

# UNITED STATES OF AMERICA

## National Report

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### **Meso-American and Caribbean Sea Hydrographic Commission (MACHC) Varadero, Cuba 27 November-02 December 2017**



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>  
<https://www.nga.mil/Pages/Default.aspx>



Naval Meteorology and Oceanography Command  
United States Navy  
<http://www.navmetoccom.navy.mil>  
<https://www.facebook.com/NavalOceanography/>

## Hydrographic Office/Service

This National Report provides specific information pertaining to individual products and services of primary interest to the Meso-American and Caribbean Sea Hydrographic Commission (MACHC). U.S. domestic and international hydrographic services are primarily conducted by three government agencies: The National Oceanic and Atmospheric Administration's (NOAA) Office of Coast Survey (OCS), the National Geospatial-Intelligence Agency (NGA), and the Naval Meteorology and Oceanography Command (CNMOC, U.S. Navy). A fourth agency, the U.S. Army Corps of Engineers, is responsible for hydrographic surveys in designated U.S. federal waterways and inland rivers, and produces U.S. inland ENC's (IENCs).

## 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 take 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**. 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.

Many hydrographic data, products and services produced by the U.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 as follows:

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

### The NOAA ENC Direct to GIS website

([http://www.nauticalcharts.noaa.gov/csdl/ctp/encdirect\\_new.htm](http://www.nauticalcharts.noaa.gov/csdl/ctp/encdirect_new.htm)) provides users access to all available NGA / 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 real-time data for broad customer use.

NGA fully supports the U.S. Open Data Policy and is a regular supporter of making data available to support ongoing crisis situations such as those caused by the recent Hurricanes Harvey, Irma, and Maria events, which are provided at:

<https://www.nga.mil/Pages/default.aspx>, and by clicking on the NGA Hurricane Support Icon. Alternatively the Analyst can go directly to the webpage at:

<http://nga.maps.arcgis.com/apps/MapAndAppGallery/index.html?appid=85c45e071293405ba0926b75d740f83e>

This data supports not only the U.S. agencies that are responding to the crisis but also the many responding partners as well.

## International Open Government Partnership (OGP)

OGP was launched in 2011 to provide an international platform committed to making governments more open, accountable, and responsive to citizens. Since then, OGP has grown from 8 countries to 75 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/>.

OGP embraces the principles of transparency and open government with a view toward achieving greater prosperity, well-being, and human dignity in our respective countries and in an increasingly interconnected world. These principles are very much in line with the MACHC Statutes of promoting technical cooperation and training, stimulation of all countries in the Region to expand their hydrographic capabilities, and coordination of hydrography and charting efforts within the Region in order to promote Safety of Navigation.



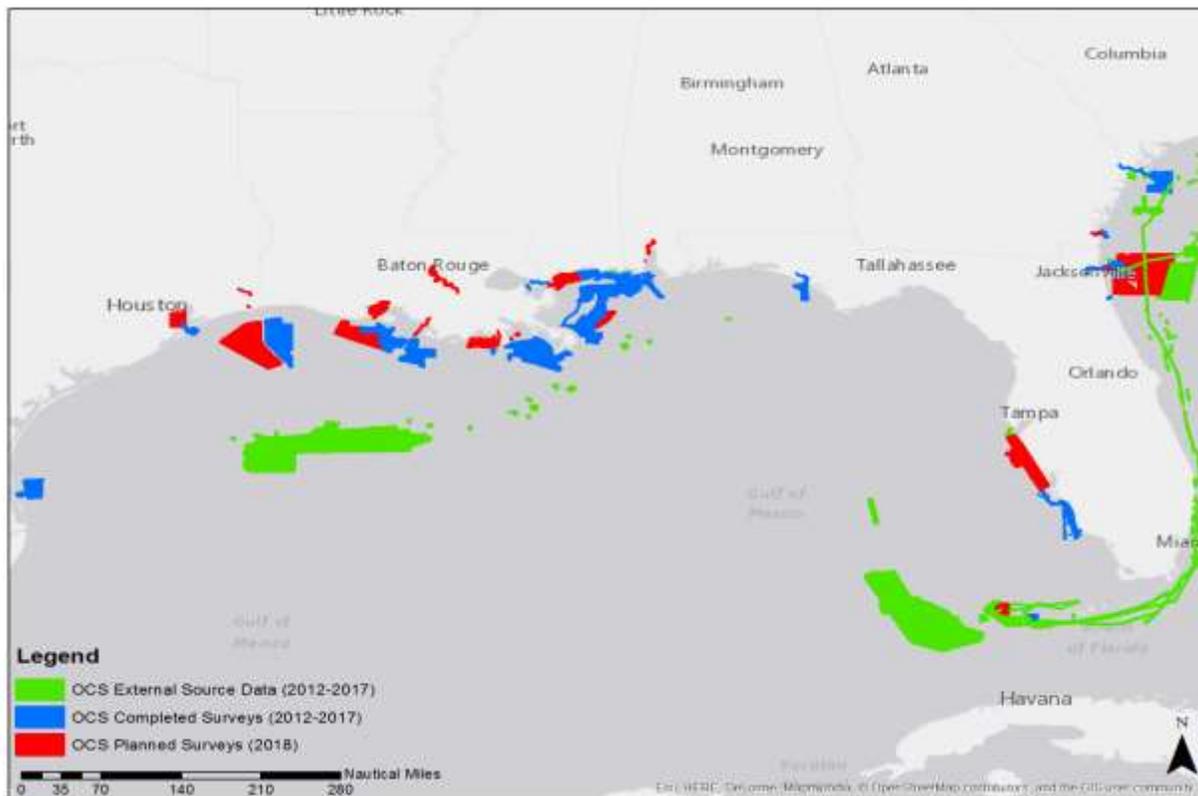
Participating MACHC member states within the OGP include: Brazil, Costa Rica, Colombia, Dominican Republic, El Salvador, France, Guatemala, Honduras, Jamaica, Mexico, Netherlands, Panama, Trinidad & Tobago, United Kingdom, and the United States.

