the one paper chart (as confidential nautical/naval chart).

New technologies

The process of creating paper charts and ENC's using the dKart cartographic software from the Cartographic Database has been fully introduced.

Problems encountered

1. Some overlaps still exist between HR, IT and GR Overview and General ENCs. The process of consideration of the final proposal is still underway between IT and HR.
2. A several small thin overlaps on IT/HR border in UB 3 are successfully solved through a perfect coordination and cooperation between two hydrographic offices.
3. An overlap between HR and MNE ENC in UB 3 is under consideration according to the preliminary technical arrangement.
4. Some inconsistencies observed between national (HR) paper charts and ENCs are under constant consideration and deliberation. Furthermore, any feedback received from users, the IHO or other hydrographic office is a matter of urgent examination and solving.
5. Problems of implementation of attributes SCAMIN has been recognized as a key task to be realized in the ongoing period. Therefore, all information about the methodological approach to the problem, organizational model and estimated time needed for implementation of attribute SCAMIN on HR ENC are of particular importance and one of the objectives of the course. Regarding the current paper chart-based scheming of the cells in UB3, CHI is planning for re-scheming the cells in a square grid.
6. One of the challenges for the CHI will be transition to the new generation of ENC produced according to S-101 standard. The issue is almost equally demanding in organisational, technical-technological, and financial terms as the issue of transition from paper versions of navigational charts to digital ones (ENC). The transition issue is additionally complicated by the fact that it will be necessary to ensure maintenance and availability of both ENC generations (Dual Fuel) for several years. Some initial tasks are dedicated to responsible staff which close cooperates with PRIMAR and ECC staff through the several initiated and approved S-100 projects. Training is recognized as a key element for realization transition from S-57 to S-100 series product and services.
7. As regards navigation areas of non-SOLAS ships, particularly the areas of navigation and stay of leisure boats and yachts a significant contribution towards improving the hydrographic-navigational element of navigational safety was made through publishing of a considerable number of new Croatian ENCs based on the data obtained from the new hydrographic survey. Entire ENC folio has been made available to end users on ships and to maritime administration worldwide through a network of authorised distributors by PRIMAR.
8. Most critical are those areas that have not been surveyed after interventions in the maritime domain, and the relevant data has not been published in the CHI official editions. However, according to the IHO specifications, even in these situations the relevant information ensuring minimum requirements for safe navigation is available to users of CHI editions (descriptive warnings of interventions in non-surveyed areas that have not been displayed on charts). In the past two-year period, an improvement has been achieved even in these areas, because the systematic hydrographic survey included a considerable number of marinas and small harbours for which corresponding charts and ENCs were produced.

4. NAUTICAL PUBLICATIONS

National official nautical publications series



Figure 12. CHI official nautical publications

Nautical publications issue

Since the XXI MBSHC Conference the following publications have been issued:
Adriatic Sea Pilot volume I and II 2020 (HR edition), 2021 (ENG edition)

Tide Tables:

- Tide Tables 2020
- Tide Tables 2021

Nautical Almanac:

- Nautical Almanac 2020
- Nautical Almanac 2021
- Nautical Almanac 2022 (in preparation)

List of Lights and Fog Signals 2020

Catalogue of Nautical Charts and Publications 2020/2021 (paper and digital editions)

Notices to Mariners (paper and digital monthly edition)

5. MARITIME SAFETY INFORMATION (MSI)

In the Republic of Croatia MSI service (Navigational Warnings) is available 7/24/365. NAVTEX broadcasts are transmitted in English and Croatian. MSI are transmitted regularly on VHF channels of coastal radio stations.

Correctness of the promulgation of information is controlled on the NAVTEX receiver and VHF station installed in the CHI Nautical Department (Fig. 13). There is no failure occurring during ordinary operation.



Figure 13. Equipment for monitoring the correctness of the promulgation of navigation warnings

Schedule of navigational warnings is shown in the following table:

NAV. WARNINGS	2019	2020	2021 (Until 15.4.2021)
NAVAREA	1	10	1
COASTAL	91	106	61
TOTAL	519	417	142

Navigational warnings are drafted according to IHO publication S-53 and there has been a high degree of unification and standardization achieved when it comes to general principles applied to message drafting. Hence, the CHI Nautical department continuously contributes to overall quality and consistency of MSI messages.

Besides, the CHI Nautical department intensively cooperates with relevant factors in the maritime domain such as: Harbour master offices, Coastal radio stations, Croatian VTS and MRCC, Croatian Navy, ship-owners, private boaters, etc. The main goal is to ensure safety of navigation by gathering the urgent safety information and issuing navigational warnings. Nevertheless, the CHI Nautical department cooperates with NAVAREA III coordinator Cadiz through Coast radio station Split, and there were no difficulties identified in overall communication.

In the past period, since the last MBSHC Conference, in addition to Croatian NAVTEX system [Q] located on the island of Hvar to cover the area of the Croatian part of the Adriatic Sea, NATIONAL NAVTEX 490 kHz SERVICE [F], fully operational since 24 April 2019 at 1250 UTC, when the first broadcast on 490 kHz was transmitted has become fully adopted keeping the overall safety of navigation in the Adriatic Sea within the high standards.

6. C-55 IHO PUBLICATION

Updating information was provided on 30 May 2019. using a new IHO online submission functionality (Fig.14).



Submission Time: April 30, 2021 9:29 am
Unique ID: 801875414

Your submission for IHO C-55 updating:

The IHO Secretariat will collect and use submitted information only for the original purpose to update the IHO publication C55. Do you agree with it? Yes, I agree.

Area name for C55 HR | Croatia

Data provider's Country, Area HR | Croatia

Figure 14. IHO C-55 online submission updates

7. CAPACITY BUILDING

New technologies

Computer and communication infrastructure

The implementation of a new server communication infrastructure is underway with the aim of increasing availability and security. Client computers are migrating to the new infrastructure. The energy infrastructure has been upgraded in the server room (Fig. 15).



Figure 15. New server communication infrastructure

Print on Demand printing technology has been introduced, using a large format plotter capable of producing high-quality paper charts printed to order (Fig. 16). The introduction of the Print on Demand process significantly reduces the quantity of nautical paper charts in the HHI warehouse. This is an important shift, since all the printed charts are stored at the HHI warehouse, and over time, after corrections made by NTM's, it is necessary to update them before delivery by any of these methods (machine automated correction, manual correction) for the customer to receive an up-to-date nautical chart. After printing, the nautical paper chart shall be up to date with the last NTM (Notice to Mariner).



Figure 16. Print on Demand

WEB Services

The new CHI web pages were created (www.hhi.hr), providing a variety of new information and services, with modern design and functionality (Fig. 17).

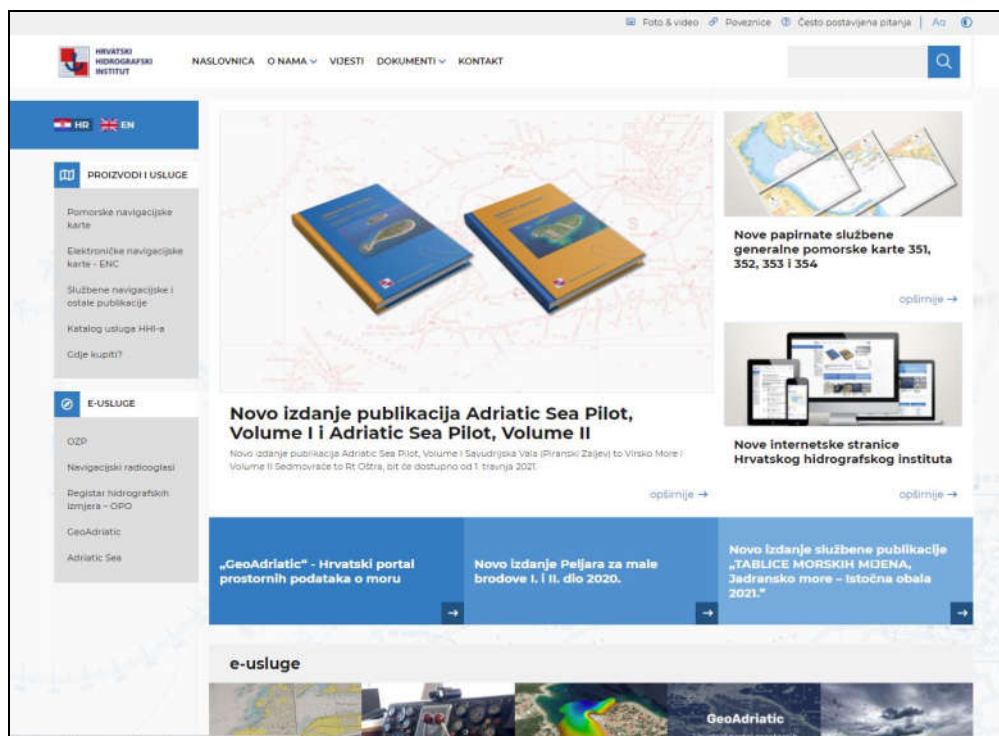


Figure 17. New CHI web pages

Online publication Catalogue of Nautical Charts and Publications is updated on a regular basis (Fig. 18).

Products and services > Nautical charts

Nautical Charts

One of the basic activities of HHI is construction, production, publishing and maintenance of charts in analogue format (paper charts) and digital format (ENC). Nautical chart is a representation of a particular navigation area with the main purpose to ensure safe navigation of ships. They are constructed in Mercator projection at different scales depending on navigational purposes. HHI chart production includes:

- **Overview charts** – Adriatic Sea, Ionian Sea, and other parts of the Mediterranean Sea
- **General charts** – Adriatic Sea and a part of the Ionian Sea
- **Coastal charts** – Eastern Adriatic Sea
- **Approach charts** – parts of Eastern Adriatic Sea
- **Harbour charts** – major Eastern Adriatic ports, harbours, anchorages, and channels
- **Berthing charts** – major ports and harbours in the Croatian part of Eastern Adriatic
- **Thematic charts** – special charts to be used with Nautical charts
- **Other nautical charts**

Categories: Show all

Chart	Label	Title	Category	Scale	Format	ISBN
	354	Barletta - Dubrovnik	General	1:350000	B1	
	353	Pescara - Split	General	1:350000	B1	
	352	Ancona - Šibenik	General	1:350000	B1	
	351	Venezia - Zadar	General	1:350000	B1	

Figure 18. Online Catalogue of Nautical Charts and Publications

E-Services of Notices to Mariners and Navigational Warnings are available on the CHI website. Digital “Notices to Mariners” provide monthly updates for official editions, as well as archives of previously published digital notices (Fig. 19).

The screenshot displays the 'e-Services - Notice to Mariners - detail' page. At the top, it shows the month 'October 2020' and the year '2020/10'. Below this, a summary box contains the following information:

- Date: 04. 11. 2020.
- Number of Notices: 49
- PDF: ozp202010.pdf
- Number of Block Corrections: 2
- Block Corrections: ozp2020klk2.pdf

Below the summary, there are two main sections:

- Correcting Charts:** This section lists five chart updates:
 - 100-15: Grado - Rovinj, 1:100000, 0
 - 100-16: Pula - Kvarner, 1:100000, 1
 - 100-19: Silba - Pag, 1:100000, 3
 - 100-20: Dugi otok - Zadar, 1:100000, 2
 - 100-21: Sibenik - Split
- Correcting Publications:** This section lists three publications:
 - Katalog pomorskih karata i publikacija 2020
 - HI-N-20: PELJAR I. JADRANSKO MORE - ISTOČNA OBALA (2012) 2012.
 - Pejar za male brodove - drugi dio: Sedmovrače - Rt. Oštra 2020
 - Pejar za male brodove - prvi dio: Savudrijska vata (Piranski zaljev) - Virsko more 2020
 - HI-N-10: Popis svjetala i signala za maglu, Jadransko more - istočna obala, 2020. 2020

Figure 19. Notices to Mariners e-Service

Radio Navigational Warnings Service was rose to a higher level. Navigational warnings are updated promptly on the CHI web, as soon as new information is reported and promulgated to mariners by ordinary means (NAVAREA, NAVTEX or VHF) (Fig. 20).

The screenshot displays the 'e-Services - Radio Navigational Warnings' page. It features a title 'Radio Navigational Warnings' and a disclaimer: 'The Service of Radio Navigational Warnings on this web site may not be a substitute for the monitoring Radio Navigational Warnings through coastal radio stations, of their responsibility to monitor them masters and/or members of the crew.' Below this, it states: 'Information published on the web pages of Radio Navigational Warnings e-Service shall not be considered as official information for the safety of navigation!'

The main heading is 'Radio Navigational Warnings in force 29. 04. 2021. 08:19 LT'. Below this, there is a table with the following structure:

ISSUE	RNW
137 2021.	<p>Category: COASTAL - NAVTEX Region: ADRIATIC SEA Charts: 101; Date: 29. 04. 2021.</p> <p>1. RADIONAVIGATIONAL WARNINGS IN FORCE 290700 UTC APR 21: 2021 SERIES: 85/21, 92/21, 97/21, 101/21, 105/21, 109/21, 112/21, 113/21, 122/21, 123/21, 128/21, 132/21, 134/21, 136/21. 2. CANCEL RADIONAVIGATIONAL WARNING: 123/21.</p>
136 2021.	<p>Category: LOCAL Region: NORTH ADRIATIC - OTOK KRK Charts: 100-18; Date: 26. 04. 2021.</p> <p>BASKA PORT ENTRANCE, PRIMARY BREAKWATER UPGRADE WORKS. WIDE BERTH AND 100 METERS DISTANCE FROM BREAKWATER HEAD REQUESTED.</p>
134 2021.	<p>Category: LOCAL Region: MIDDLE ADRIATIC - BASKA VODA Charts: 100-26; Date: 26. 04. 2021.</p> <p>BASKA VODA, BREAKWATER HEAD, PORT LIGHT LL 586 / E3387, IN 43-21,4' N 016-57,1' E, RE-ESTABLISHED. CHARACTERISTIC: FL R 5 SECONDS 7 METERS 4 MILES</p>

Figure 20. Navigational Warnings e-Service

Oceanographic data acquisition system

Portal Operational Oceanography - Adriatic Sea online is available on the new Institute website (<http://adriaticsea.hhi.hr>)

The traditional approach to oceanography is based on field research, and data collection from remote coastal stations or during research cruises and then their post processing and comparison with modelling results.

The importance of operational oceanography can be seen when studying climate change, disturbances in the marine food chain, safety of navigation, protection against flooding or protection against pollution. These are all problems that can occur in the Adriatic.

Having in mind all the above, HHI has developed its own specialized web application called Portal Operational Oceanography - Adriatic Sea online. On this web page near real time measurement from tide gauge stations in Rovinj, Zadar, Split, Ploče and Dubrovnik and waverider stations in the Adriatic (Dubrovnik, Split and Rijeka) can be found. The application provides the ability to download measured data from web page directly. Also, HHI intention is to establish new measuring stations and further develop the application with new modules. This application also shows the actual measurements of wind in Split and Ploče and air pressure in Split. The mentioned portal (Fig. 21, 22, 23) is the first step towards operational oceanography.

