United States of America

National Report

South West Pacific Regional Hydrographic Commission

30 November – 2 December 2016

Noumea, New Caledonia

Office of Coast Survey

National Oceanographic & Atmospheric Administration

http://www.nauticalcharts.noaa.gov

Maritime Safety Office

National Geospatial-Intelligence Agency

http://msi.nga.mil/NGAPortal/MSI.portal

Naval Meteorology and Oceanography Command

United States Navy

http://www.navmetoccom.navy.mil

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1. Hydrographic Office/Service

This National Report provides information specific to individual products and services of primary interest to the South West Pacific Regional Hydrographic Commission (SWPRHC). U.S. domestic and international hydrographic services are primarily conducted by three government agencies: (i) The National Oceanic and Atmospheric Administration's (NOAA) Office of Coast Survey (OCS), (ii) the National Geospatial-Intelligence Agency (NGA), Maritime Safety Office (MSO), and (iii) U.S. Navy, Commander, Naval Meteorology and Oceanography Command (COMNAVMETOCCOM).

NOAA provides nautical charts and related hydrographic information within the nation's Economic Exclusion Zone (EEZ). COMNAVMETOCCOM conducts oceanographic, bathymetric, and hydrographic surveys worldwide to satisfy U.S. Navy requirements. NGA is the mapping and charting authority for the U.S. Department of Defense and commercial mariners worldwide, building a global suite of nautical products and services for the U.S. Navy and commercial mariners in areas the U.S. is considered to be the charting authority.

United States Strategies for the South West Pacific

As a Pacific-facing nation, the United States has broad and fundamental interests in the South West Pacific Region. The strategic approach is governed by The United States and the Asia-Pacific Region: Security Strategy of the Obama Administration (February, 2009). Other strategic documents include the U.S. Department of Defense Asia-Pacific Maritime Security Strategy, United States Coast Guard Pacific Area Strategic Intent (Fiscal Years 2015 – 2019), and the NOAA Pacific Islands Regional Office Strategic Plan: 2016 – 2020. These documents align with the National Strategy and collectively describe in greater detail the goals, objectives, functions and organizational relationships within and between the U.S. government agencies. Additionally, each of these strategic documents acknowledges the importance of international partnerships in addressing common challenges.

The U.S. remains committed to exercising sovereignty, both preserving and protecting its interests in the region as it strengthens its commitments to its regional allies. U.S. Strategies for the South West Pacific are available at:

https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/issuesinsights_v09n01.pdf

http://www.defense.gov/Portals/1/Documents/pubs/NDAA%20A-P_Maritime_SecuritY_Strategy-08142015-1300-FINALFORMAT.PDF

https://www.uscg.mil/pacarea/PACAREA_STRATEGIC_INTENT_2016_FINAL_FOR_RELEASE.pdf

http://www.fpir.noaa.gov/Library/DIR/PIRO_Strategic_Plan_2016-2020.pdf

United States Open Data Policy – Managing Information as an Asset

Information is a valuable national and global resource. The U.S. considers information a strategic asset to the U.S. Federal Government, its partners and the public. In order to ensure the U.S. Federal Government is taking full advantage of its information resources, agencies are directed to increase operational efficiencies, reduce costs, improve services, support mission needs, ***and increase public access to valuable government information***.

The access to data and services, usable to the public, can help fuel entrepreneurship, innovation, and scientific discovery – all of which improve lives and contribute significantly to job creation. This policy is available at: https://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf

Many hydrographic data, products and services produced by the U.S. Hydrographic Office's (HO's) are generally made available for download at no cost. For nautical products and services, web deliveries of digital versions of most data are available free to the public.

For access to survey data: http://www.nauticalcharts.noaa.gov/hsd/hydrog.htm

For access to charting data: http://www.nauticalcharts.noaa.gov/staff/chartspubs.html

In addition to Safety of Navigation products and services, the U.S. is committed to making the Safety of Navigation data available in a variety of formats for as many users as possible. ENC data (S-57) can be obtained in GIS friendly format for non-traditional users, opening up HO data to a host of new customers and users. New map services are in place to allow others simple access to real time access to data, creating opportunities for near-real time coastal intelligence via interactive map viewers.

The NOAA ENC Direct to GIS website (http://www.nauticalcharts.noaa.gov/csdl/ctp/encdirect_new.htm) allows users to display, query and download all available NOAA ENC data in a variety of GIS/CAD formats, using Internet mapping technology. The NOAA NowCOAST web site (http://Nowcoast.noaa.gov) is an example of the possibilities created by delivering data for broad customer use.

NGA fully supports the U.S. Open Data Policy and is a supporter of the South West Pacific Hydrographic Commission. NGA's South West Pacific website (http://msi.nga.mil/NGAPortal/MSI.portal) also includes NGA nautical charts, sailing directions, Digital Elevation Models (DEMs), and a downloadable South West Pacific Map on its site.