## 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.

### Survey operations in the Gulf of Mexico over the last five years

NOAA has issued 21 task orders to contractors for Gulf of Mexico hydrographic survey projects over the past five years (2012-2017). Usually, NOAA contractors have one or more task orders per year. Total awards for these task orders exceeded \$61,000,000. In total, contractors and NOAA vessels mapped over 2,400 square nautical miles (SNM) in the Gulf for charting. In addition, over 7,000 SNM of external data sources were assessed for charting.



Hydrographic surveys conducted by NOAA’s Office of Coast Survey between 2012 and 2017, planned for 2018 and outside source data that was evaluated and applied to the charts in the Gulf of Mexico.

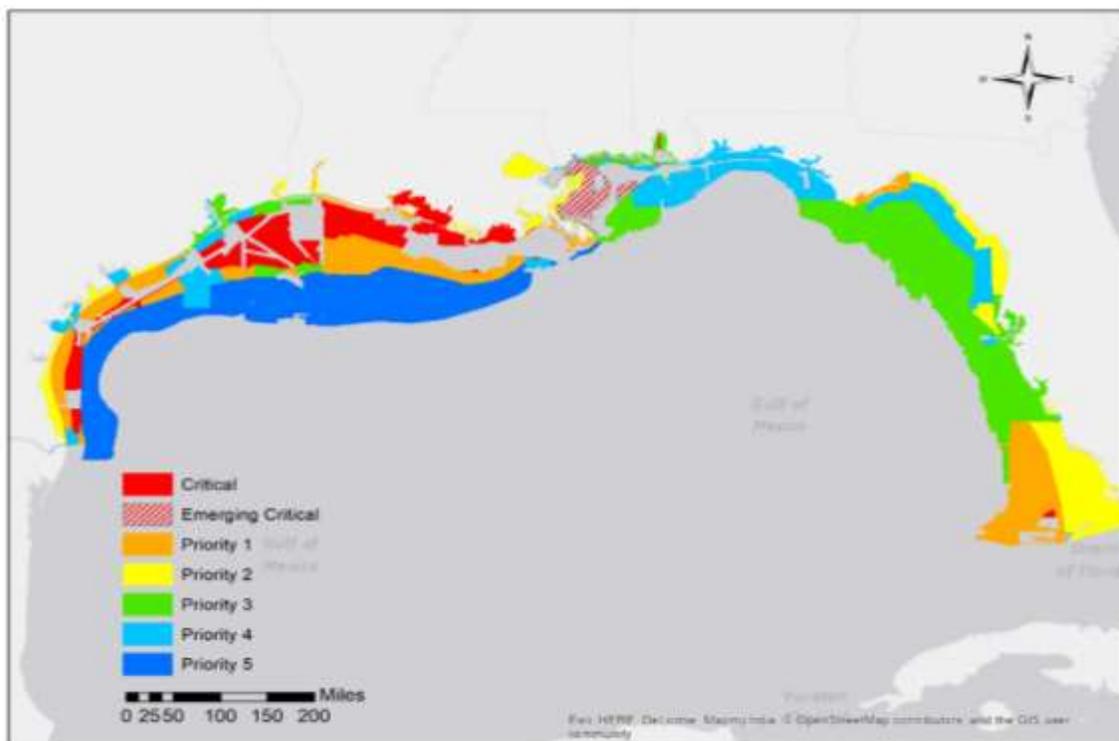
### Coast Survey Gulf of Mexico-region survey priorities

Last published in 2012, the NOAA Hydrographic Survey Priorities (NHSP) document partitioned all U.S. waters based on the need for the acquisition of modern bathymetric coverage. Each partition was then assigned a survey priority rating from “Critical” (most

important) to “Priority 5” (least important) based on the water depth, anticipated vessel traffic, and age/quality of the existing hydrographic holdings. .