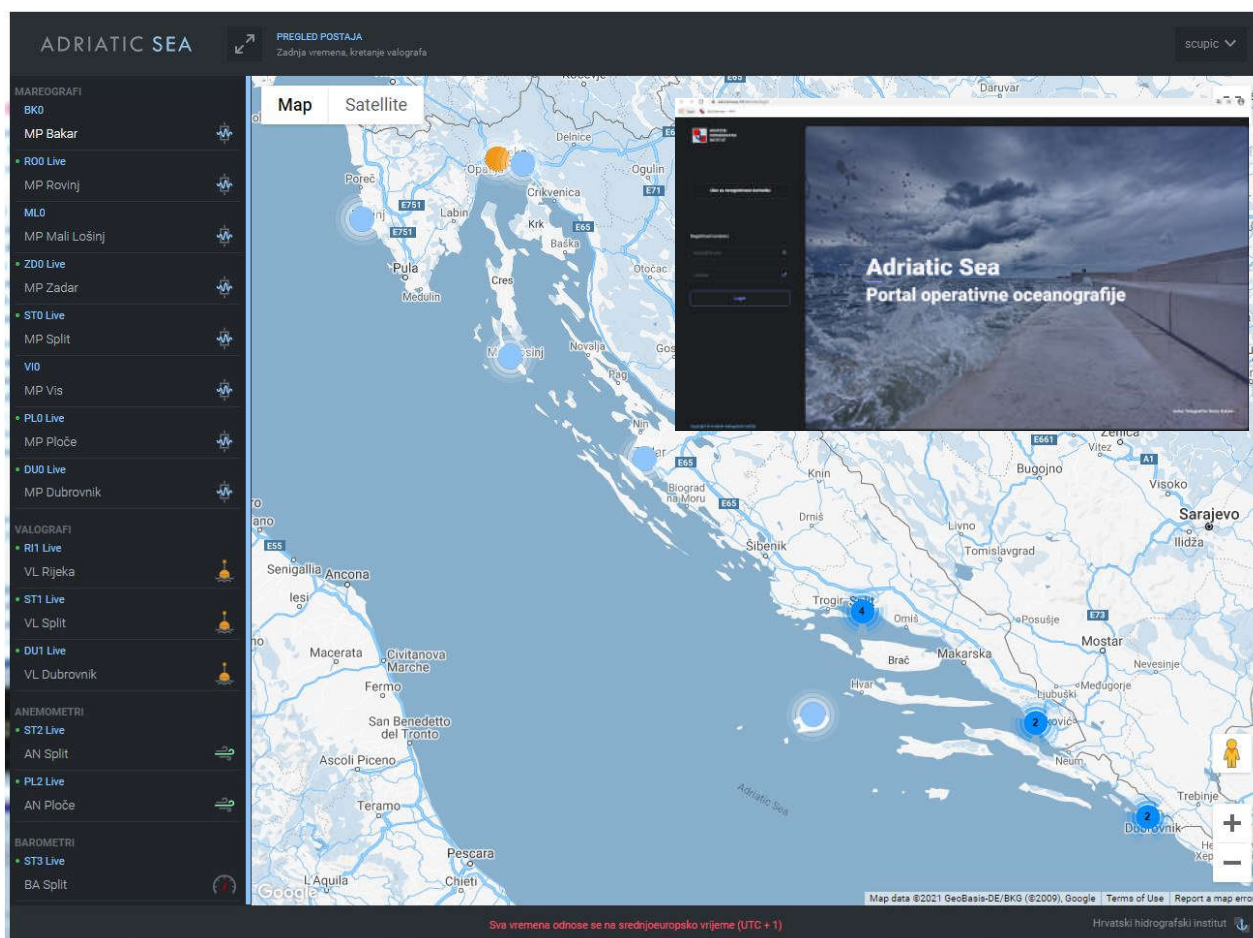


Figure 21. Operational Oceanography Portal - Adriatic Sea online

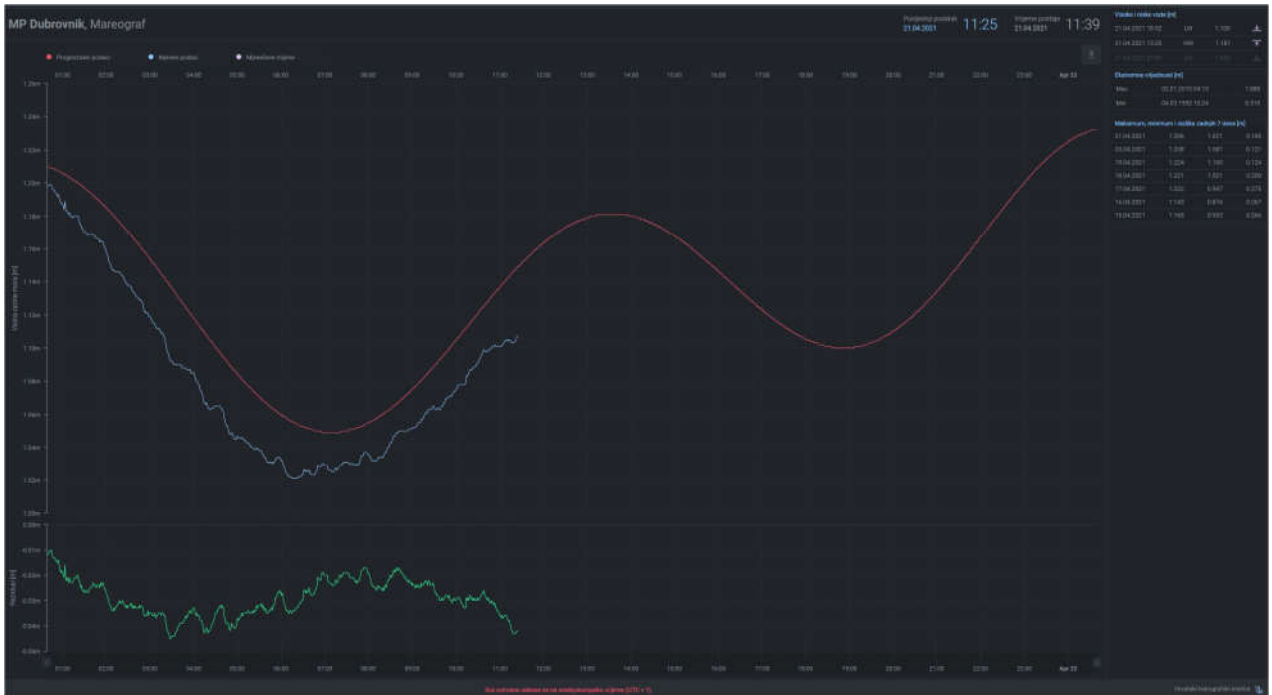


Figure 22. Tidal measurements and tide-gauge data e-Service



Figure 23. Wave measurements and tide-gauge data e-Service

GIS

A GIS component of a functional prototype of the Hydrographic Information System is under development. The determination and organization of spatial data from the area of competence of the HHI is in progress (Fig. 24).

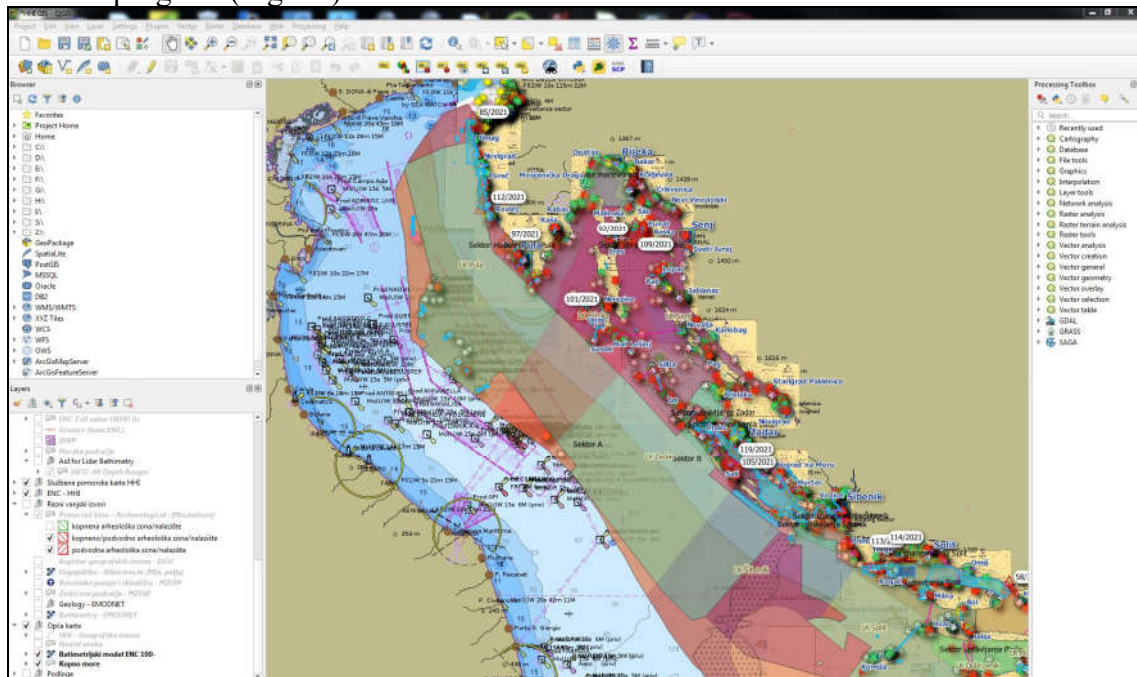


Figure 24. A prototype of the Hydrographic Information System

Croatian Marine Spatial Data Portal – GeoAdriatic (Fig. 25) provides search and view services for marine spatial data, and e-services from the scope of the Hydrographic Institute of the Republic of Croatia <https://geoadriatic.hhi.hr/>

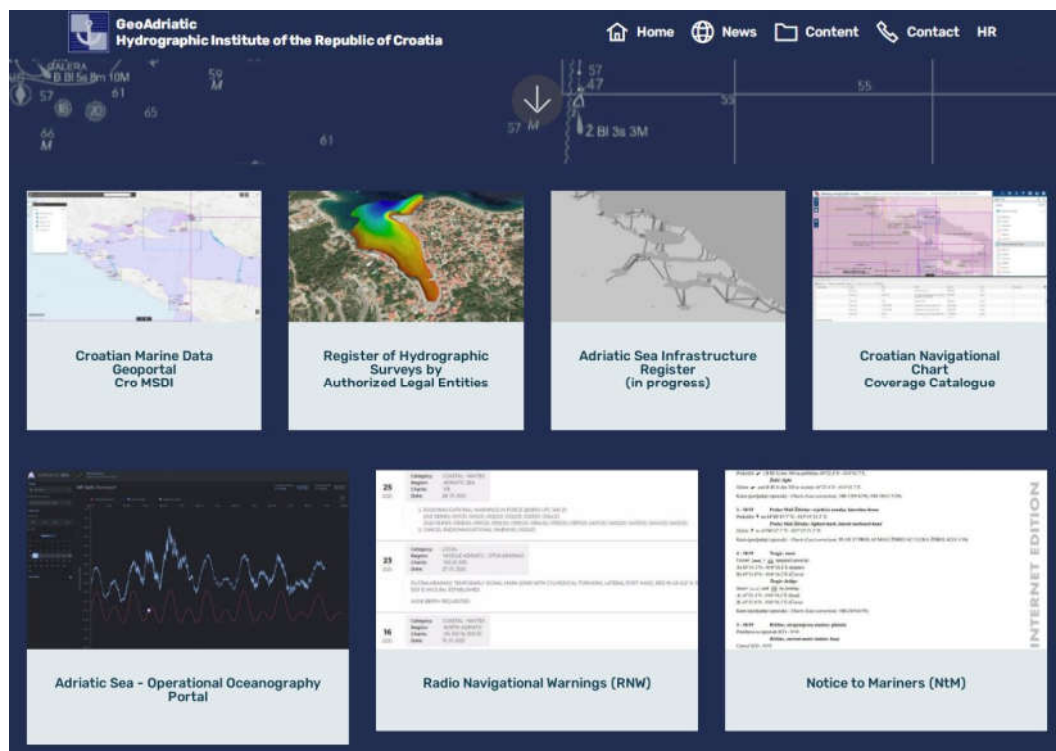


Figure 25. Croatian Marine Spatial Data Portal - GeoAdriatic

Online Library Catalogue

Special library software package METELwin is upgraded aiming to promote the resources of the CHI Library, including several modules (cataloguing and classification, management of users' records, statistics, search of library catalogue by all criteria) to cover most library operations. This new software enables online access and search of library catalogue (Fig. 26).

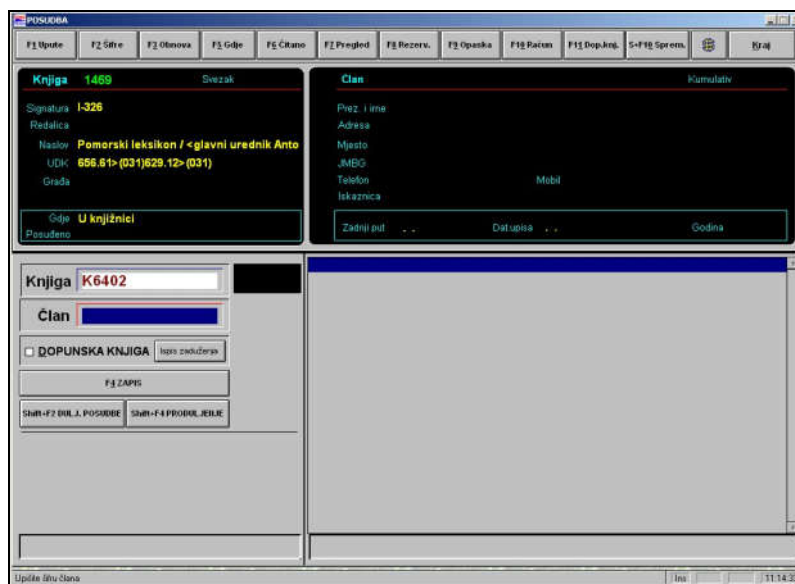


Figure 26. METELWin Application

Training

Participation in professional webinars and trainings

1. A total of 14 employees have registered to participate in a series of S-100-based online training courses organized by PRIMAR for its Member States.
2. Participation in a one-day webinar organized by the Finnish company "Arctia Finland" on "Bathymetric LiDAR as an effective method for coastal and shallow water bathymetric mapping".
3. Participation in a one-day seminar organized by PRIMAR on the topic of training the Central Administrator to administer the delivery of ENC's for the needs of HHI users (office and ship ECDIS), in accordance with the concluded GMO agreement on the delivery of ENC's.
4. Participation in a one-day webinar organized by PRIMAR on the topic of developing the PRIMAR service for its members, which would provide a simpler service of providing S-57 data for reuse by third parties.
5. Participation in a one-day webinar organized by ESRI on "What's New in ArcGIS Maritime with S-57 and Automation Confirmation"
6. One HHI employee (from the Cartographic Department) completed the training in the Arc GIS PAGO software.
7. During 2020, due to the epidemiological situation (COVID-19), educations and trainings were held by the webinars for:
 - CARIS BASE Editor,
 - Transition to S100
 - Pink-to-chart: expectations and emerging technologies
8. Due to the pandemic Covid-19, planned trainings and educations for the Nautical Cartographer Cat B were not achieved, and HHI plans to realise them for 2-3 cartographers when opportunity arises.