International Open Government Partnership (OGP)

OGP was launched in 2011 to provide an international platform committed to making their governments more open, accountable, and responsive to citizens. Since then, OGP has grown from 8 countries to the 70 participating countries. In all of these countries, government and civil society are working together to develop and implement ambitious open government reforms. Additional information regarding the OGP can be found at: http://www.opengovpartnership.org/

Of note are the commitments nations strive to accomplish within a specified period of time. These commitments include many aspects of national governance, including commitments to overarching themes such as:

• Transparency: This includes publication of all government-held information (as opposed to only information on government activities); proactive or reactive releases of information; mechanisms to strengthen the right to information; and open access to government information.

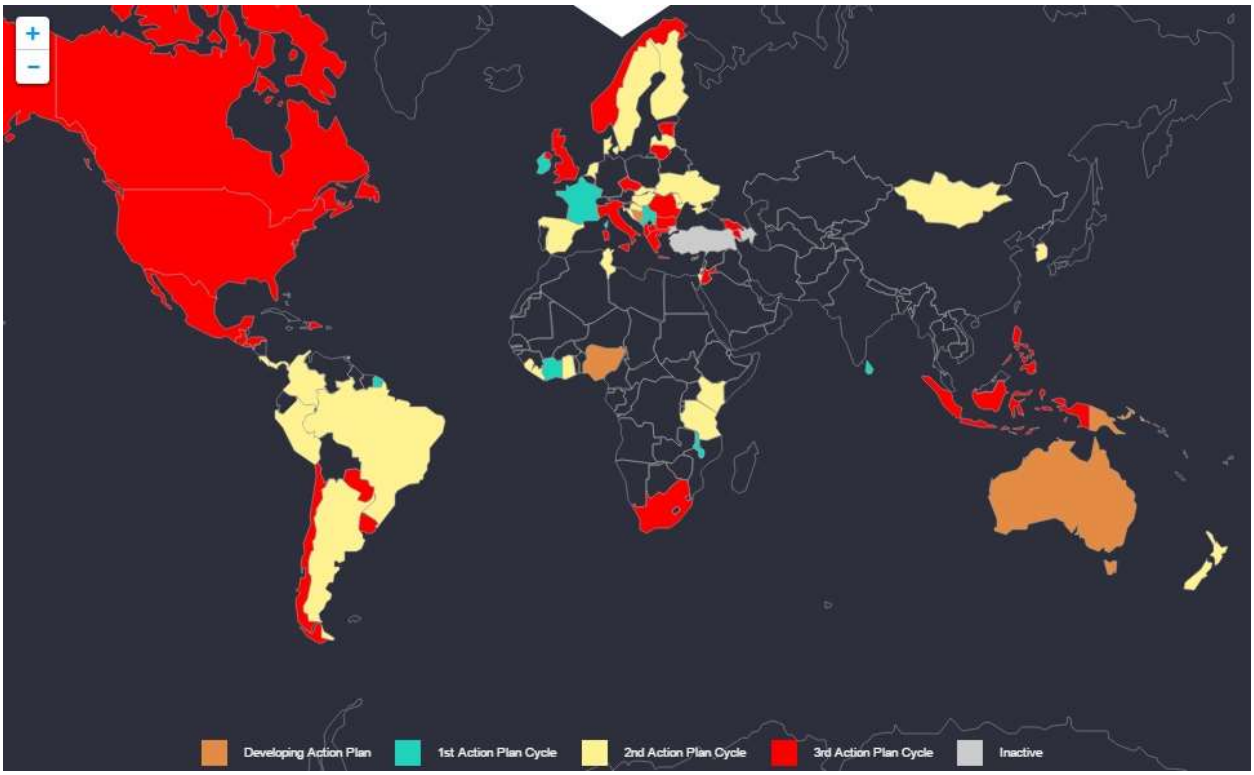
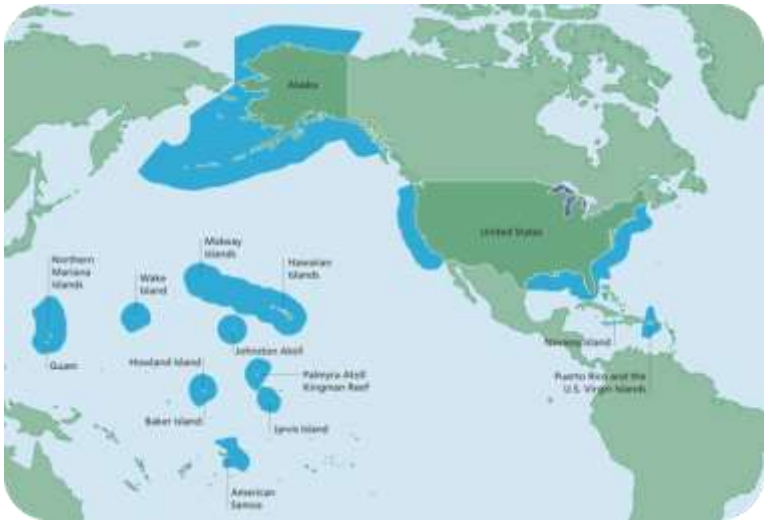


Figure 2: Participating SWPHC member states within the OGP include: Australia, France, New Zealand, Papua New Guinea, and the United States.