A full description of the NHSP can be found here: <http://www.nauticalcharts.noaa.gov/hsd/NHSP.htm>

The 2012 NHSP is a direct descendent of the original 1994 NHSP, as such, the document does not reflect modern knowledge regarding vessel traffic patterns and change in port usage from the past two decades. Further, the original NHSP did not meaningfully address the dynamics of the seafloor and the potential need for resurveying. NOAA is presently developing a new survey prioritization model based on a thorough risk analysis of all U.S. waters, which will incorporate, among many factors, modern vessel and port usage data sets. This risk-based model will be implemented in 2018.



Outstanding hydrographic survey priorities based upon the 2012 edition of the NHSP.

Area remaining of various categories of the 2012 NOAA Hydrographic Survey Priorities (in addition to the areas addressed in the past 5 years) within Gulf of Mexico:

- Critical – 8,304 SNM remaining
- Priority 1 – 11,162 SNM remaining
- Priority 2 – 8,051 SNM remaining
- Priority 3 – 14,363 SNM remaining)
- Priority 4 – 8,617SNM remaining
- Priority 5 – 14,348 SNM remaining
- TOTAL – 64,845 SNM remaining

## Survey plans for the near future in the Gulf region

Over the next few years, approximately 7,000 SNM of survey are tentatively planned for the Gulf of Mexico. The survey areas, shown below, are presently focused on regions previously identified as high priority by the 2012 edition of the NHSP; however, (as discussed in the previous section) these areas will be iteratively updated in early 2017 as the refined risk-based model for establishing survey priorities is implemented. The surveys will be a combination of either 200% side scan sonar in regions of critical under keel clearance, or 100% side scan sonar surveys where there is a relaxed requirement for feature detection. These plans do not reflect emerging storm response work.



Preliminary hydrographic survey plans of NOAA's Office of Coast Survey in the Gulf of Mexico.

The U.S. Navy surveys waters outside the United States and in the territorial waters of other nations through diplomatic channels and international agreements to support safety of navigation initiatives that enhance maritime commerce and maritime security while supporting relationship and capacity building initiatives. 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 COMNAVMETCOM, currently has six (6) 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 BOWDITCH (T-AGS 62), USNS HENSON (T-AGS 63), USNS BRUCE C. HEEZEN (T-AGS 64), USNS MARY

SEARS (T-AGS 65), and USNS MAURY (T-AGS 66). BOWDITCH, HENSON, and HEEZEN each carry two 10-meter hydrographic survey launches (HSLs). The new ship, USNS MAURY (T-AGS 66), is eight (8) 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 surveying, including two 9 meter Workskiff with amidships transducer moon pools and two Sea Arks, fitted with multi-beam sonar technology and peripherals. They also employ rapid littoral survey vehicles (RLSVs) 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 maintains a year round stand by Fly-Away Team consisting of four personnel and survey gear to outfit boats of opportunity. 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.

In 2017, the US Navy conducted cooperative hydrographic surveys in Nevis (Long Point, Charleston), Guatemala (Puerto San Jose), and Panama (Bocas del Toro) in support safety of navigation. Navy plans to continue cooperative hydrographic survey activities in Belize, Suriname, and Panama in 2018.

## **New Charts and Updates**

### **Nautical Information System (NIS)**

The Office of Coast Survey's Marine Chart Division completed a major milestone in the modernization of nautical chart production. Four years ago, the division began the task of loading the entire portfolio of over 1,000 electronic navigational charts (ENC) into the Nautical Information System database. This database is where the division stores and updates all of the information used to produce the weekly ENC updates, as well as the data used to update NOAA's other nautical chart products. The project was initially planned to take five years, but was completed almost a year ahead of schedule. With the database load completed, work on the system is now focused on improving the quality of the data and streamlining the production process to get data vital to safe navigation into the hands of mariners more quickly.

### **Electronic Nautical Charts (ENC)**

The U.S. (NOAA) produces 223 ENCs in domestic waters within the MACHC region. There will be a total of 401 new editions for 2017.

The U.S. (NGA) produces ENC's in areas where the U.S. functions as the Prime Charting Authority outside U.S. domestic waters. Currently, NGA has 15 ENC's in the MACHC Region available, specifically in Haitian and Panamanian waters. These ENC's will continue to be maintained by NGA with new source information from the U.S., Panama, and Haiti as it becomes available. There are also an additional 11 ENC's completed but not yet published, and 3 more ENC Cells are currently in work. These are shown in Appendix A to this Report. The US (NGA) is working to expand its ENC Portfolio within the MACHC Region in areas where the U.S. is the Prime Charting Authority.

ENC Band	1	2	3	4	5	6
Number of U.S. ENC's existing in MACHC Region (NOAA)	3	5	14	62	119	5
Number of U.S. ENC's existing in MACHC Region (NGA)	0	0	0	7	16	0

### ENC distribution

U.S. ENC's, including newly created NGA ENC's, are distributed directly from NOAA on the web at [www.nauticalcharts.noaa.gov](http://www.nauticalcharts.noaa.gov). They are also available through NOAA ENC® Distributors.