ISO Quality Management System

CHI successfully completed the process of ISO 9001:2015 certification (2020, 2021). An external audit is performed on yearly basis aiming to improve and confirm the certificate and compliant the CHI business process with ISO 9001:2015 standard. (Fig. 27).



Figure 27. Certificate of compliance with the ISO 9001:2015 standard

Bilateral and Multilateral Cooperation

Bilateral agreements

Activities within the bilateral arrangement between Croatia and Italy are continued.

In accordance with the bilateral agreement in force between the UKHO and CHI, intensive cooperation has been established and continued with the UKHO RT2 South Geographic Manager to address and harmonize various data in official charts and publications of both hydrographic offices.

Very good cooperation is taking place with the UKHO (IPS) under the Custodianship Agreement, which defines the licensing process for making CHI data available to a third party, taking into account principles of the public service data and information regulations.

Bilateral and multilateral meetings

CHI - UKHO licensing meeting

Working session with representatives of the UKHO Licensing Section was held in August 2020 and April 2021.

Main topics were related to numerous challenges coming from new requests for reuse of hydrographic data. Certain legal, administrative, financial, organizational and ICT aspects of the licensing issues were under comprehensive consideration.

CHI –IIM bilateral meeting

Two bilateral meeting were held (Croatia, Feb 2020 and Italy, July 2020). Main topics were related to ENC overlap issue, bilateral agreement, and joint projects in the Adriatic Sea.

The IHO Council Meetings

CHI representatives were actively participated at 3rd the IHO Council meeting 2019 in Monaco and 4th Council meeting 2020 as VTC event.

The IHO Assembly

CHI representatives were actively participated at 2nd Session of the IHO Assembly 2020 as VTC event.

PRIMAR Advisory Committee Meeting

CHI representatives were actively participated at 27th PRIMAR Advisory Committee meeting 2020 as VTC event after which Croatia took over a two-year chairships.

10th IHO WEND Working Group Meeting

Active participation in the two-day work (February 2021) of the IHO working group on "policy" issues related to the transition to a new generation of ENCs based on the new framework standard for hydrographic data S-100, (Fig. 28).

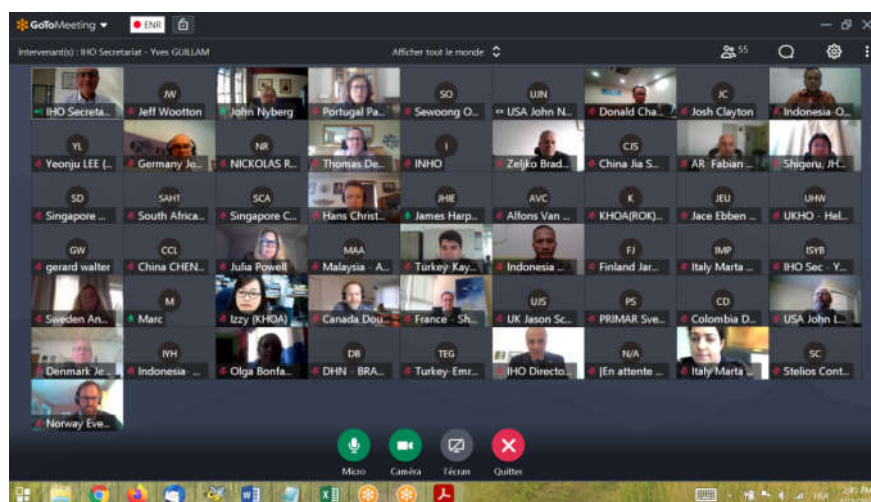


Figure 28. Participants of the IHO WEND Working Group

International Conference on Satellite Bathymetry

Participation in the 3rd International Conference on Satellite-Derived Bathymetry "SDB Day 2021", (Fig. 29).

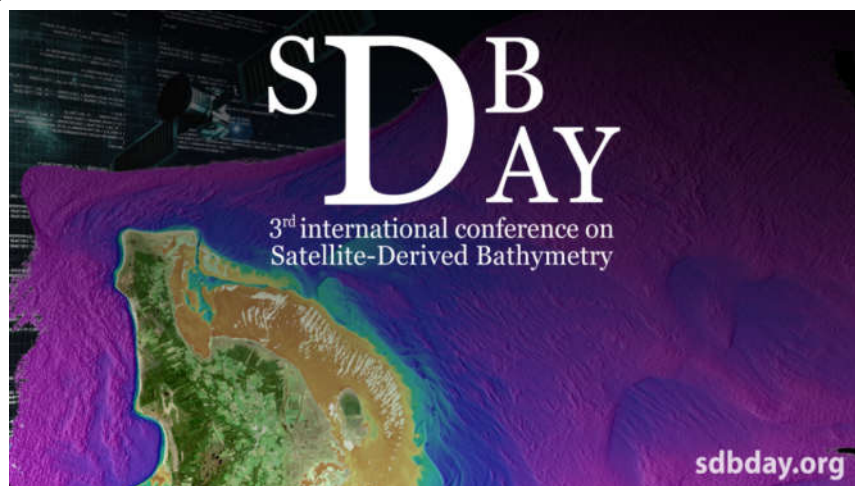


Figure 29. SDB Day 2021

IHO CSB Working Group Meeting

Participation in the work of the IHO working group for the so-called Crowd-Sourced Bathymetry (CSB) - correspondence and video meeting from 30 March to 1 April 2021 (Fig. 30).



Figure 30. Participants of CSB WG Meeting

Meeting of the three PRIMAR working groups

Participation in the work of the working groups for strategy (PSWG), marketing (PMWG), technology (TEWG) and finance (PFWG) - correspondence and video meeting May 2021.

CHART project for Alumni Seminar

In organization by the IHO under the auspices of the Nippon Foundation from 28 to 31 October 2019 in Singapore, the second order of the CHART project Alumni Seminar was held. The seminar was attended one CHI participants among 42 students (out of a total of 65) from the first CAT B course (2009) and until 2019 (total 10 training courses) gained the status of CAT B nautical cartographer (Fig. 31). In three days of the seminar, there was discussion of the future "Capacity Building" program, strategy, and development of the same, cooperation with Nippon foundation and network cooperation of all participants in the future. Also, there was also mentioned academic and administrative review of the CHART project, a modern approach to maintaining the competence standards for CAT B hydrographer and CAT B nautical cartographer. With this training, it is continued education of HHI employees which have been trained through IHO and excellent cooperation between all Members.



Figure 31. Representatives of IHO, NIPPON Foundation, UKHO trainers and 42 students from courses from 2009-2019

TEWG meeting of & S-101 Workshop in Stavanger.

In October 2019 in Stavanger (Norway), a 16th meeting of the PRIMAR TEWG was held. Representatives of 12 countries and industry representatives participated (Fig. 32). The Croatian hydrographic Institute was represented by two employees from the HHI Cartographic Department. New services of the PRIMAR and the current state of implementation of S-101 projects were presented at the meeting. There was discussion about the status of the ENC's of the new Members, cooperation between regional electronic navigation centres, new methods, and solutions for the distribution of ENC's, as well as the current S-102 services implementation status (CHS). Current working groups (HSSC11, S-101 PT4, ENCWG) have also been presented. A workshop was held about the new generation of ENC's according to IHO Standard S-101. During the workshop, participants met the challenges of S-101 technology through data conversion, structural and attribute display and function of the geometry and topology of ENC's, with a particular focus on the safety and data protection of the S-101 systems. This workshop has continued the training and education of HHI employees and quality cooperation with the PRIMAR, the regional coordination centre, which ensures the availability of ENC's to the end-users.



Figure 32. TEWG meeting and the S-101 workshop in Stavanger

EU projects

1. The European Marine Observation and Data Network (EMODnet) project

The EMODnet initiative has been launched by the European Commission - DG MARE as part of its Marine Knowledge 2020 strategy and is implemented in partnership with over a hundred European organizations. Within the EMODnet, associated organizations are working together to bring together various sea information from a variety of sources and resources to enable searching and browsing to the wider public. A total of 41 organizations from 20 countries (18 EU Member States), located along the European seas, are participating in the project. Most organizations include marine research institutes (17) and national hydrographic offices (16), with the involvement of other experts from different research and ICT fields.

CHI has been partnering in the project since May 2017. Croatia supplied part of the data Bathymetry (Fig. 33) and Geology (Fig. 34) layers in accordance with the national regulations and contributed to the administration of the project. More information about the project can be found at the following link: www.emodnet.eu

For the project EMODnet Bathymetry HRSM2, were created DTM's (Digital Terrain Model), SHP files and CDI (Common Data Index) files. For the EMODnet Bathymetry - HRSM2 were created 107 CDI files for 4 DTM's (during 2020).

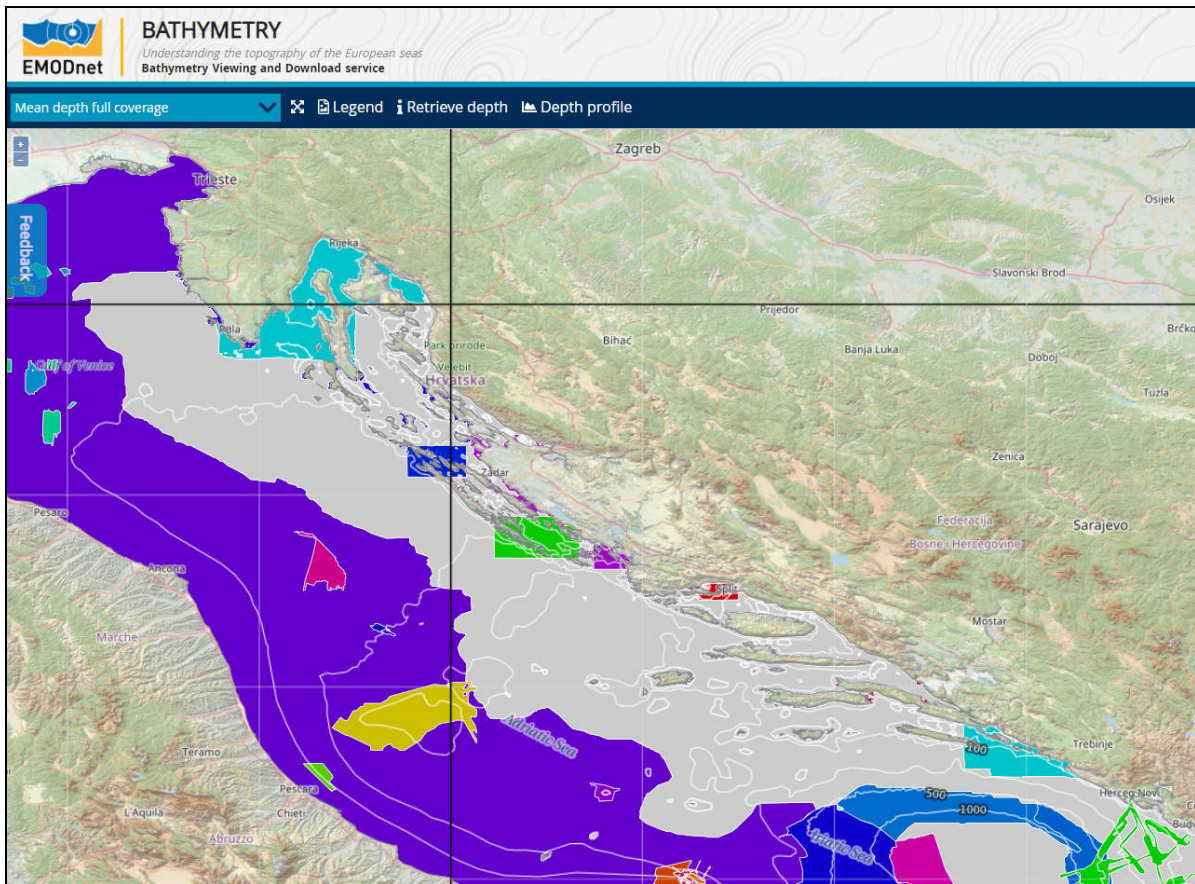


Figure 33. EMODnet Bathymetry 2017-2109 contribution <https://portal.emodnet-bathymetry.eu>

Seabed substrate map based on simplified Folk classification scheme (1954) with 7 classes (<https://www.emodnet-geology.eu/map-viewer/>), (Fig 34.)

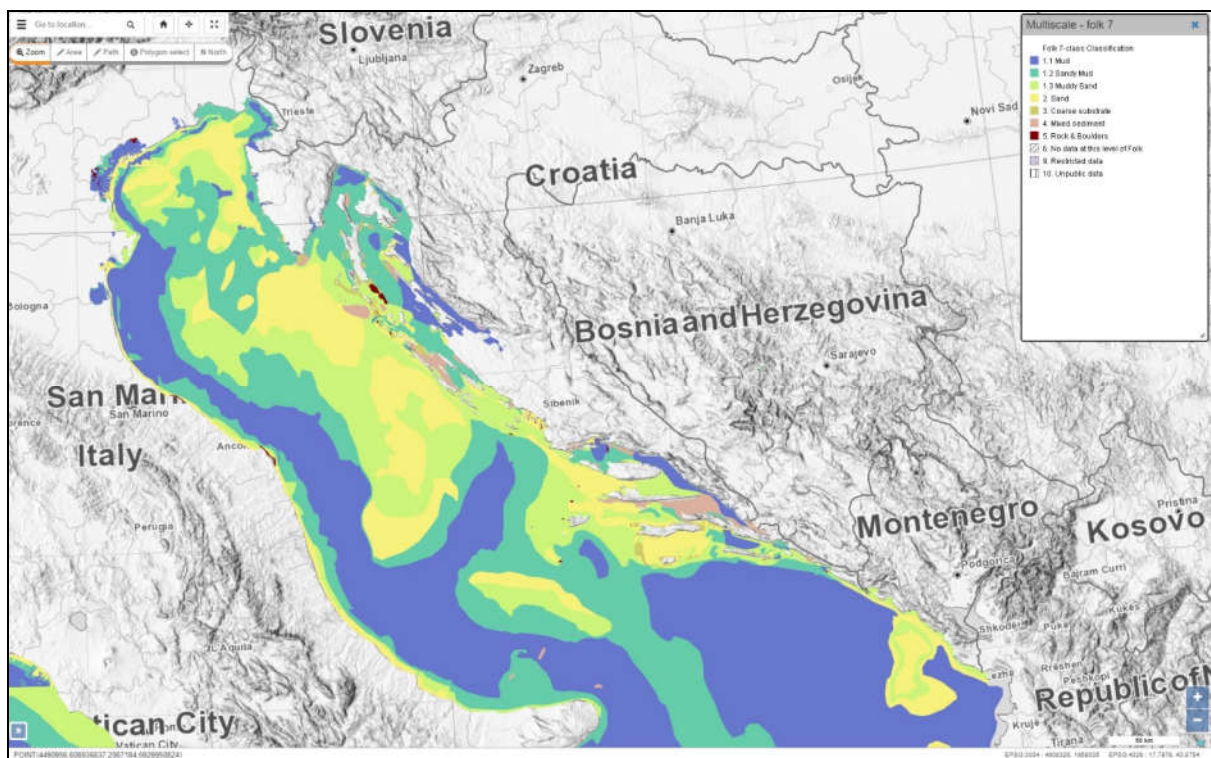


Figure 34. EMODnet - Seabed substrate map

The EMODnet bathymetry project 2020-2022 is under way. CHI will contribute with bathymetry data for the area of 2003 square km (Fig. 35).