2. Surveys



A statutory mandate authorizes NOAA to provide nautical charts and related hydrographic information for the safe and efficient navigation of maritime commerce as well as providing basic data for engineering, scientific, and other commercial and industrial activities within the nation's 3.4 million square nautical mile EEZ and along its 95,000 miles of shoreline.

Figure 1: The U.S. EEZ.

Coverage of New Surveys

The *NOAA Hydrographic Survey Priorities* (http://www.nauticalcharts.noaa.gov/hsd/NHSP.htm) defines the methodology NOAA uses to identify survey priorities across the U.S. EEZ. *NOS Hydrographic Surveys Specifications and Deliverables* has been updated for 2016 and includes new specifications and changes made since the 2013 version. Those who acquire hydrographic survey data in accordance with NOS specifications should use the current version; 2016 Specifications and Deliverables available at http://www.nauticalcharts.noaa.gov/hsd/specs/specs.htm.

Using four NOAA ships (three of which are equipped with small boats for near shore work), six 28-foot survey boats, a research vessel, a LIDAR-capable aircraft, and private contractors, NOAA Coast Survey acquires hydrographic data that can update the nation's nautical charts with the accuracy and precision that is essential to maintain the public trust in navigational products.

The U.S. Navy COMNAVMETOCCOM surveys waters outside the United States and in the territorial waters of other nations through diplomatic channels and international agreements. Hydrographic data and information from surveys conducted in territorial waters are shared between the US and the Host Nation. The Naval Oceanographic Office (NAVOCEANO), a subordinate command of COMNAVMETOCCOM, currently has five Pathfinder Class 100-meter multi-purpose survey ships to conduct oceanographic, bathymetric, and hydrographic surveys in deep-ocean and coastal waters. These ships are USNS PATHFINDER (T-AGS 60), USNS MARY SEARS (T-AGS 65), USNS BOWDITCH (T-AGS 62), USNS HENSON (T-AGS 63), and USNS BRUCE C. HEEZEN (T-AGS 64). BOWDITCH, HENSON, and HEEZEN each carry two 10-meter hydrographic survey launches (HSLs).

USNS SUMNER (T-AGS 61) was inactivated in 2014 but the new ship USNS MAURY (T-AGS 66) was delivered in early 2016 bringing NAVOCEANO's survey fleet back up to six ships. Maury is eight meters longer than previous ships of the class to accommodate a moon pool for operating unmanned underwater vehicles (UUV).

NAVOCEANO has upgraded its Airborne Coastal Survey (ACS) capability with the new Optech, Inc., Coastal Zone Mapping and Imaging LIDAR (CZMIL) system. The system is flown on a Basler BT-67, a refurbished DC-3. NAVOCEANO is currently using the new system to conduct airborne hydrographic surveys.

Fleet Survey Team (FST), a subordinate command of NAVOCEANO is comprised of approximately 65 military and civilian surveyors. FST employs various small craft for survey including 9-meter SAFE boats (Defender-class) and Sea Arks, fitted with multi-beam and rapid littoral survey vehicles (ESVs) which are personal water crafts fitted with a single beam echo sounder and side scan sonar. All FST craft can be transported aboard C-130 aircraft for rapid deployment. FST also has equipment to outfit boats of opportunity for survey. This capability is used to address standard Navy survey requirements, but has also been employed to ensure clear approach corridors in support of humanitarian aid and disaster relief.

NAVOCEANO's survey ships, ACS aircraft, and FST have all been utilized in the past to conduct cooperative hydrographic surveys through Memoranda of Agreements (MOA) with countries in the region.

3. New Charts and Updates

Digital Nautical Chart (DNC) and Electronic Nautical Charts (ENC)

The US (NGA) produces three (3) DNCs in SWPHC waters. These DNCs are maintained by NGA with new source information from the US and prime foreign hydrographic authorities. This product is Limited Distribution and is not available for public sale or download.

NGA, in coordination with NOAA produced two ENC cells, primarily in the waters around Palau. When permitted, NGA will seek to complete the entire country.

See Appendix A for figures and tables

Paper charts and Raster Navigational Charts (RNC)

NGA produces 435 paper charts for the SWPHC region in their DNC portfolio, but NGA is withdrawing many of them from public sale. The only charts NGA will continue to distribute to the public are those where NGA is the primary charting authority. These are specifically areas where the US conducts the surveys, compiles and issues the chart, and there is no functioning national authority or NGA has specific authority (e.g. Trust Territory of the Pacific).