### NOAA ENC® Distributors

Company	Certification Type <sup>1</sup>
<a href="#">Baker Lyman and Co, Inc.</a>	CED
<a href="#">ChartWorld</a>	CEVAD
<a href="#">C-MAP Norway</a>	CEVAD
<a href="#">Creative Map Corp</a>	CED
<a href="#">Maris</a>	CED
<a href="#">National Geospatial-Intelligence Agency (NGA)</a>	CED
<a href="#">Primar</a>	CED
<b>Titafin, LLC</b>	CED
<a href="#">Transas</a>	CEVAD
<a href="#">United Kingdom Hydrographic Office</a>	CED
<a href="#">CherSoft</a>	CED

### Regional ENC Coordinating Center (RENC) Membership

The U.S. is a member of [International Centre for Electronic Navigational Charts](#) (IC-ENC) and the IC-ENC North American regional office is located at NOAA. Regional IC-ENC offices conduct full and independent validation of all ENC data from regional members before it is

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<sup>1</sup> 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.

published. Through this validation process, IC-ENC member nations receive valuable feedback, reassurance, and greater confidence in the quality of their ENC data.

IC-ENC distributes validated NOAA ENC<sup>®</sup>s independently; NOAA's membership in IC-ENC does not affect NOAA's complete discretion regarding its production and other means of ENC distribution. NOAA continues to make U.S. ENC<sup>®</sup>s available to the public free of charge via the internet. In addition, NOAA independently maintains all distribution arrangements with other organizations such as PRIMAR and other value-added ENC resellers.

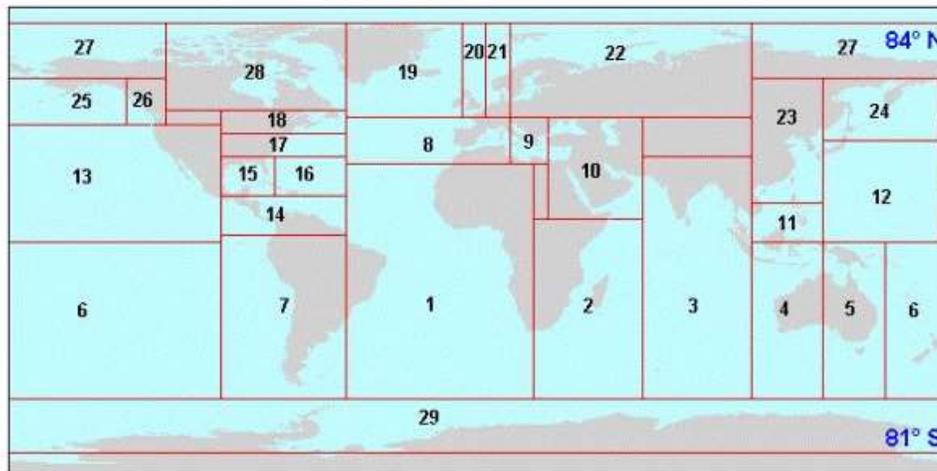
### Digital Nautical Chart (DNC)



The U.S. produces many DNCs in the MACHC 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](http://www.nauticalcharts.noaa.gov/mcd/learn_diffENC_DNC.html).

DNC consists of libraries in a variety of scales for complete worldwide coverage. MACHC data is included in DNC regions 13, 14, 15, and 16. 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](mailto:maritime.international@nga.mil).

## Raster Navigational Charts (RNCs) and Paper Charts

U.S. RNCs may be downloaded from 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>.

NOAA produces 182 charts in domestic waters within the MACHC region. As of April 2014, NOAA no longer produces lithographic paper charts with traditional print cycles for new editions. All paper charts are fully updated and available as Print on Demand (POD) products. The list of NOAA Certified Printers is available at: [http://www.nauticalcharts.noaa.gov/staff/print\\_agents.html](http://www.nauticalcharts.noaa.gov/staff/print_agents.html). 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>.

NGA produces 566 paper charts for the MACHC region in their Region 1 & Region 2 portfolios. Most of these charts are not available via public sale but can be requested through bilateral partners via bilateral agreements. The only charts NGA distributes to the public are those where NGA is the primary charting authority. These are areas where the U.S. conducts the surveys, compiles and issues charts, and there is no fully functioning national authority or NGA has specific authority (e.g. Trust Territory of the Pacific). (See table in Appendix B for those areas within the MACHC.)

## INT Charts

NOAA and NGA share INT chart responsibility within the MACHC region. The U.S. is responsible for 12 international series charts in the MACHC, ranging in scales between 1:300,000 to 1:2,750,000. (See Appendix C for table depicting projected INT chart production.)

## New Publications and Updates

### 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 of coastal and intracoastal waters and the Great Lakes. *Coast Pilots 4, 5, and 7* provide information for the MACHC region. U.S. Coast Pilot now offers completely [updated publications](#) every week.