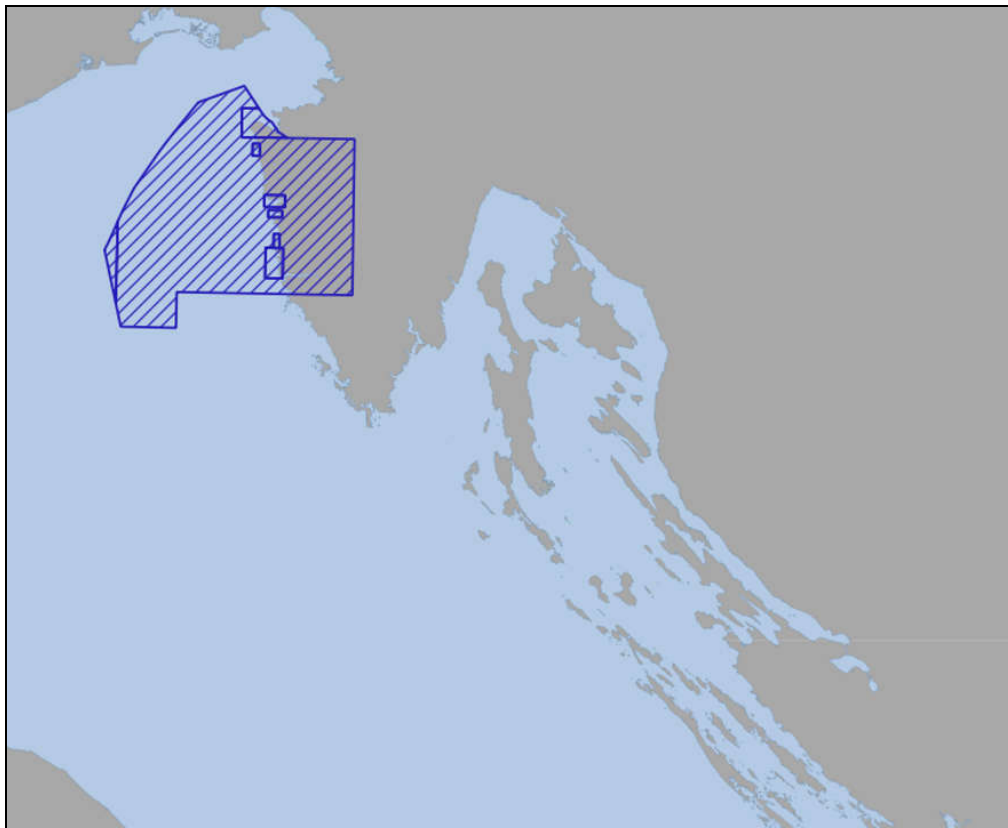


Figure 35. CHI contribution to EMODnet Bathymetry project 2020-2022

2. *“Improving the hydrographic service and increasing the availability of hydrographic data”*

In the past two-year period, a comprehensive documentation was prepared for launching a new project called “Improving the hydrographic service and increasing the availability of hydrographic data” which will be financed from EU funds. The main goal of the project is to improve the hydrographic services in organizational, technical-technological, and functional terms as permanent activities 24/7 of special interest to the Republic of Croatia, and thus improve the hydrographic-navigation element of the information segment of navigation safety in accordance with new requirements. Additional but not less important goal is to ensure availability of hydrographic data, products, and services to a wider community of users in other segments of human activities.

8. OCEANOGRAPHIC ACTIVITIES

Cooperation and contribution to Permanent Service for Mean Sea Level (PSMSL)

Monthly mean of sea level data from five stations (Rovinj, Zadar, Split, Ploče, Dubrovnik) are sent to Permanent Service for Mean Sea Level (PSMSL) <https://psmsl.org/>, responsible for the collection, publication, analysis and interpretation of sea level data from the global network of tide gauges, based in Liverpool at the [National Oceanography Centre](#) (NOC), United Kingdom.

HHI is in the process of expanding the tide gauge network. New tide gauges will be equipped with radar sensors and meteorological stations.

“StVar-Adri Project”

Scientists from the Oceanology department of HIRC are part of the research team on the Strength and Variability of the Adriatic Sea Level Extremes in Present and Future Climates (StVar-Adri) Project, which is funded by Croatian Science Foundation. Whole research team consists form scientists from the University of Split, Faculty of Science (PMFST), Hydrographic Institute of the Republic of Croatia, PMFST University of Zagreb, Faculty of Science (PMF), Institute of Oceanography and Fisheries (IOF) in Split and Institute of Ocean Sciences, Department of Fisheries and Oceans (IOSFO, Canada), Shirshov Institute of Oceanology of Russian Academy of Sciences (IORAS, Russia). The project StVar-Adri aim is to estimate contribution of selected components of extreme sea levels to present-day and future-day floods. To accomplish this goal, the focus of the project is on: (i) cataloguing the strongest known events; (ii) estimating contribution of individual processes to extreme sea levels using statistical tools and numerical modelling, (iii) linking extreme sea levels to atmospheric processes, and (iv) assessing future strength and variability of extreme sea levels using outputs of Regional Climate Models (RCMs).

There are also more than 60 smaller projects (e.g., outfall preparation studies, electric cable preparation studies...) in which oceanographic data were measured and analysed. As an example, Fig. 36 shows the current sedimentology chart, prepared for the Peljar publications.

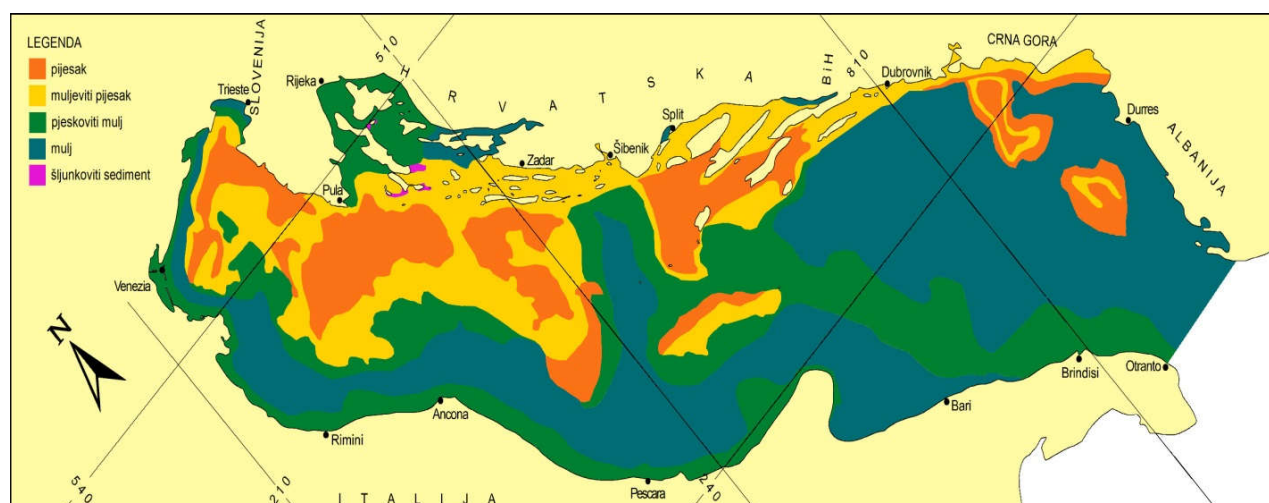


Figure 36. Sedimentology chart updated with data from a series of projects (version end 2016)

Oceanographic publications

Annual publications "Tide Tables – Adriatic Sea, East Coast" (Fig. 37) are also available in a digital format.

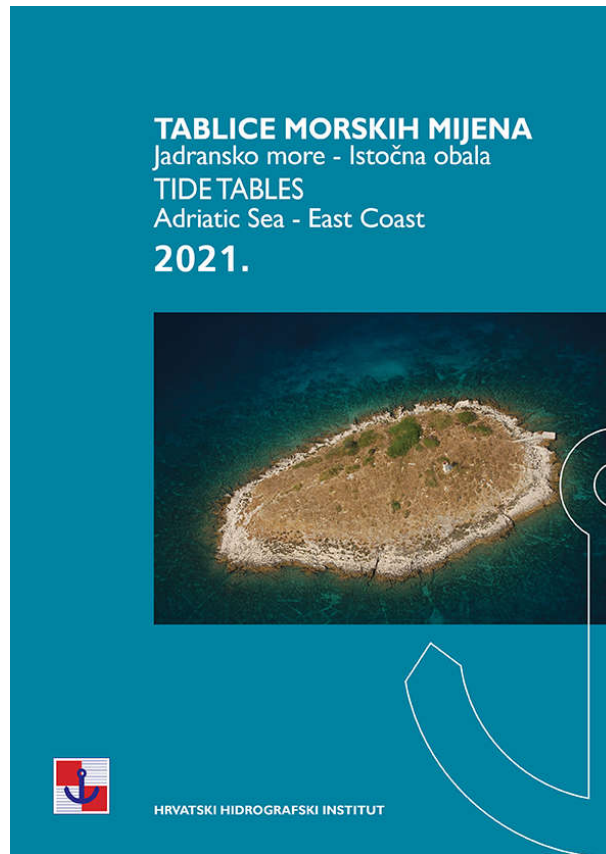


Figure 37. Tide Tables – Adriatic Sea, East Coast 2021

9. OTHER PROJECTS AND ACTIVITIES

National Marine Spatial Data Infrastructure – MSDI

CHI actively participates in the long-term Croatian project at national level for the implementation of national legislation relating to NSDI aiming to establish the MSDI (Fig. 38).

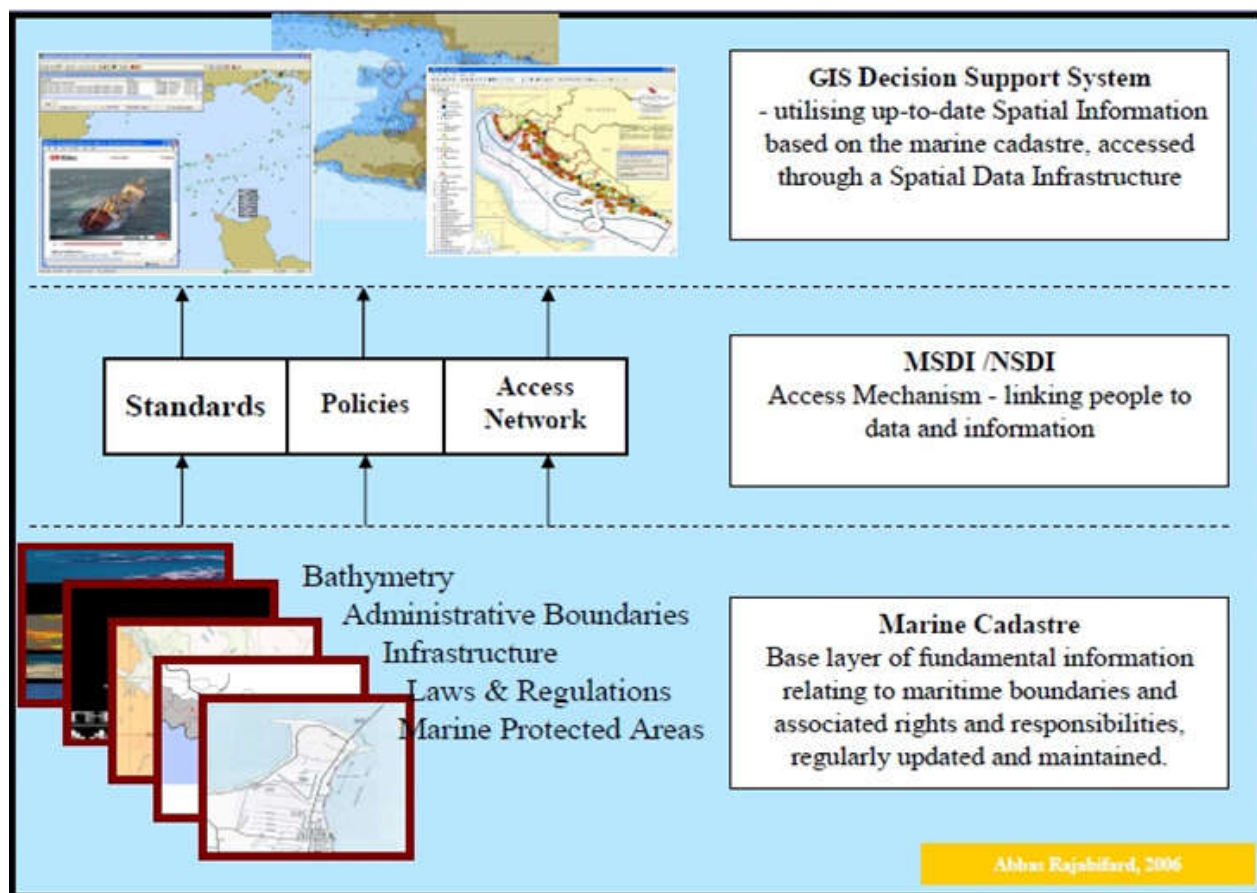


Figure 38. An overview concept of Croatian MSDI

In Croatia, Marine Spatial Data Infrastructure (MSDI) is a component of National Spatial Data Infrastructure, so currently CHI provides metadata to the Croatian NSDI Geoportal that serves as a starting point for accessing spatial data sources that are, according to the NSDI Act (Official Gazette 56/2013), part of National Spatial Data Infrastructure (<http://geoportal.nipp.hr/en>).

In the future CHI plans to set up a conceptual framework for Croatian MSDI with other providers of marine data and partners. That includes building of a MSDI reference model and evaluating Metadata & Data geo-portal.

Others

CHI personnel participated in several international scientific and technical conferences presenting hydrographic and oceanographic papers.

Supporting marine policies for efficient protection, use and disaster management

CHI continuously participates in multiple projects designated by the competent administrations providing high quality support.

10. CONCLUSIONS

Operational Level - status

In the past two-year period, the status of hydrographic-navigational element of the navigational safety was at an optimal level.

Entire area of responsibility of the Republic of Croatia for the hydrographic-navigational safety of vessels has been covered by relevant official editions of navigational charts and publications – paper and digital ones. This particularly applies to navigation areas of SOLAS ships.

Navigational warning service is in good working order, efficiently cooperating with all navigational safety entities in Croatia, its neighbouring countries and the NAVAREA III Coordinator.

Paper editions of official navigational charts are updated through monthly editions of Notices to Mariners, and ENC's through weekly updates.