NGA does not produce RNCs. However, NOAA does produce EEZ ENCs in the region with USEEZ1M, USEEZ2M and US EEZ3M, primarily around the Marianas Islands, American Samoa, Cook Islands and Kingman Reef. NOAAs RNC catalogue can be found at:

http://www.nauticalcharts.noaa.gov/mcd/catalogs/viewer.php?cat=Pacific&side=Chart

International (INT) Charts

NGA shares INT chart responsibility within the SWPHC region, primarily over US Trust Territories and builds its chart schema and DNC library limits from these INT schema, if practical. NGA is responsible for 7 of the 8 INT Charts for which the US is responsible in the SWPHC Region (charts 5712, 5090, 5092, 5093, 5094, 5095, and 5096), while NOAA is responsible for Chart 5091.

ENC distribution

U.S. ENCs, including newly created NGA ENCs, are distributed directly from NOAA on the web at www.nauticalcharts.noaa.gov. They are also available through NOAA ENC® Distributors.

NOAA ENC® Distributors

Company	Certification Type[1]
Baker Lyman and Co	CED
ChartWorld	CEVAD
C-MAP Norway	CEVAD
Creative Map Corp	CED
Maris	CED

[1] A CED is a "Certified NOAA ENC® Distributor" who is permitted to download NOAA ENC® files, perform exact copying, and redistribute those copies of NOAA ENC® data. A CEVAD is a "Certified NOAA ENC® Value Added Distributor" who is permitted to reformat official NOAA ENC® data into a System Electronic Navigational Chart (SENC) using type-approved software, and may distribute the SENC.

National Geospatial-Intelligence Agency (NGA)	CED
Primar	CED
Titafin	CED
Transas	CEVAD
United Kingdom Hydrographic Office	CED

Regional ENC Coordinating Center (RENC) Membership

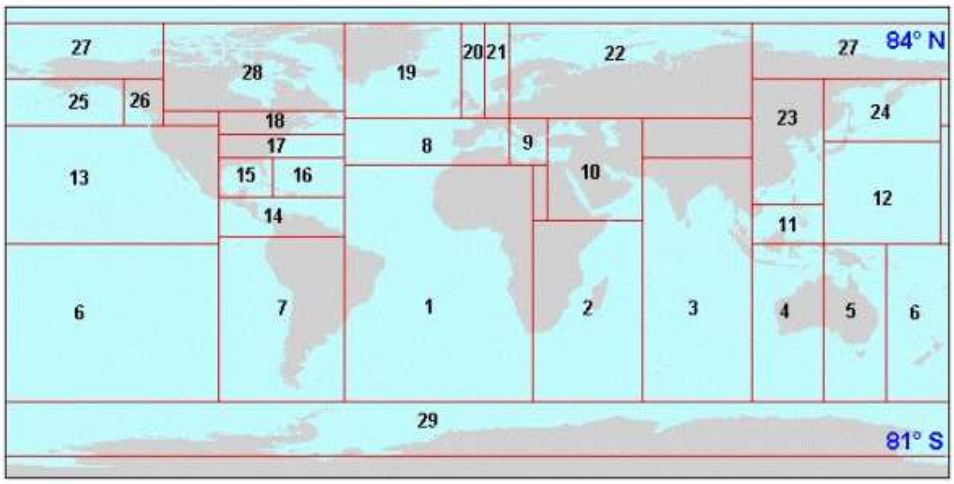
At the annual meeting of its steering committee in September 2015, the International Centre for Electronic Navigational Charts (IC-ENC) agreed to accept NOAA as a member of its organization and to establish an IC-ENC regional office, “IC-ENC North America.”

Regional IC-ENC offices conduct full and independent validation of all ENC data from regional members before it is published. They also handle data distribution to value-added resellers on behalf of their members.

Digital Nautical Chart (DNC)

The U.S. produces many DNCs in the SWPHC waters. The DNC is produced by the National Geospatial-Intelligence Agency (NGA) and is an unclassified, vector-based, digital database containing maritime significant features essential for safe marine navigation. The DNC uses the Vector Product Format, which is a NATO standard for digital military map and chart data. Additional details can be located at: http://msi.nga.mil/NGAPortal/DNC.portal or http://www.nauticalcharts.noaa.gov/mcd/learn_diffENC_DNC.html

DNC consists of libraries in a variety of scales for complete worldwide coverage. South West Pacific data is included in DNC regions 4, 5, and ~~6, 11, 12, 13~~6. See coverage below.



They are maintained by NGA with new source information from the U.S. and prime foreign hydrographic authorities. This product is Limited Distribution and is not available for public sale or download except within U.S territorial waters and where source data restrictions allow. However, data can be shared with host nations based on Bi-lateral agreements.

For requests regarding DNC data, please contact maritime.international@nga.mil

Raster Navigational Charts (RNC)

In 2014, the U.S. Government ceased printing of lithographic nautical charts. U.S. paper charts are available on a Print on Demand basis from NOAA Certified Printers. The list of NOAA Certified Printers is available at http://www.nauticalcharts.noaa.gov/staff/print_agents.html.