Publication	Edition Date
<b>U.S. Coast Pilot 4:</b> Atlantic Coast of the United States from Cape Henry, Virginia to Key West, Florida	Edition 49, 2017
<b>Coast Pilot 5:</b> Gulf of Mexico from Key West, FL to the Rio Grande, Texas. Coast Pilot 5 also covers Puerto Rico and the U.S. Virgin Islands.	Edition 45, 2017

<p><b>Coast Pilot 7:</b> California, Oregon and Washington, between Mexico on the south and Canada's British Columbia on the north. <i>Coast Pilot 7</i> also includes Hawaii and other United States territories in the South Pacific.</p>	<p>Edition 49, 2017</p>
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U.S. Coast Pilots can be downloaded at:  
<http://www.nauticalcharts.noaa.gov/nsd/cpdownload.htm>.

### Sailing Directions

[Sailing Directions](#) and [Planning Guides](#) are published by NGA, and digital updates can be downloaded from NGA.

Six (6) volumes of *Sailing Directions* cover the MACHC region.

Publication	Edition Date
<i>Sailing Directions 120</i> – Pacific Ocean and Southeast Asia (Planning)	2015 Edition
<i>Sailing Directions 140</i> – North Atlantic Ocean and Adjacent Seas (Planning)	2017 Edition
<i>Sailing Directions 124</i> – East Coast of South America (Enroute)	2017 Edition
<i>Sailing Directions 147</i> – Caribbean Vol. 1 (Enroute)	2015 Edition
<i>Sailing Directions 148</i> – Caribbean Vol. 2 (Enroute)	2017 Edition
<i>Sailing Directions 153</i> – West Coast of Mexico and South America (Enroute)	2017 Edition

### List of Lights, Radio Aids and Fog Signals

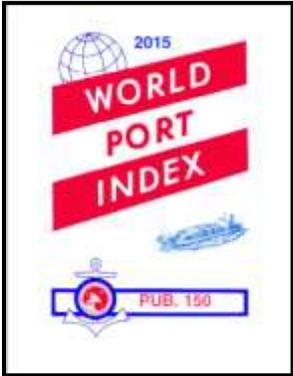
The NGA [List of Lights, Radio Aids and Fog Signals](#) and their digital updates are available to the public and are posted at the NGA Maritime Safety website.

Two (2) volumes of *List of Lights* cover the MACHC region.

Publication	Edition Date
List of Lights Pub. 110 (Greenland, E. Coast N & S America and W. Indies, excluding USA)	2017 Edition

List of Lights Pub. 111 (W. Coast N & S America (excluding USA), Australia, Tasmania, NZ, and Islands in the N/S Pacific Ocean	2017 Edition
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**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.

**Notice to Mariners**

The U.S. Coast Guard issues Notice to Mariners for NOAA charts. NGA produces Notices to Mariners for NGA charts in the MACHC region.

The *U.S. Notice to Mariners* is posted at the NGA Maritime Safety website.

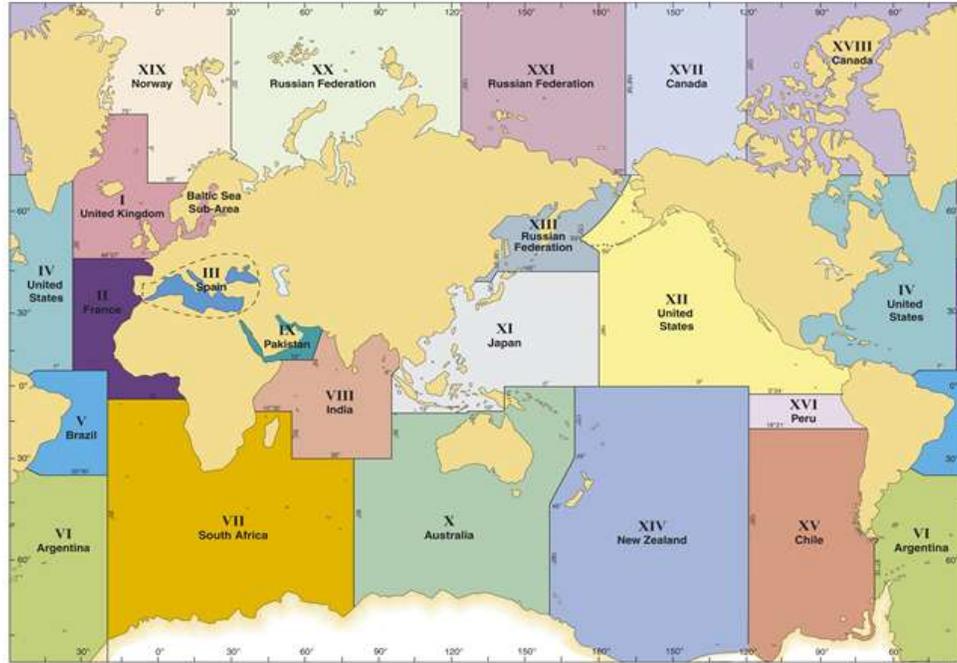


**Maritime Safety Information (MSI)**

Maritime Safety Information (MSI) means navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships in accordance with the provisions of the International Convention for the Safety of Life at Sea, 1974, as amended.