Significant progress has been made towards pleasure and yacht users by issuing a new edition of the Adriatic Sea Pilot, the first and second parts in Croatian and English. Most of the plans of small ports and marinas from the paper edition were also issued as ENC's.

Realization of hydrographic surveying and charting was conducted according to defined priorities and the planned schedule. A total of 569 square kilometres were surveyed by the multi-beam system equipment.

A significant contribution towards improving the hydrographic-navigational element of navigational safety was made through publishing of a considerable number of new Croatian electronic navigational charts (ENC) based on the data obtained from the new hydrographic survey. In the period between two conferences 64 new ENC's were released. Entire ENC folio has been made available to end users on ships and to maritime administration worldwide through a network of authorised distributors by PRIMAR.

Since the end of 2016 Croatian ENC's have been made available on the Croatian Navy vessels through the Navy Agreement. Agreements have also been concluded with the Directorate for the Safety of Navigation of the Ministry of Maritime Affairs and the Croatian Navy on ENC usage for administrative-office purposes (WMS for ENC's). Ongoing support is provided to ensure the provision of timely and quality ENC service.

Since the beginning of 2021 Croatian ENC's have been made available for the Croatian hydrographic survey vessel as well as for the CHI ECDIS office use through GMO agreement signed between PRIMAR and HHI.

Some long-standing overlaps issue in UB3 between HR and IT is successfully solved through a perfect coordination and cooperation between two hydrographic offices. Cooperation continues resolving the remaining overlaps in UB1 and UB2.

CHI has maintained a high level of technical and technological equipment by acquisition of several important systems, devices, and equipment through EU funded projects. Existing software of the basic production line is regularly updated.

Operational Level – challenges

There are some problems and challenges regarding HR ENC's. Some overlaps still exist between HR, IT and GR in Overview and General ENC's. Currently, there is a commonly harmonized proposal, most likely to be the final solution.

Problems of implementation of attributes SCAMIN CHI recognized as a key task planned to be realized in the ongoing period. Regarding the current paper chart-based scheming of the cells in UB3, CHI is planning for re-scheming the cells in a square grid.

Some inconsistencies observed between national (HR) paper charts and ENC's are under constant consideration and deliberation. Furthermore, any feedback received from users, RENC's or the IHO is a matter of urgent examination and solving

In the past two-year period, a comprehensive documentation was prepared for launching a new project called "Improving the hydrographic service and increasing the availability of hydrographic data" which will be financed from EU funds. The main goal of the project is to improve the hydrographic services in organizational, technical-technological, and functional terms as permanent activities 24/7 of special interest to the Republic of Croatia, and thus improve the hydrographic-navigation element of the information segment of navigation safety in accordance with new requirements. Additional but not less important goal is to ensure availability of hydrographic data, products, and services to a wider community of users in other segments of human activities (The MSDI development).

One of the challenges for the CHI will be transition to the new generation of ENC produced according to S-101 standard. The issue is almost equally demanding in organisational, technical-technological, and financial terms as the issue of transition from paper versions of navigational charts to digital ones (ENC). The transition issue is additionally complicated by the fact that it will be necessary to ensure maintenance and availability of both ENC generations (Dual Fuel) for several years. Some initial tasks are dedicated to responsible staff which close cooperates with PRIMAR and ECC staff through the several initiated and approved S-100 projects. Training is recognized as a key element for realization of transition to the S-100 series product and services.

CHI continuously participates in multiple projects designated by the competent administrations providing high quality support. The CHI personnel participated in several international scientific and technical conferences presenting hydrographic and oceanographic papers.

Through participation in several bodies and working groups of the IHO and PRIMAR RENC, the CHI continues its proactive role and contributes to realisation of objectives established by these organizations.

Recognizing a wider use of hydrographic data, CHI constantly improves the established licensing model, keeping in mind obligations arising from the public service information regulations.

Achievement of main strategic and programme objectives in the current and next planned periods will be challenging in every respect because it is expected to proceed in very restrictive conditions with additional requirements and tasks.

Management Level – challenges

A general assessment of overall CHI capacity determines an approach to achievement of objectives which will be based on prioritization, well organized business processes and cooperation between employees, as well as good cooperation with the Management Board and competent ministry.

The main challenges in the forthcoming period will be in connection of updating an existing digital production line and internal organizational restructuring to establish a new business model in accordance with ISO QMS, which will ensure a modern and high-quality hydrographic service.

It is well known that the key point and premise of a quality hydrographic service is to achieve and maintain a high level of motivated and educated staff. Overwhelming fact is that new technologies pose high demands on the required qualifications of employees. This will be a major challenge, as well as the introduction of new technologies. Set IHO S-100 related courses developed and offered

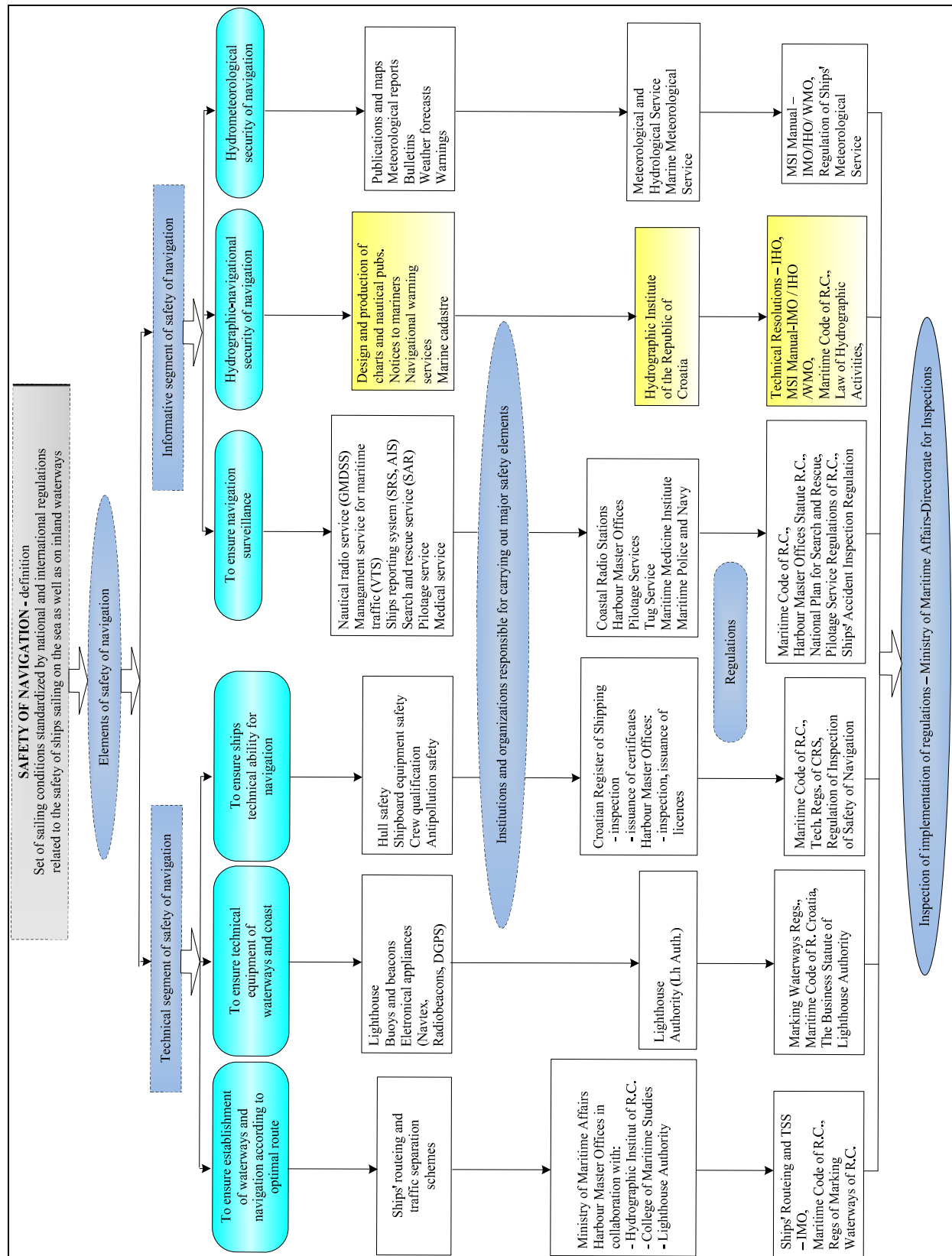
by PRIMAR will make a great contribution toward acceptance of the new knowledge and competences of the CHI staff for fulfilment required goals in forthcoming transition period.

Expectations – topics for discussion and exchange of views and experiences

Finally, in preparation for previous XXI MBSHC Conference the CHI prepared a list of hot hydrography related topic as they were recognized for CHI, the MBSHC region and wider. Given that the topics are still considered relevant for a better understanding of the overall situation in the Croatian Hydrographic Service with an emphasis on operational, management and political aspects, and expecting that this could contribute to the success of the conference through lectures, discussions and exchanges of views and experiences, below are listed again, and slightly updated.

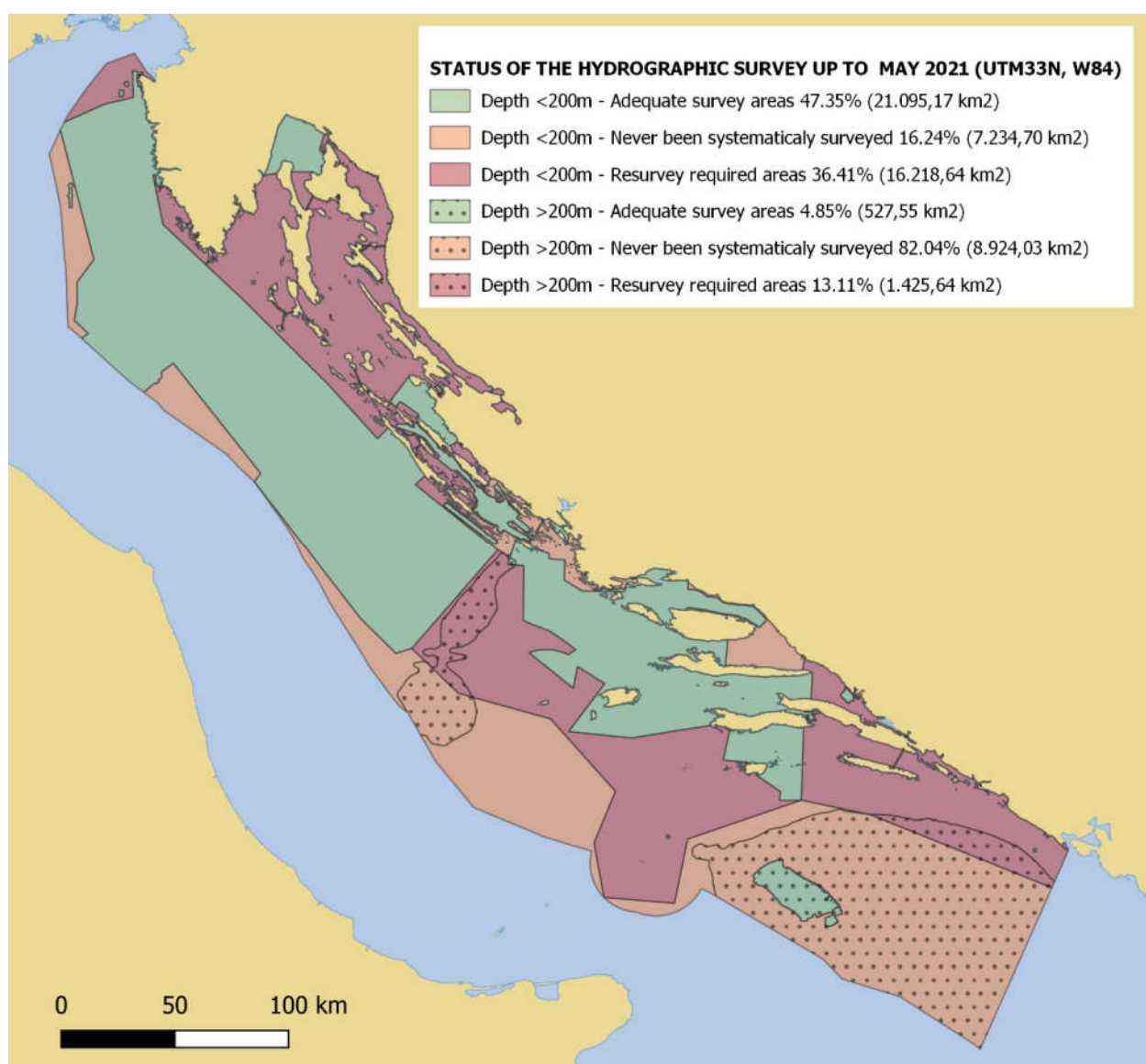
- 1. Smooth technological transition – HO organizational structure**
- 2. Legal framework for hydrographic service – national prospective, strategic, and planning docs**
- 3. Data centric approach – challenges of introducing and implementations**
- 4. ISO QMS design, implementation and improving**
- 5. Dual fuel ENC service operating – S-57 and S-101,**
- 6. National ENC distribution options and challenges**
- 7. ENC S-101 test data development - expectations**
- 8. ENC overlap in region – applications of the WEND principles (Technical Agreement)**
- 9. Increasing the availability of hydrographic data**
- 10. Data licensing policy**
- 11. Commercial hydrographic survey – legal aspect and implications**
- 12. LIDAR experience and praxis (coastline and shallow waters)**
- 13. Satellite bathymetric data (accessibility and applications)**
- 14. Crowdsourced bathymetry – position and national regulation (restrictions)**
- 15. Science approach for HO**
- 16. Non-SOLAS ENC and market options for leisure users – regulations**
- 17. Regional cooperation with neighbouring countries**
- 18. Regional Hydrographic Commission operation (capacity building)**
- 19. e-Office – administrative arrangement and daily management**
- 20. Distance training and video conferencing callenges**