U.S. RNCs may be downloaded from a list at http://www.charts.noaa.gov/RNCs/RNCs.shtml or through the Coast Survey's Nautical Products Catalog at http://www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml

NGA does not produce RNCs.

Standard Nautical Charts (SNC)

NGA produces many Standard Nautical Charts (SNC) for the SWPHC region in their SNC portfolio and not all are publicly available, however NGA currently has approximately 980 SNCs posted to its public South West Pacific website.~~South West Pacific website.~~ NGA is withdrawing many SNCs from public sale due to intellectual property issues as they produce new edition charts. NGA will continue to distribute to the public charts where NGA and the U.S have historically been the primary charting authority. Other factors include areas where the U.S. conducts the surveys, compiles and issues the chart, and there is no functioning national authority or NGA has specific authority. NGA seeks cooperation of nations within

a region to allow public distribution of data, products and services that are national and regional assets to be used to promote economic benefit.

NOAA produces many SNC in the SWPHC region. The charts and the dates of latest editions are updated weekly can be obtained at the NOAA chart library: http://nauticalcharts.noaa.gov/mcd/dole.htm

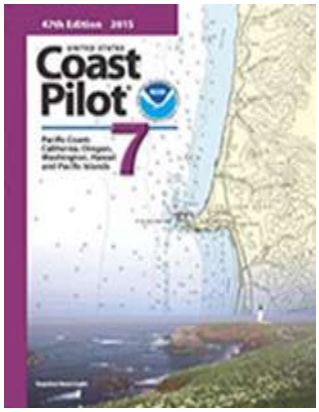
International (INT) Charts

NGA shares INT chart responsibility within the SWPHC region, primarily over US Trust Territories and builds its chart schema and DNC library limits from these INT schema, if practical. NGA is responsible for 7 of the 8 INT Charts for which the US is responsible in the SWPHC Region (charts 5712, 5090, 5092, 5093, 5094, 5095, and 5096), while NOAA is responsible for Chart 5091.

4. New Publications and Updates

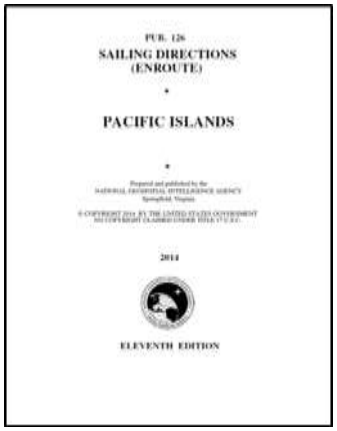
Updated Publications

United States Coast Pilot



The United States Coast Pilot consists of a series of nine regionally-focused nautical books that cover a variety of useful information important to navigators for coastal and intra-coastal waters and the US Great Lakes. Coast Pilot 7 - 47th Edition, 2015, covers the coasts of California, Oregon and Washington, and includes Hawaii and other United States territories in the South Pacific. For the SWPHC region Coast Pilot 7 covers the island of American Samoa. US Coast Pilot now offers completely updated publications every week. US Coast Pilots can be downloaded at: http://www.nauticalcharts.noaa.gov/nsd/cpdownload.htm

Sailing Directions



Sailing Directions is produced and maintained by NGA. It consists of useful information important to navigators of coastal waters. Information for the SWPHC region is contained in:

Publication 126 – Pacific Islands

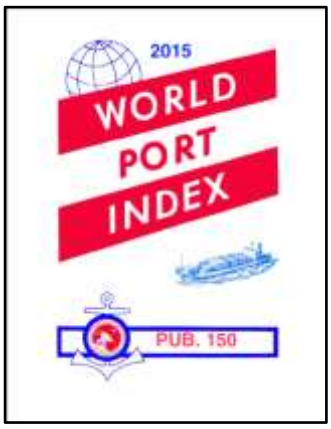
Publication 127 – East Coast of Australia and New Zealand

Publication 175 – North, West and South Coasts of Australia

Digital updates can be downloaded from NGA at

http://msi.nga.mil/NGAPortal/MSI.portal

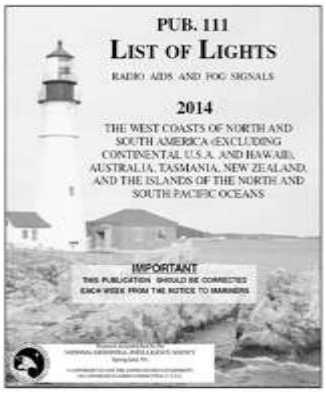
World Port Index



World Port Index (Pub150) is produced and maintained by NGA. It contains the location and physical characteristics as well as the facilities and services offered by major ports and terminals world-wide.

Digital updates are available to the public and posted at the NGA Maritime Safety website, at http://msi.nga.mil/NGAPortal/MSI.portal.