Maritime Safety Information is of vital concern to all ships. It is therefore essential that common standards be applied to the collection, editing and dissemination of this information. The NAVAREA coordinator is the authority charged with coordinating, collating and issuing navigational warnings for a designated NAVAREA within the IMO/IHO World-Wide Navigational Warning Service (WWNWS) (see figure below).

*NAVAREA Limits*



NGA is the NAVAREA IV and XII Coordinator within the WWNWS and also acts as Chairman for the IHO WWNWS-Sub-Committee (SC).

As the NAVAREA Coordinator, NGA issues the navigational warnings for the MACHC Region. These are broadcast and uploaded to <http://msi.nga.mil/NGAPortal/MSI.portal>. NGA requests the assistance of all Member States within the MACHC Region to relay pertinent maritime safety information for promulgation to [navsafety@nga.mil](mailto:navsafety@nga.mil).

## C-55 Update

The status of hydrographic surveys of navigable waters in the U.S. portion of the MACHC Region (Gulf of Mexico and Puerto Rico) out to the limits of the EEZ are 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	13%	55%	32%
Depths > 200m	59%	41%	.05%

Coverage of charts published by the U.S. in the MACHC region (Gulf of Mexico Coast of the Continental U.S), where:

- A = percentage covered by INT series, or a paper chart series meeting the standards in M-4
- B = percentage covered by Raster Navigational Charts (RNCs) meeting the standards in S-61
- C = percentage covered by ENC's meeting the standards in S-57

Purpose/Scale	A	B	C
Offshore passage/Small	100%	100%	100%
Landfall and Coastal passage/Medium	100%	100%	100%
Approaches and Ports/Large	100%	100%	100%
Percentage of Group A showing depths in metres	<1.0%		
Percentage of Group A referenced to a satellite datum	100%		

Coverage of charts published by the U.S. in the MACHC region (Puerto Rico and U.S. Virgin Islands and Navassa Island), where:

Purpose/Scale	A	B	C
Offshore passage/Small	100%	100%	100%
Landfall and Coastal passage/Medium	100%	100%	100%
Approaches and Ports/Large	100%	100%	100%
Percentage of Group A showing depths in metres	3.0%		
Percentage of Group A referenced to a satellite datum	100%		

## Capacity Building

The United States is an active participant in the IHO Capacity Building Sub-Committee (CBSC), and the U.S. (NGA) directly supports the IHO Maritime Safety Information (MSI) training course by supplying one of the Instructors. An MSI training course was conducted by the CBSC in FY2017 and hosted by Barbados. The MSI training course consisted of students from throughout the MACHC region. These MSI training courses are coordinated between the CBSC and the Regional Hydrographic Commission (RHC). There is a vetting and enrollment process that takes place for this course between the CBSC and RHC.

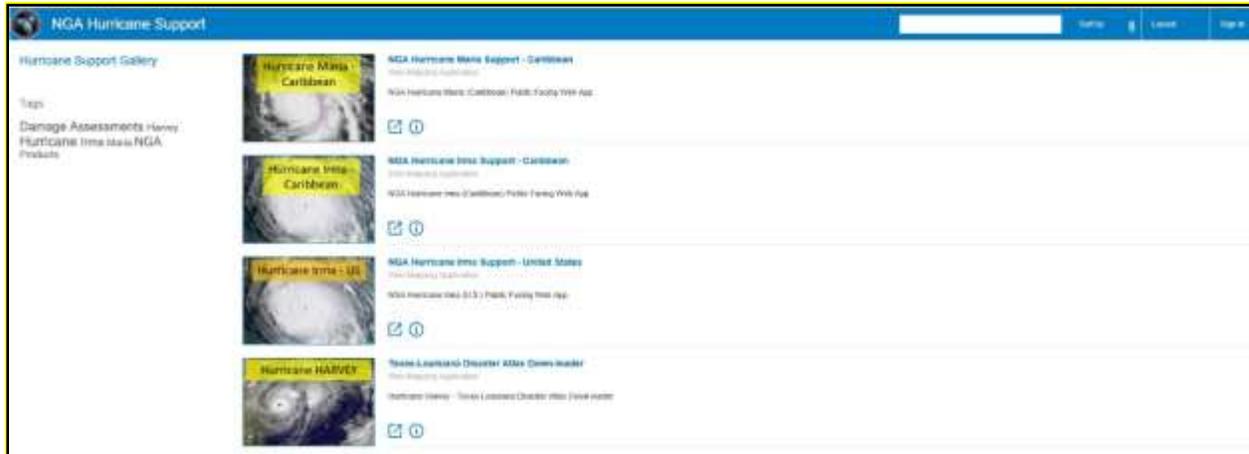
As a response to the numerous Hurricanes in the MACHC Region this season, the U.S. Navy Oceanography Office is standing by to support safety with a Fleet Survey Team (FST) that has the capacity to conduct a quick survey over critical areas for navigation for beach landings or otherwise with their Rapid Littoral Survey Vessel (RLSV= Jet skis with single beam, SSS, DGPS) to investigate hazards to navigation for go/no-go decisions. While this is not for updating nautical charts, it does an investigative tool to detect potential hazards to navigation supporting disaster relief efforts for units going ashore. Additionally, the Navy can provide hydrographic surveys to update nautical charts.