ANNEX 1 - CHI position in the structure of Croatian administration



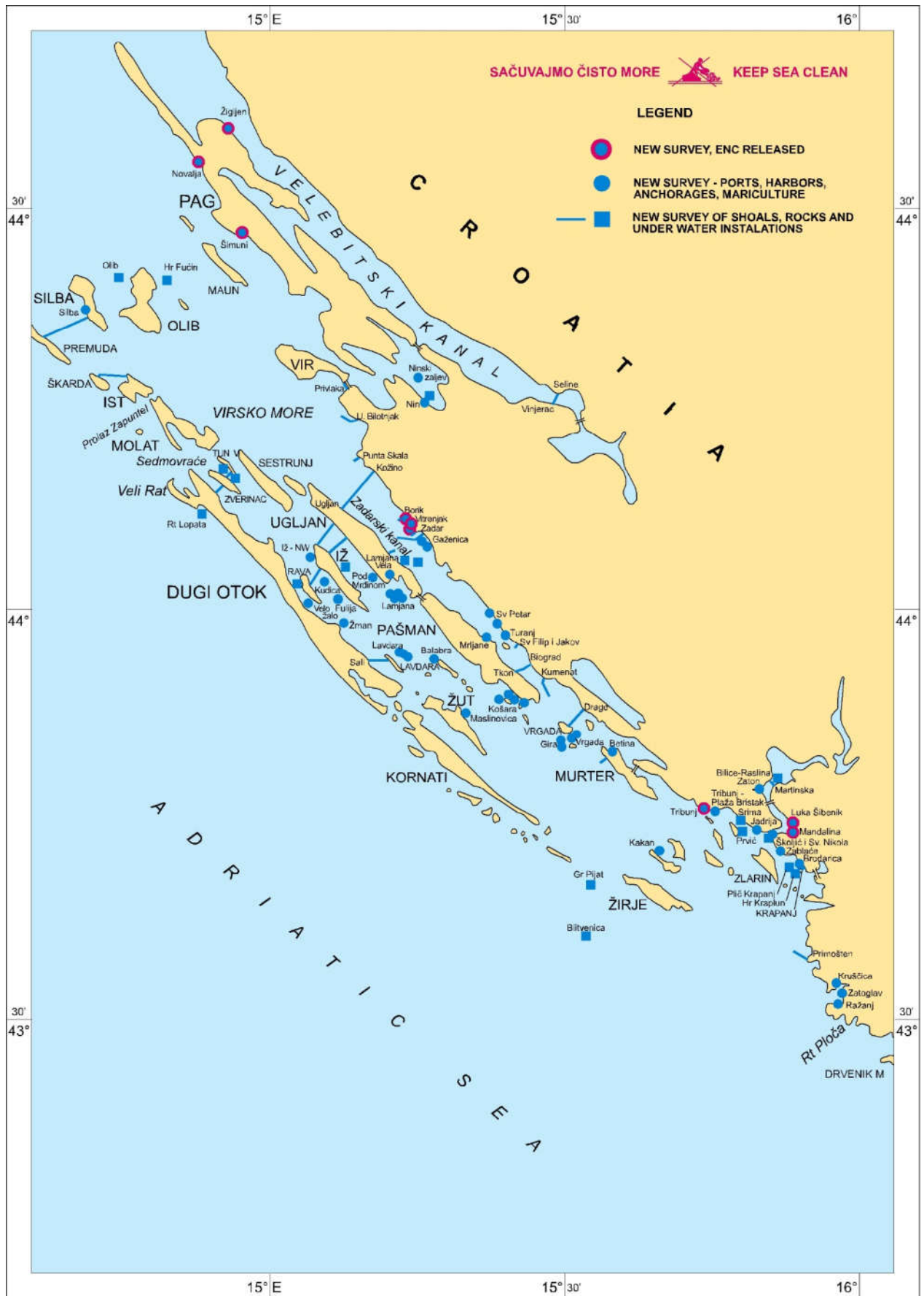
ANNEX 2 - Status of hydrographic survey in accordance with the IHO C-55 criteria

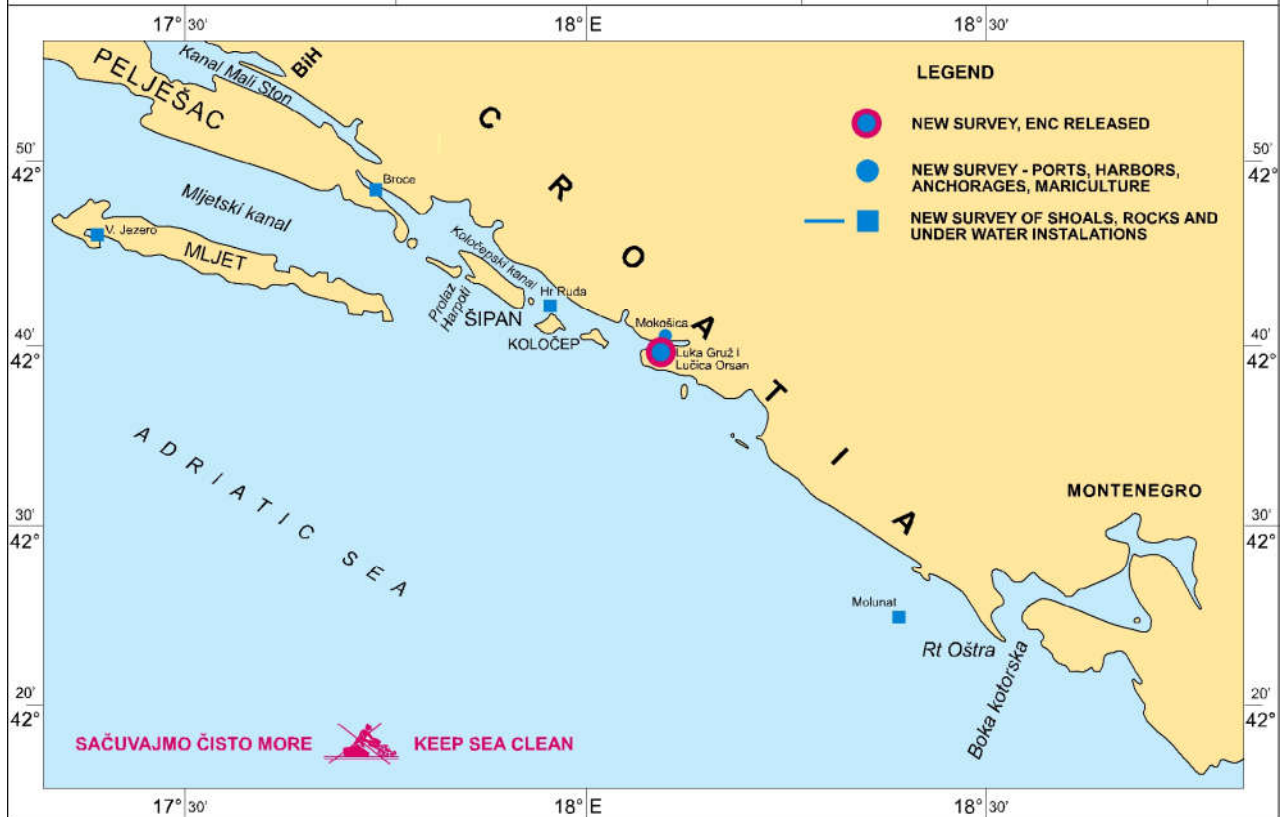
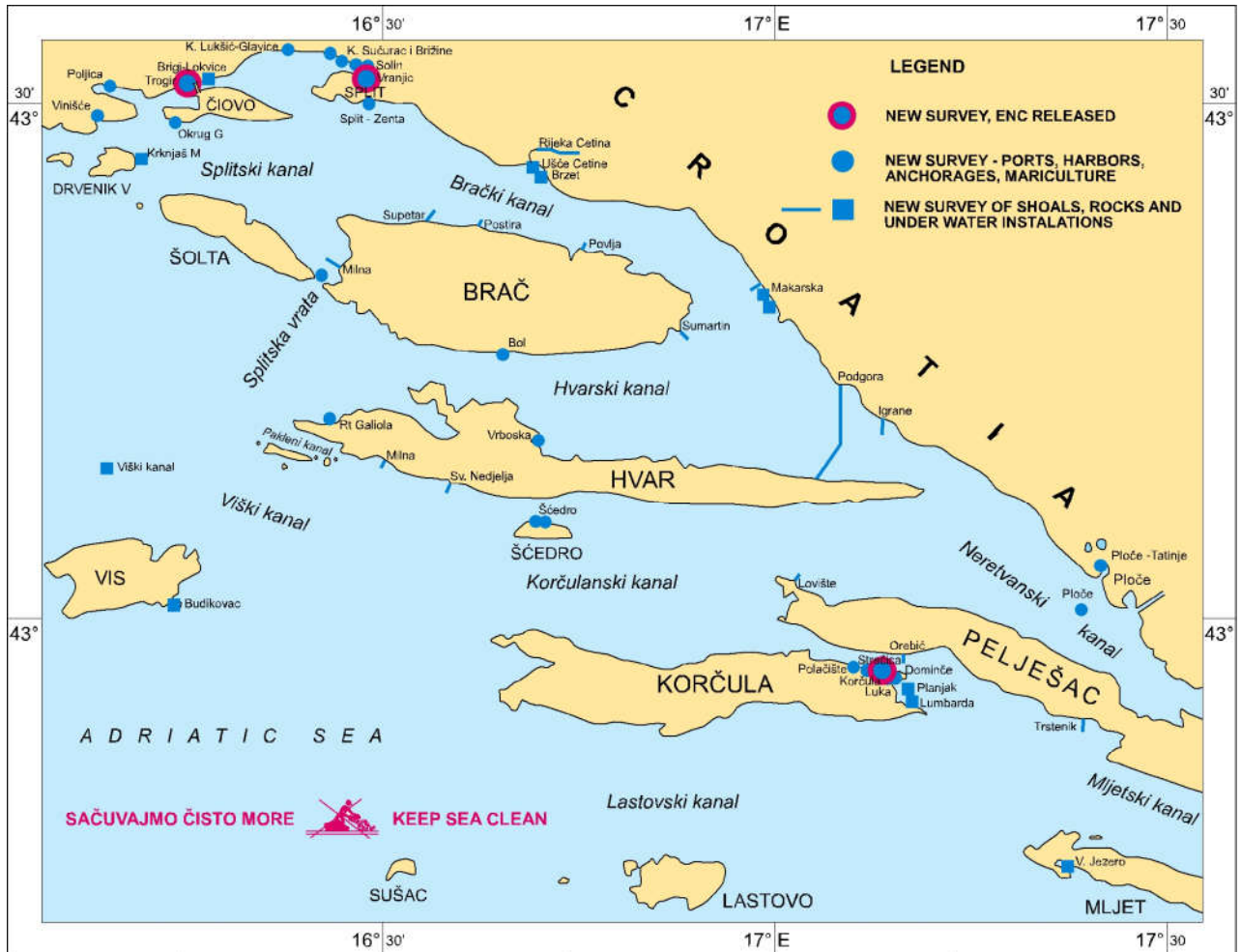
Depth	Adequate survey		Resurvey required		Never been systematically surveyed	
	A1 (<200m)	A2 (>200m)	B1 (<200m)	B2 (>200m)	C1 (<200m)	C2 (>200m)
Percentage (%)	47,35	4,85	36,41	13,11	16,24	82,04
Area (sq. km)	21.095,17	527,55	16.218,64	1.425,64	7.234,70	8.924,03



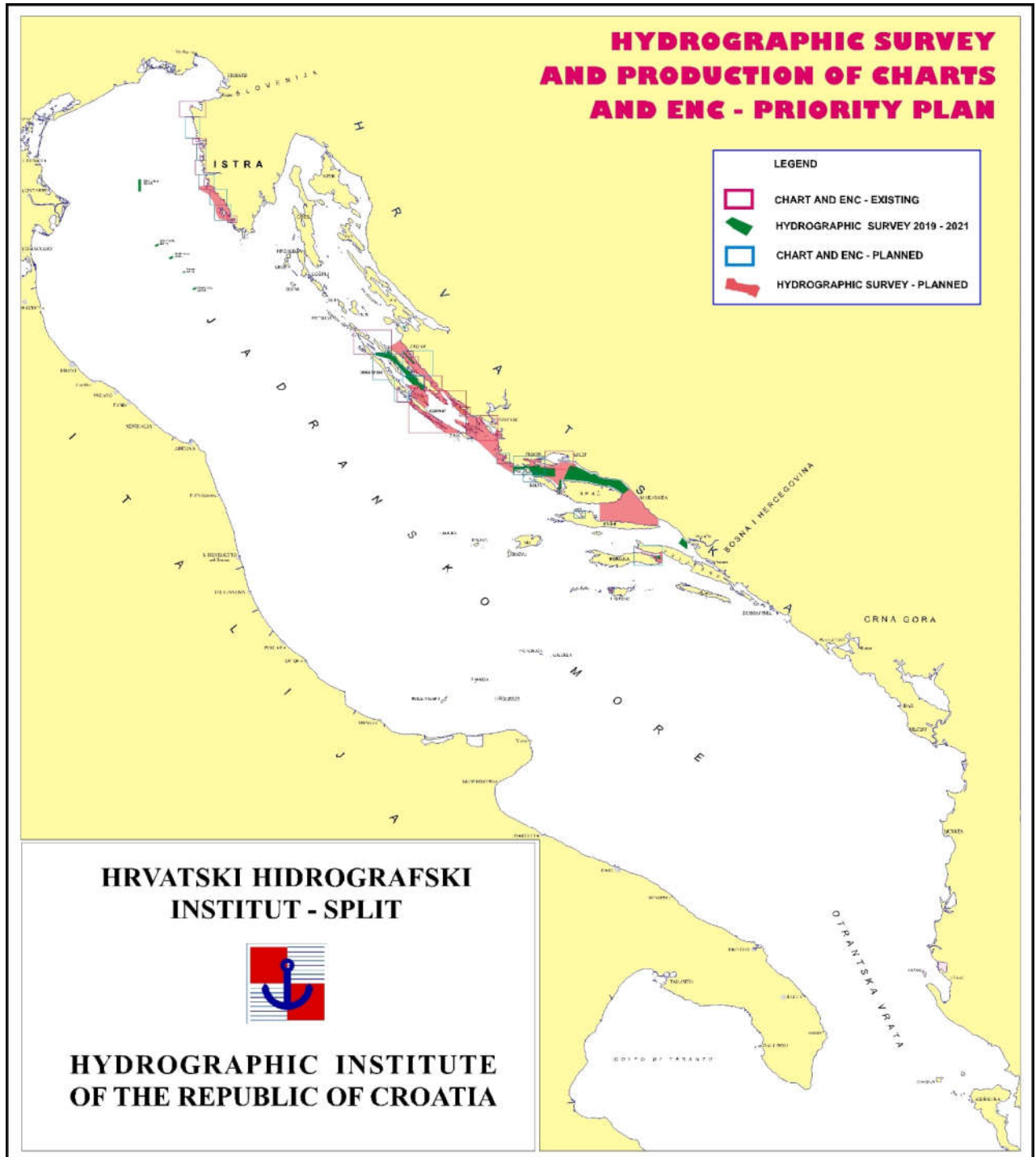
ANNEX 3 - New hydrographic survey and ENC of marinas, small ports, shoals, underwater rocks, and installations