List of Lights, Radio Aids and Fog Signals



The NGA *List of Lights, Radio Aids and Fog Signals* and their digital updates are available to the public and posted at the NGA Maritime Safety website, at http://msi.nga.mil/NGAPortal/MSI.portal.

Publication 111 - The West Coasts of North and South America (Excluding Continental USA and Hawaii), Australia, Tasmania, New Zealand, and the Islands of the North and South Pacific Oceans covers the SWPHC region.

5. Maritime Safety Information (MSI)

Existing infrastructure for transmission

The U.S. Coast Guard issues Notices to Mariners for NOAA charts, while NGA issues Notices to Mariners for NGA charts in the SWPHC region.

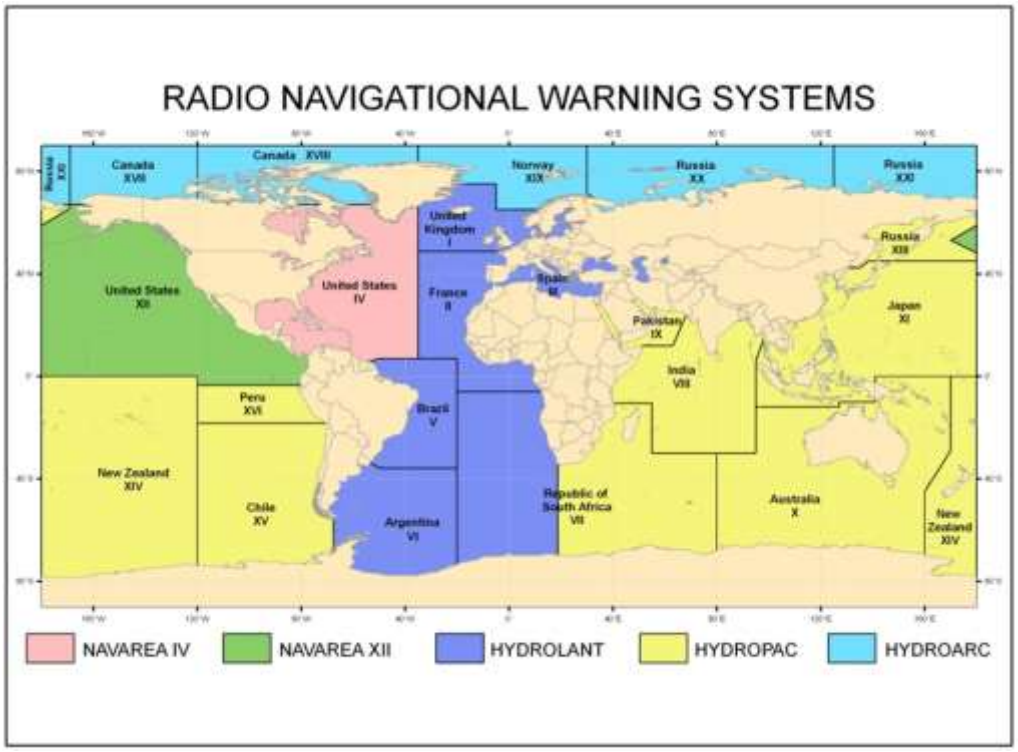
Notice to Mariners


No. 38
17 SEPTEMBER 2011
UNITED STATES OF AMERICA
NOTICE TO MARINERS
Contents
Visit the Maritime Safety Web site at http://msi.nga.mil/NGAPortal/MSI.portal

The U.S. Notice to Mariners provides timely marine safety information for the correction of all U.S. Government navigation charts and publications from a wide variety of sources, both foreign and domestic. Information published in Notice to Mariners provide for the correction of unclassified nautical charts, the unclassified NGA/DLIS Catalog of Hydrographic Products, United States Coast Pilots, NGA List of Lights, U.S. Coast Guard (USCG) Light Lists, and other related nautical publications produced by NGA, National Ocean Service (NOS), and the USCG. The U.S. Notice to Mariners corrects NGA and NOS charts using information collected from many sources, among them the Local Notice to Mariners published by the nine U.S. Coast Guard Districts.

The U.S. Notice to Mariners are posted at the NGA Maritime Safety website at http://msi.nga.mil/NGAPortal/MSI.portal

Navigation Warnings



Australia (NAVAREA X) and New Zealand (NAVAREA XIV) are the NAVAREA Coordinators for SWPHC. All member states within the SWPHC Region are encouraged to relay pertinent maritime safety information to those authorities for widespread promulgation.

6. C-55[2]

The most recent US update to C-55, Status of Hydrographic Surveying and Nautical Cartography Worldwide, is as follows:

A = percentage which is adequately surveyed

B = percentage which requires re-survey at larger scale or to modern standards

C = percentage which has never been systematically surveyed

	A	B	C
Depths < 200m	17	1	0
Depths > 200m	0	0	94

In addition, NOAA's National Ocean Service publishes both flat and folded nautical charts. The folded charts are shelved in pamphlet shelf files in the map area, and the flat charts are in flat file cabinets in the same area. There are also some bound nautical charts in book form located underneath the folded nautical charts.