NGA has created a Post-Hurricane Harvey, Irma, and Maria Assistance website that is available publically to support all the ongoing recovery operations throughout the region that was affected by the multiple Hurricanes this season. The webpage has a number of tabs containing Products, Maps/Charts, and Data that can be used by the various Defense forces, emergency responsive agencies, and (N)GOs to support their operations. The website can be found at:

<https://www.nga.mil/Pages/default.aspx>

This data and products can be accessed by clicking on the NGA Hurricane Support Icon. Or the Analyst can go directly to the webpage with the following link:

<http://nga.maps.arcgis.com/apps/MapAndAppGallery/index.html?appid=85c45e071293405ba0926b75d740f83e>



The US (NGA) also supported the IHO Capacity Building Sub-Committee (CBSC) Technical Visit to Haiti in FY2017. This follow up visit was to assess the current setup and capabilities of the various Haiti Hydrographic organizations. The Technical Visit also provided an opportunity to assist Haiti in finalizing what needed to be completed in order to become full members of the IHO. This effort included a visit with the Prime Minister of Haiti. The visit also coincided with the annual World Hydrography Day celebration which provided an opportunity for the Technical Visit Team to get the word out about the importance of Hydrography to a larger audience in Haiti.



IHO Technical Visit to Haiti

## Training Opportunities available in the United States

In July 2017, NOAA, the University of New Hampshire (JHC), and GEBCO conducted the third annual Chart Adequacy Evaluation Workshop. Twelve students participated in the training and learned techniques to evaluate the suitability of nautical chart products using chart quality and publicly available information. This year's workshop emphasized cartography and the ability to transfer NOAA procedures to the students' charting products. The workshop provided a theoretical background on:

- Chart production at NOAA
- Review of NOAA charted symbols and abbreviations
- Review of automatic identification systems (AIS) and satellite-derived bathymetry (SDB)
- Overview of the chart adequacy procedure

In addition, participants had a hands on experience (in the ArcGIS environment) on:

- Land/water separation using satellite imagery
- Identifying navigationally significant areas based on AIS
- Deriving near-shore bathymetry using SDB
- Conducting chart adequacy evaluation

Participants came from Egypt, Israel, Japan, Madagascar, Mauritius, Nigeria, Panama, Philippines, Russia, Spain, Taiwan, and Thailand. The workshop followed NOAA's open house on nautical cartography on July 7, an event held in conjunction with the 28th annual International Cartographic Conference 2017 (ICC) in Washington, D.C. Next year's nautical chart adequacy workshop is scheduled for July 2018. Individuals interested in attending should be nominated by their home hydrographic office, have previous experience in ocean bathymetry (minimum two years in hydrography or cartography), be proficient in the English language, and have future opportunities to work on bathymetric projects. Travel costs for the selected candidates will be covered by the GEBCO. For further information, please contact Dr. Shachak Pe'eri at [shachak.peeri@noaa.gov](mailto:shachak.peeri@noaa.gov).

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 ([www.marine.usm.edu/hs.php](http://www.marine.usm.edu/hs.php)) and the University of New Hampshire ([www.marine.unh.edu/research/ccom.html](http://www.marine.unh.edu/research/ccom.html)).

Capt. Andrew Armstrong, NOAA (ret.), the 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](mailto:andy.armstrong@noaa.gov)).

The US Navy, through CNMOC, has several hydrographic training programs available:

- a. The International Hydrographic Science Applications Program (IHSAP) is an IHO “Cat A” certified 1-year course at the Masters of Science level administered by the University of Southern Mississippi in partnership with the US Navy; Course Identifier is MASL # P-169265.
- b. The International Hydrographic Management and Engineering Program (IHMEP) is an IHO “Cat B” certified 6-month course administered by CNMOC. Course Identifier is MASL # P-169208.
- c. The NAVOCEANO Mobile Training Team (NMTT) provides tailored, formal and on-the-job training to USA partners, friends, and allies while simultaneously collecting maritime geospatial and environmental information to enhance safety of navigation. This training program can be from 1 week to 60 days, depends on the partner nation’s objectives. Course Identifier is MASL # P-309027.
- d. 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.

Those interested need to send a Letter of Request to your respective in-country Office of Defense Cooperation or to the U.S. Naval Attaché at the U.S. Embassy, identifying the course by its Military Articles and Service Listing (MASL) number provided above.