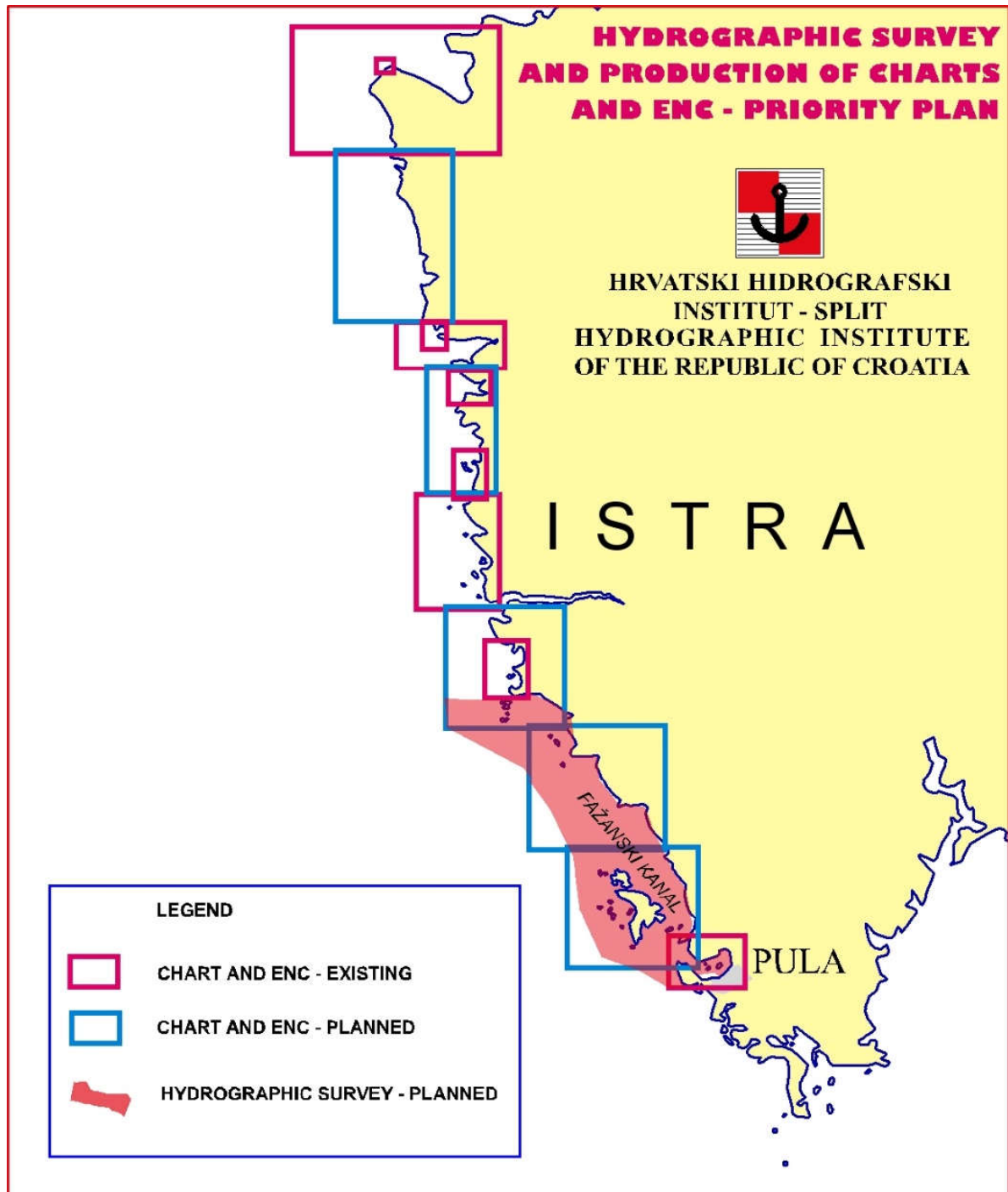


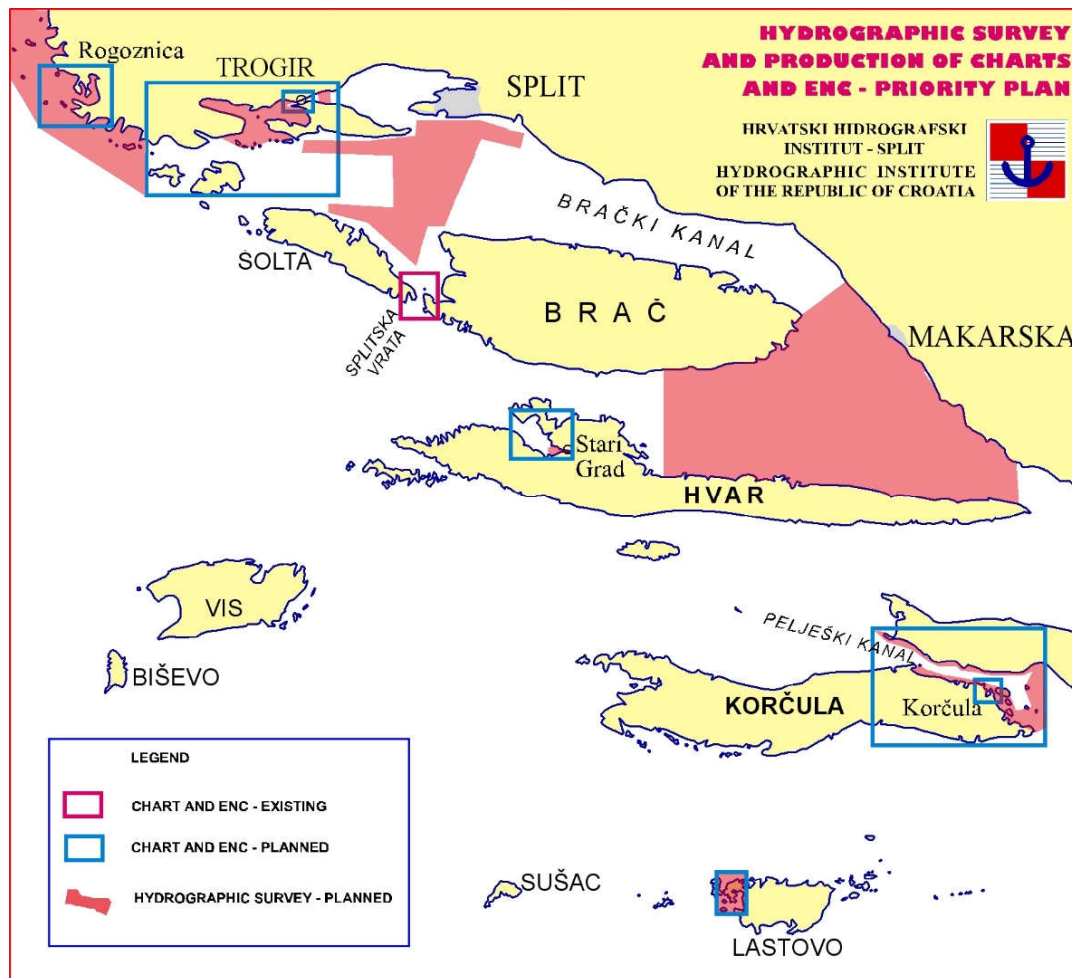
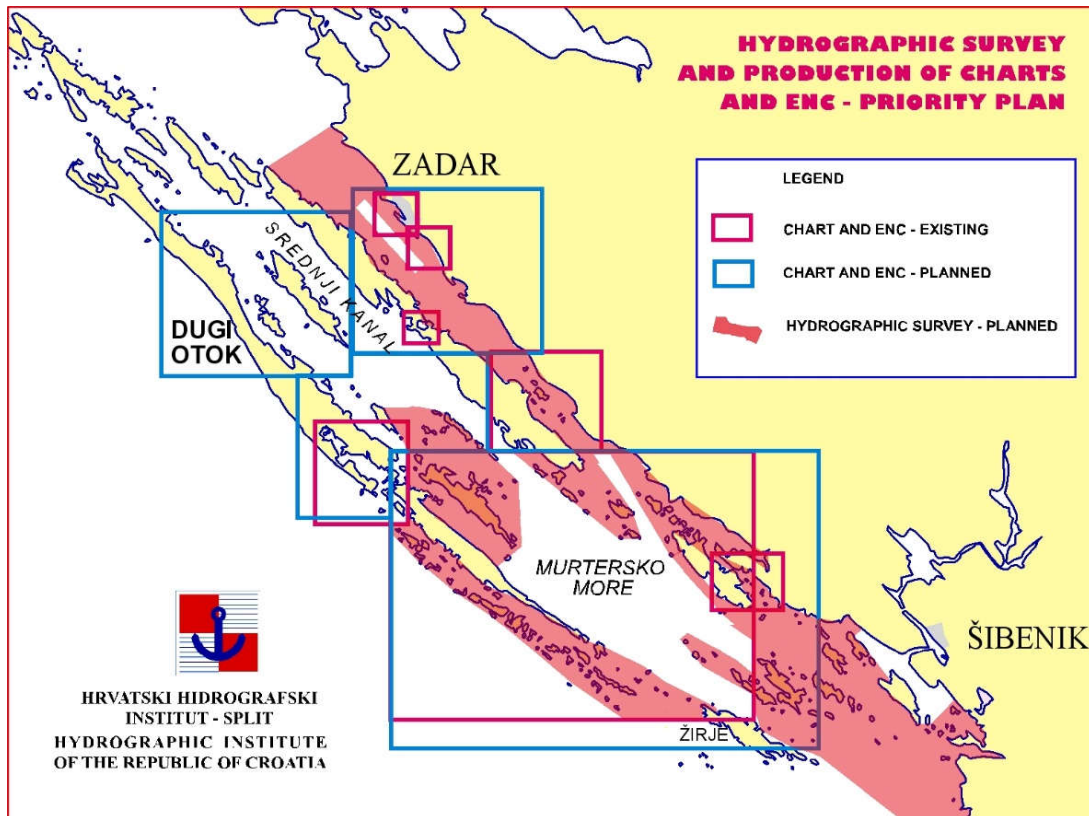


ANNEX 4 - ENC 5-year priority plan based on new hydrographic survey - Overall



ANNEX 5 - ENC 5-year priority plan based on new hydrographic survey – Regional





ANNEX 6 - Current ENC release status

HYDROGRAPHIC INSTITUTE OF THE REPUBLIC OF CROATIA

LEGEND - TUMAČ ZNAKOVA

- RELEASED / REALIZIRANO
- PREPARED / U IZRADI
- PLANNED / U PLANU

HRVATSKI HIDROGRAFSKI INSTITUT - SPLIT

ENC PORTFOLIO

01/2021 271 cells /čelija

HARBOUR CHARTS - LUČKI PLANOVİ

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR50011B	11	(Imanja)			10 000	
HR50011C	11	(Luka Cvrar)			10 000	
HR50011P	11	(Porac)			10 000	
HR50011H	11	(Rovinj)			11 000	
HR50011J	11	(Novigrad)			8 000	
HR50016	100-16	(Pula)			30 000	
HR50013B	13	(Zaljev Raša)			20 000	
HR50014C	14	(Plovninska luka)			7 500	
HR50015	15	(Plovača)			15 000	
HR50016B	16	(Ornišijski zaljev)			10 000	
HR50017C	17	(Bakarski zaljev)			10 000	
HR50020A	20	(Rabac)			10 000	
HR50020B	20	(Čak)			10 000	
HR50020C	20	(Senj)			5 000	
HR50020D	20	(Rab)			5 000	
HR50020E	20	(Puntarska draga)			15 000	
HR50020F	20	(Drač)			15 000	
HR50035A	50-3	(Osarski jezanac)			10 000	
HR50032C	22	(Ilovicka vrata)			20 000	
HR50032D	22	(Prolaz Zapunje)			10 000	
HR50032E	22	(Novižan)			15 000	
HR50032G	100	(100-10 Plova)			5 000	
HR50020B	100-20	(Zadar)			15 000	
HR50020A	100-20	(Luka Gašanića)			7 500	
HR50037G	37	(Luka Záhalec)			10 000	
HR50037C	37	(Prolaz Vela Rovenska)			5 000	
HR50051Z	51Z	(Muratovski kanal - St. dio)			20 000	
HR500533	533	(Luka Šibenik)			10 000	
HR50047E	47	(Split - Kaštelanski zaljev)			15 000	
HR50021A	100-21	(Sibenski vrat)			15 000	
HR500530	50	(Pašanski kanal)			18 000	
HR500535A	535	(Viška luka)			20 000	
HR50026A	100-26	(Makarska)			10 000	
HR500633	63	(Plovača)			10 000	
HR50027A	100-27	(Luka Polača)			20 000	
HR50027B	100-27	(Sibinj)			15 000	
HR50020A	60-20	(Suzanica I. pr. Harpog)			110 000	
HR50021A	60-20	(Luka Zadar)			10 000	
HR50030	83	(Dračevine)			10 000	
HR50026A	100-26	(Cavtat)			15 000	
HR50010LV	Luka Veneta (PZMB)				6 500	
HR500251	Zaljev Soline (PZMB)				21 750	
HR50061N	Novigrad (PZMB)				5 000	
HR500346	46	(Trogirski kanal)			10 000	
HR500355	55	(Luka Krčić)			10 000	
HR500518	518	(Rijeka Kisel - Prodrijsko)			115 000	
HR5001K	Luka Krk					
HR5001BZ	Novsko ždrište					
HR5006KZ	Karinsko ždrište					
HR5009LR	Luka Rogoznica					
HR5005P1	Stonska prevlaka - Malo more					
HR5005P2	Stonska prevlaka - Kiek-Neum					
HR5005P3	Stonska prevlaka - Kistina-Kuta					
HR5005LZ	Luka Zadarčica				10 000	
HR5006DL	Šibenik Luka					
HR5006LL	Luka Lovčić					

BERTHING CHARTS - PRISTANSKI PLANOVİ

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR50011B	11	(Luka Šibenik)			5 000	
HR50013A	13	(Brijuni - Tugot)			8 000	
HR50014A	14	(Prizajac u ugljen)			2 000	
HR50014B	14	(Tuzinjska luka)			2 000	
HR50016H	16	(Luka Rijeka)			4 000	
HR50015B	15	(Luka Torpeda)			1 500	
HR50016A	16	(Petrolovska luka)			3 500	
HR50018B	18	(Rijeka - Dračica)			4 000	
HR50016A	16	(Turski zaljev - Omišalj)			3 500	
HR50017A	17	(Bakar - Gostinje)			2 000	
HR50017B	17	(Plovača - Podgorje)			2 000	
HR50022B	22	(Ljubinski)			5 000	
HR50022F	22	(Luka M. Stinača Tr. Pr.)			3 000	
HR50018A	18	(Luka Zadar)			3 000	
HR50018B	18	(Luka Plovača)			3 000	
HR50037A	37	(Prolaz Mala Provenska)			2 500	
HR50037B	37	(Prolaz Mala Provenska)			2 000	
HR50047F	47	(Split - Gradiska luka)			4 000	
HR50047B	47	(Split - Bazenski Vranjci)			4 000	
HR50047C	47	(Split - Bazenski Vranjci)			4 000	
HR50047D	47	(Split - Bazenski Vranjci)			4 000	
HR50053A	50	(Luka Vrlji)			5 000	
HR50053B	50	(Luka Vrlji)			2 500	
HR50053C	53	(Dračevine - Stara luka)			2 000	
HR50053D	83	(Dračevine - Stara luka)			2 000	
HR50053E	83	(Marina Dubrovnik)			2 500	

OVERVIEW CHARTS - PREGLEDNE KARTE

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR100101	101	(Jadransko more)			800 000	

GENERAL CHARTS - GENERALNE KARTE

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR200351	351	(Venezia - Zadar)			350 000	
HR200352	352	(Ancona - Šibenik)			350 000	
HR200353	353	(Foscara - Split)			350 000	
HR200354	354	(Barfetta - Dubrovnik)			350 000	