- Nautical charts come in a wide variety of chart types, but they are all accessed by 5 digit number as found in the Nautical Chart Catalog, copies of which are in the map area as well as at the front desk. (Exceptions to this 5 digit number are chart numbers 50, 411, 500, 501, 530, and 531).

A chart library can be accessed at: http://nauticalcharts.noaa.gov/mcd/dole.htm

7. Capacity Building

Offer of and/or demand for Capacity Building

The United States is an active participant in the IHO Capacity Building Sub-Committee (CBSC), and the US/NGA directly supports the IHO Maritime Safety Information (MSI) training course as well as provide support to nations through on site and remote guidance ad advice as they grow their hydrographic capacity.

Training offered

Training opportunities are available at various institutions in the United States. Two Category A certified hydrographic programs are available through:

- The University of Southern Mississippi (USM)
  - www.marine.usm.edu/hs.php
- The University of New Hampshire (UNH)
  - www.marine.unh.edu/research/ccom.html

COMNAVMETOCCOM and USM are partners in their Category A program and NOAA has a similar arrangement with UNH for their Category A program. COMNAVMETOCCOM also offers a six-month category B International Hydrographic Management and Engineering Program and mobile training via its Naval Meteorology and Oceanography Professional Development Center in Gulfport, Mississippi. COMNAVMETOCCOM's Category A and B programs and mobile training also qualify for Security Cooperation assistance.

CAPT Andrew Armstrong, NOAA (ret.), NOAA co-director of the Joint Hydrographic Center at UNH, is a member of the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers. As a member of the board, CAPT Armstrong is available to advise institutions on establishing hydrographic training curricula and preparing submissions to the International Board for Category A or Category B recognition. (andy.armstrong@noaa.gov).

In July 2016, NOAA, the University of New Hampshire (JHC), and GEBCO conducted the second Chart Adequacy Evaluation Workshop. The Workshop was held in Silver Spring, Maryland and co-sponsored by NOAA and the UKHO with 15 participants from 13 nations attending. This workshop provided training regarding a chart adequacy assessment procedure using automatic-identification system (AIS) data and satellite-derived bathymetry (SDB). Currently, the U.S. is exploring opportunities to offer the course again in latter 2017. Currently, there are only two spots left for this year. For further information, please contact Anthony.Klemm@noaa.gov or Dr. Shachak Pe'eri at shachak.peeri@noaa.gov.

8. Oceanographic Activities

General Bathymetric Chart of the Oceans (GEBCO) and Seabed 2030

The IHO-IOC General Bathymetric Chart of the Ocean (GEBCO) Project provides an open and freely available 30" gridded elevation model of the world's seafloor and landmass. According to GEBCO Digital Atlas Manager's Report (GDAMR33) many scientists have used this model for research purposes. However, this model is unreliable in many areas owing to the lack of direct seafloor measurements. To address the lack of direct measurements, many in the international community have provided data to improve the quality of the model. In the IHO circular letter (IHO CL 11/2016), Member States were invited to provide shallow water bathymetric data from Electronic Navigational Charts (ENC) in order to help improve the GEBCO grid.

The United States participates on the IOC-IHO Guiding Committee for GEBCO, and hosts the IHO Data Centre for Digital Bathymetry at NOAA's National Centers for Environmental Information (NCEI) (formerly the National Geophysical Data Center, NGDC). The British Oceanographic Data Center (BODC) hosts the GEBCO grids and outputs from the various regional mapping efforts.

Seabed 2030

Introduction/background

The shape and depth of the ocean floor forms one corner stone of the geospatial framework that is needed to effectively manage the marine component of a coastal nation. The data is a national and global resource that with broad use, creates opportunities for operational efficiencies, cost savings and reduction of risk to marine navigation. Providing broad access to data, usable to the public, can help fuel entrepreneurship, innovation, and scientific discovery – all of which improve lives and contribute significantly to job creation. The use of ocean depth data includes scientific research, navigation, exploration, fisheries and tourism, to name just a few. Sharing data across regions allows improved understanding of physical characteristics across large ecosystems and economic activities that transcend national boundaries.

The need for a global commitment to support improvements to GEBCO Gridded Models

The IHO-IOC General Bathymetric Chart of the Ocean (GEBCO) Project provides an open and freely available 30” gridded elevation model of the world’s seafloor and landmass. According to GEBCO Digital Atlas Manager’s Report (GDAMR33) many scientists have used this model for research purposes. However, this model is unreliable in many areas owing to the lack of direct seafloor measurements. To address the lack of direct measurements, many in the international community have provided data to improve the quality of the model. In the IHO circular letter (IHO CL 11/2016), Member States were invited to provide shallow water bathymetric data from Electronic Navigational Charts (ENC) in order to help improve the GEBCO grid. Prior this request, several countries volunteered ENC sounding data to improve the quality of the model in coastal areas. Significant improvements could be made in the SWPHC region if Member States and regional community members contribute more data, and support research and data collection initiatives to increase our common understanding of the oceans.