## Oceanographic Activities

### GEBCO

The United States participates on the IOC-IHO Guiding Committee for GEBCO and chairs the IHO IRCC Crowdsourced Bathymetry Working Group. It also hosts both the IHO Data Centre for Digital Bathymetry (IHO DCDB) and the online GEBCO Gazetteer of Undersea Features at NOAA’s National Centers for Environmental Information (NCEI). NCEI is in the process of enhancing the infrastructure and interface of the IHO DCDB to accommodate crowdsourced bathymetry data.

Crowdsourced bathymetric data can be used to identify areas where the data of the 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 crowdsourced 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 crowdsourced bathymetry data from mariners around the world. NOAA is coordinating with the Association of Arctic Expedition Cruise Operators (AECO) to ingest Arctic data to test the new system. 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.

### **IHO-IOC GEBCO Seabed 2030 Project**

U.S. mapping agencies are assessing how they may contribute to the global Seabed 2030 initiative, which has a goal to achieve the complete mapping of the ocean floor by the year 2030. NOAA conducted a preliminary assessment of coverage based on bathymetric holdings at its National Centers for Environmental Information. This gap analysis will be used by partners to determine where additional existing data can fill in gaps, and/or where data acquisition efforts will have the most impact. The gap analysis is available to view here: <http://seasket.ch/OwJiQE0h0k>.

## Appendix A

The U.S. (NGA) is responsible for producing ENC's in areas where the US functions as the Prime Charting Authority outside US domestic waters. NGA will continue to add additional ENCs to this portfolio in the future.

NGA Cells		
Cell Name	Title	Posted
US409860	Approach to Panama Canal – North, Panama	12/16/2016
US409890	Punta Rincon to Isla Tupile, Panama	07/22/2015
US410840	Approaches to Les Cayes and Aquin, Haiti	03/04/2015
US410865	Navassa Island (US) to Cap Tiburon, Haiti	03/04/2015
US410880	Approach to Port-Au-Prince, Haiti	09/12/2014
US410915	Canal De La Tortue, Haiti	Completed
US410930	Approaches to Cap-Haitien and Bahia de Monte Cristi, Haiti	09/19/2014
US509860	Panama Canal Northern End, Panama	Cancelled
US509890	Golfo De San Blas, Panama	07/22/2015
US510820	Jacmel, Haiti	09/12/2014
US510830	Aquin, Haiti	03/04/2015
US510840	Les Cayes, Haiti	03/04/2015
US510860	Miragoane, Haiti	Completed
US510870	Petit Goave, Haiti	Completed
US510880	Port-Au-Prince, Haiti	11/28/2015
US510885	Baie de Saint-Marc, Haiti	09/12/2014
US510890	LaFiteau, Haiti	Completed
US510910	Gonaives, Haiti	09/12/2014
US510918	Mole Saint Nicolas, Haiti	Completed
US510920	Port de Paix, Haiti	Completed
US510922	Rada De La Basse Terre, Haiti	Completed
US510925	Baie de L'Acul, Haiti	Completed
US510930	Cap-Haitien, Haiti	11/28/2015
US515390	Panama Canal, Panama	Cancelled
US515410	Panama Canal Southern End, Panama	06/23/2016
US3HTI01	Haiti Coast	In Progress
US511050	Las Calderas, Dominican Republic	Completed
US510970	Monte Cristi, Dominican Republic	Completed
US510960	Pepillo Salcedo, Dominican Republic	Completed
US511060	Puerto de Haina, Dominican Republic	In Progress

## Appendix B

The US (NGA) produces 566 paper charts within the MACHC region. There have been four new editions SNC's completed within the last year.

Chart	Chart Title	Edition Date	Distribution
28051	Puerto Limon, Costa Rica	February 2016	
24354	Degrad des Cannes, French Guiana	March 2016	LIM DIS
24355	Entrances to Riviere de Cayene and le Mahury Fleuve, French Guiana	April 2016	LIM DIS
26066	Approaches to Cristobal, Panama	July 2016	LIM DIS
24502	Barranquilla, Colombia	March 2017	LIM DIS
27085	Bahia de la Habana, Cuba	April 2017	LIM DIS
24465	Sint Anna Baai and Schottegat, Curacao, Netherland Antilles	July 2017	LIM DIS
24462	Curacao, Netherland Antilles	August 2017	LIM DIS

## Appendix C

The table below depicts projected INT chart production.

INT No.	Nat No.	Producing Agency	Title	Projected Availability
4015		NOAA		FY2016
4016	11006	NOAA	Gulf Coast - Key West to Mississippi River	FY2016
4017		NOAA		FY2016
4021	26025	NGA	Eastern Cuba to Puerto Rico	FY2018
4145	11300	NOAA	Galveston to Rio Grande	FY2015
4146	11340	NOAA	Mississippi River to Galveston	FY2015
4147	11360	NOAA	Cape St. George to Mississippi Passes	FY2015
4148	11420	NOAA	Havana to Tampa Bay	FY2016
4149	11549	NOAA	Straits of Florida Eastern Part	FY2017
4178	25640	NOAA	Puerto Rico and Virgin Islands	FY2017