COASTAL CHARTS - OBALNE KARTE

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR30015	100-15	(Crado - Rovinj)			100 000	
HR30016	100-16	(Pula - Kvarner)			100 000	
HR30017	100-17	(Lošnjak - Mola)			100 000	
HR30018	100-18	(Rijeka - Kvarner)			100 000	
HR30019	100-19	(Sibinj - Plova)			100 000	
HR30020	100-20	(Duga Otok - Zadar)			100 000	
HR30021	100-21	(Šibenik - Zadar)			100 000	
HR30022	100-22	(Jabuka - Vrs)			100 000	
HR30023	100-23	(Tromin - Palagruža)			100 000	
HR30024	100-24	(Palagruža - Lastovo)			100 000	
HR30025	100-25	(Hvar - Lastovo)			100 000	
HR30026	100-26	(Brač - Hvar)			100 000	
HR30027	100-27	(Pelješak - Mljet)			100 000	
HR30028	100-28	(Dubrovnik - Budva)			100 000	
HR303410	INT3410	(Rijeka - Venezia)			100 000	
HR303412	INT3412	(Split - Gargano)			100 000	
HR303414	INT3414	(Dubrovnik - Dume)			100 000	
HR303408	INT3414	(Ancona - Zadar)			100 000	

BERTHING CHARTS - PRISTANSKI PLANOVİ

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR5000P1	Uglje				3 500	
HR5000P2	Uglje				3 200	
HR5000P3	Porozina - tr. pr.				2 400	
HR5000L1	Marićevica				3 800	
HR5000P4	Moklenička draga				6 200	
HR5000P5	Medevo				2 500	
HR5000L2	Lovran				1 700	
HR5000P6	Isa				2 600	
HR5000L3	Opuzica				2 400	
HR5000L5	Posušje				3 000	
HR5000L6	Bakar - luka				1 700	
HR5000L7	Kraljevica				1 700	
HR5000L8	Malinska				2 200	
HR5000L9	Starina Brijuni				1 650	
HR5000P7	Lim - pristan				1 600	
HR5000L10	Isoprt				5 000	
HR5000L3C	Baska				6 000	
HR5000TM	M. Lošnjak-brod- IPTO				2 200	
HR5000L4	Volosko				2 200	
HR5000L11	Vukovar				2 250	
HR5000L12	Sakarac				3 200	
HR5000L13	Haličinski Brijuni solni				1 200	
HR5000L21	Gavotić				1 200	
HR5000L22	Krk				4 500	
HR5000L23	Uva i Talina				1 300	
HR5000L24	Uva i Mahna				2 500	
HR5000L25	Stara Novaja				1 250	
HR5000L26	Tovarnica				1 500	
HR5000L27	Novaja				3 800	
HR5000L28	Karminica				1 400	
HR5000L29	Rovenska				4 350	
HR5000L30	lovk				2 600	
HR5000P8	Jvala Scott				1 100	
HR5000L31	Črčabeno				1 000	
HR5000P9	Jadransko				1 000	
HR5000P10	Kilimo				2 500	
HR5000L32	Sio				2 600	
HR5000L33	Stani				3 650	
HR5000L34	Sveti Juraj				2 800	
HR5000L35	Duboko				1 650	
HR5000L36	Lukovo Ozdiko				1 700	
HR5000P11	Duga Otok				1 700	
HR5000L37	Slanograd				2 200	
HR5000L38	Jablana				1 800	
HR5000L39	Karlobag				3 000	
HR5000P12	Trnava - Sv. Magdalena				1 400	
HR5000L40	Ninje				1 800	
HR5000L41	Vinjarac				2 600	
HR5000L42	Nerodnja				1 800	
HR5000P13	Novigrad				2 100	
HR5000P14	Novigrad - pristan				2 700	
HR5000L43	Ninje				1 800	
HR5000L44	Povljana				2 400	
HR5000L45	Vir				2 200	

BERTHING CHARTS - PRISTANSKI PLANOVİ

ENC CELL	Nr.	NAME	Br.	IME	Scale	Metre
HR5000L46	Uglje				3 200	
HR5000L47	Zalac				1 500	
HR5000L48	Isot				2 500	
HR5000P15	Telašćica - U. Mir				2 022	
HR5000L49	Božava				1 440	
HR5000P16	Dumboka				1 800	
HR5000L50	Luka Zapunje				2 000	
HR5000P17	Trojan				2 550	
HR5000L51	Zverinac				2 800	
HR5000L52	Hvalica				5 000	
HR5000L53	Rivarij				6 000	
HR5000L54	Lokvina				2 400	
HR5000L55	Marićevica				2 400	
HR5000L56	Uglje - luka i marina				2 400	
HR5000L57	Knož				2 600	
HR5000L58	St. Mali				2 800	
HR5000P18	Pristan - U. Provenska				2 800	
HR5000L59	Milina				1 500	
HR5000L60	Uglje - tr. pr.				2 500	
HR5000P19	Lokvina Veli				1 800	
HR5000L61	Kaljeva				3 500	
HR5000M1	Marina Viteznak				2 574	
HR5000M2	Marina Zadar - tankokomora				2 445	
HR5000L62	Blatje				2 700	
HR5000L63	Šušunja				2 700	
HR5000L64	Baranj				2 800	
HR5000L65	Dobrovoljansko				2 800	
HR5000L66	Novižan				1 650	
HR5000L67	Palagruža				2 500	
HR5000L68	Pašanski				2 050	
HR5000L69	Turan				2 700	
HR5000L70	Šušunja - Sv. Filip - Jakov				2 700	
HR5000L71	Biograd n/m				3 000	
HR5000L72	Biograd n/m - Ilija				2 600	
HR5000L73	Provat				1 800	
HR5000L74	Bačina				1 500	
HR5000L75	Marićevica - Ilija				3 400	
HR5000L76	Luka (Maca)				2 700	
HR5000L77	Šušunja				2 700	
HR5000L78	Sv. Nikola (Murter)				2 400	
HR5000P22	Štima				2 500	

BERTHING CHARTS - PRISTANSKI PLANOVİ

ENC CELL	Nr.	NAME	Br.	IME	Scale
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ANNEX 7 - MEDINTCHART Catalogue - HR Status - Table

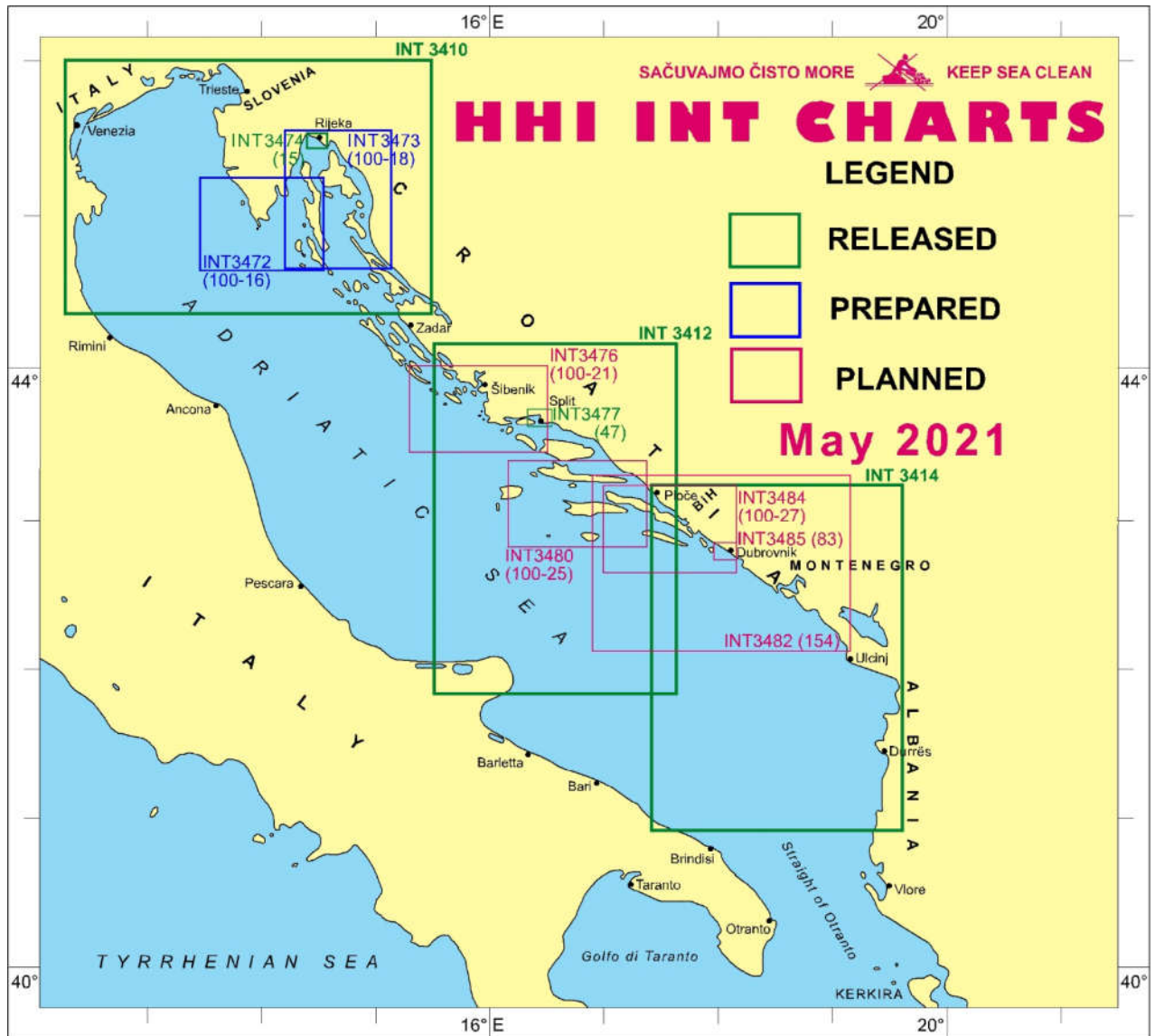
Table 1. INT charts - Croatia Printer Nation

INT No.	PR	Nat No.	Date		Scale		For	Printer Nation	Chart title	Chart limits				Status
			Publ	New Edition	I:	Latitude (N)				S	N	W	E	
300	IT	360	1984	1997	4 200 000	41°30'	A0	ES, FR, GB, HR	Mare Mediterraneo e Mar Nero	25°00.00'	49°50.20'	07°00'00"	42°15.30'	Available
301	IT	340	1972	2001	2 250 000	41°30'	A0	FR, DE, ES, GB, US, PT, HR	Mare Mediterraneo, Bacino Occidentale	32°45.00'	45°52.22'	06°44.00'	19°40.48'	Available
302	IT	350	1982	2001	2 250 000	41°30'	A0	FR, DE, ES, GB, US, HR	Mare Mediterraneo, Bacino Orientale	30°05.00'	43°39.25'	09°55.00'	36°19.50'	Available

Table 2. INT charts - Croatia Producer Nation (Pro)

INT No.	PR	Nat No.	Date		Scale		For	Printer Nation	Chart title	Chart limits				Status
			Publ	New Ed.	I:	Latitude (N)				S	N	W	E	
3410	HR		1988	2007	250 000	45°00'	A0	FR	Rijeka - Venezia	44°13.00'	45°50.00'	12°08.00'	15°28.00'	Available
3412	HR		1991	2000	250 000	42°50'	A0	FR	Split - Gargano	41°40.00'	44°00.00'	15°29.00'	17°40.00'	Available
3414	HR		1998		250 000	41°55'	A0	FR	Dubrovnik - Durrës	40°45.00'	43°04.00'	17°25.00'	19°38.00'	Available
3472	HR	100 -16	1973	1998	100 000	44°50'	B1		Pula - Kvarner	44°30.60'	45°05.20'	13°15.40'	14°27.00'	Preparation
3473	HR	100 -18	1977	1996	100 000	44°52.60'	B1		A - Pula	44°51.73'	44°53.71'	13°47.35'	13°51.46'	Preparation
3474	HR	15	2004	2020	15 000	45°18.50'	A0		Rijeka - Kvarnerić	44°31.40'	45°22.00'	14°09.40'	14°58.80'	Preparation
	HR	15	2017	2020	4 000	45°19.67'	A0		Rijeka	45°16.59'	45°20.59'	14°22.32'	14°30.52'	Available
	HR	15	2004	2020	4 000	45°19.20'	A0		A-Luka Rijeka	45°19.15'	45°20.20'	14°24.53'	14°26.73'	Preparation
	HR				4 000				B-Brajčica-kontejnarski terminal	45°18.99'	45°19.39'	14°26.66'	14°27.59'	Preparation
3476	HR	100 -21	1973	2003	100 000	43°35'	B1		Šibenik - Split	43°17.20'	43°51.80'	15°17.50'	16°28.00'	Preparation
	HR				15 000	43°19.80'	B1		A - Splitska vrata	43°18.79'	43°20.77'	16°23.37'	16°25.38'	Preparation
3477	HR	47	2002	2017	15 000	43°30.50'	A0		Split - Kaštelanski zaljev	43°27.33'	43°33.42'	16°17.62'	16°29.80'	Available
	HR				4 000	43°30.23'	A0		A - Split - Gradska luka	43°29.97'	43°30.50'	16°25.61'	16°26.66'	Preparation
	HR				4 000	43°31.70'	A0		B - Bazen Vranjic	43°31.60'	43°31.91'	16°27.73'	16°28.46'	Preparation
	HR				5 000	43°32.20'	A0		C - Bazen Solin	43°32.07'	43°32.35'	16°27.18'	16°28.23'	Preparation
3480	HR	100 -25	1972	2003	100 000	42°55'	B1		Hvar - Lastovo	42°38.40'	43°13.00'	16°12.00'	17°21.60'	Preparation
3482	HR	154	1955	1975	200 000	42°35'	B1		Pelješac - Rt Oštra	42°01.00'	43°09.00'	16°54.00'	19°10.00'	Cancelled
3484	HR	100 -27	1970	1999	100 000	42°51'	B1		Pelješac - Mljet	42°28.80'	43°03.40'	16°58.60'	18°08.20'	Preparation
	HR				20 000	42°47.70'	B1		A - Luka Polaçe	42°46.98'	42°48.34'	17°22.45'	17°26.92'	Preparation
	HR				15 000	42°46.80'	B1		B - Luka Slano	42°46.22'	42°47.35'	17°52.29'	17°53.83'	Preparation
3485	HR	83	2001		10 000	42°40'	A0		Dubrovnik	42°36.71'	42°40.81'	18°00.80'	18°08.50'	Preparation
	HR				5 000	42°39.58'	A0		A - Dubrovnik - Luka Gruž	42°39.16'	42°40.05'	18°04.47'	18°05.37'	Preparation
	HR				2 000	42°38.42'	A0		B - Dubrovnik - Stara luka	42°38.31'	42°38.55'	18°06.60'	18°06.87'	Preparation
	HR				2 500	42°40.22'	A0		C - Marina Dubrovnik	42°40.13'	42°40.33'	18°07.32'	18°07.78'	Preparation

ANNEX 8 - MEDINTCHART Catalogue - HR Status – Figure



ANNEX 9 - INT Paper Charts - HR Status – IHO INTToGIS manager