In the opening address of the Future of Ocean Floor Mapping (FFOFM) in Monaco in June 2016, Mr. Sasakawa, Chairman of The Nippon Foundation, set forth an initiative to partner with GEBCO to cooperatively work towards mapping 100% of the World Ocean bathymetry by 2030. This initiative led to the formulation of Seabed 2030, a global project within the framework of the General Bathymetric Chart of the Oceans (GEBCO) with the focused goal of leaving no features of the World Ocean floor larger than 100 m unmapped by the year 2030. At the 33rd meeting of the GEBCO Guiding Committee, the Seabed 2030 Project was approved. Seabed 2030 sets the goal of collecting, using and sharing, data of the world’s oceans. The project seeks to encourage the data collectors and data managers of governmental, academic and private interests to work together to improve the quality of publicly-available grids of the ocean floor. This project is focused on the goal of compiling a high-resolution, openly available, Digital Bathymetric Model (DBM). This DBM should efficiently provide bathymetric information to end users and leave no features of the World Ocean floor smaller than 100 m unmapped by the completion of the program. The Seabed 2030 project has great potential to create partnerships and cooperation between interested parties, significantly improving our understanding of the sea floor and empower sustainable ocean management in the coming century.

Based on GEBCO's successful experiences of working with Regional Mapping Projects, the structure of Seabed 2030 rests on the establishment of two types of new technical mapping centres, a Global Data Assembly and Coordination Center (GDACC) and Regional Data Assembly and Coordination Centers (RDACCs). The regional centers will be responsible for championing regional mapping activities as well as assembling and synthesizing bathymetric information within their prescribed region. The global center will be responsible for producing centralized GEBCO products and centralized data management for non-regionally sourced data. In ocean regions where strong mapping initiative already are operational, Seabed 2030 will strive to avoid duplication and instead work towards fostering a close collaboration for the most efficient use of global resources.

The US joins other nations in support of improvements to the GEBCO gridded models of the world's seafloor, and note great benefit in supporting their continuing improvement. To do this, nations must make ocean depth data available to the project. One simple way is by sharing ENC soundings, and where national policy allows, sharing full resolution data sets. Several US agencies have provided data and data management resources for improvements GEBCO 30" model, and continue to support the development of crowd-sourced data sharing through the IHO Data Center for Bathymetry Digital (DBDC). These IHO projects establish the framework and encourage data sharing which benefits the global international maritime and oceanographic community.

Recommendations

The South West Pacific Hydrographic Commission (SWPHC) Member States are encouraged to provide bathymetric sounding data to General Bathymetric Chart of the Ocean (GEBCO) in support of mapping the world's oceans and become active participants of the IOC-IHO GEBCO Seabed 2030 project.

Action Required of SWPHC

The SWPHC is invited to:

- Note the report;
- Participate as active members of the GEBCO Seabed 2030 project;
- Provide bathymetric data to the IHO DCDB to support mapping ocean areas at high resolution;
- Provide shallow water bathymetric data from Electronic Navigational Charts (ENC) to the IHO DCDB;
- Develop strategies to collect bathymetric data in ocean areas; and
- Take action as seen appropriate.

Crowd-Sourced Bathymetry

Crowd-Sourced bathymetric data can be used to identify areas where nautical charts are inadequate and proper hydrographic surveys are needed or can be applied to nautical charts when the source and uncertainties of the data are well understood. The key to successful CSB

efforts are volunteer observers who operate vessels-of-opportunity in places where charts are poor or where the seafloor is changeable and hydrographic assets are not easily available.

The NOAA Office of Coast Survey is providing financial support for an IHO-initiated project to develop a global database for crowd sourced bathymetry hosted by the IHO Data Centre for Digital Bathymetry (IHO DCDB). The IHO DCDB, co-located with NOAA's National Centers for Environmental Information (NCEI), is building the infrastructure necessary to provide archiving, discovery, display and retrieval of global crowd-sourced bathymetry data from mariners around the world. The vision is to tap into the enthusiasm for mapping the ocean floor by enabling trusted mariners to easily contribute data to fill the gaps in our current bathymetric coverage.

NOAA and NGA are active participants in the IHO Crowd-Sourced Bathymetry Working Group (CSBWG), and together, with other CSBWG members, they are compiling a CSB Guidance Document for layman mariners who wish to contribute data to the IHO DCDB. This document will provide volunteer collectors with information about CSB, the installation and use of CSB data loggers, data quality issues, and instructions for submitting the data to the IHO data repository.

Appendix A

NGA ENC Coastal and Harbor scale library coverage and list for Marshall Islands, Palau and Micronesia

The US (NGA) is responsible for producing ENCs in areas where the US functions as the Prime Charting Authority outside US domestic waters. NGA recently produced two (2) ENCs within the SWPHC region.