United States of America

National Report

South West Pacific Regional Hydrographic Commission

21 February – 23 February 2018

Nuku'alofa, Tonga

Office of Coast Survey

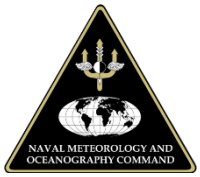
National Oceanographic & Atmospheric Administration

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

Table of Contents

1. Hydrographic Office/Service

This National Report provides specific information pertaining to individual products and services of primary interest to the South West Pacific Hydrographic Commission (SWPHC). Three government agencies are responsible for the management of U.S. domestic and international hydrographic products and services.

- **Government Agencies with hydrographic responsibilities in the South West Pacific Region**
  - National Oceanic and Atmospheric Administration (NOAA)[1] conducts hydrographic surveys and produces nautical charts and related hydrographic information within the nation's Exclusive Economic Zone (EEZ).
  - National Geospatial-Intelligence Agency (NGA)[2] provides nautical charts and related hydrographic information *outside* of the U.S. Exclusive Economic Zone and is the mapping and charting authority for the US Department of Defense and commercial mariners in areas outside the US where the US is designated as the charting authority.
  - The U.S. Navy[3] conducts oceanographic, bathymetric, and hydrographic surveys worldwide to satisfy US Navy requirements.

The United States is an active participant in multiple Regional Hydrographic Commissions. The current information in the IHO Publication P-5 (*Yearbook*) is up to date.

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 exemplified by the United States Coast Guard Pacific Area Strategic Intent (Fiscal Years 2015 – 2019)[4] and the NOAA Pacific Islands Regional Office Strategic Plan: 2016 – 2020[5]. These documents align with the National Strategy and are representative of 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.

[1] Primarily the Office of Coast Survey

[2] Primarily Source Operations and Management Directorate, Foundation Group, Maritime Safety Office (MSO)

[3] Primarily, Commander, Naval Meteorology and Oceanography Command (COMNAVMETOCCOM) and the Hydrographer of the Navy

[4] http://www.pacificarea.uscg.mil/Portals/8/Documents/PACAREA%20Strategic%20Intent%20-%202016%20-%20final%20for%20release.pdf

[5] 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. To ensure the U.S. Federal Government is taking full advantage of its information resources, policy directs agencies 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[6].

Many hydrographic data, products, and services produced by U.S. Hydrographic Offices (HO's) are available for download at no cost. NOAA provides nautical products, services, and web deliveries of digital versions of most data, which 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. commits to making the Safety of Navigation data available in a variety of formats for as many users as possible. ENC data (S-57) is available in a GIS friendly format for non-traditional users, opening HO data to a host of new customers and users. New map services are in place to allow others simple access to real time data, creating opportunities for near-real time coastal intelligence via interactive map viewers.

The NOAA ENC Direct to GIS website[7] 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 website[8] 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[9] also includes NGA nautical charts, sailing directions, Digital Elevation Models (DEMs), and a downloadable South West Pacific Map on its site. The site also includes U.S. Notice to Mariners and other selected publications in PDF format, a marine navigation calculator and corrections to NGA, NOS and U.S. Coast Guard hydrographic products.

International Open Government Partnership (OGP)

The Open Government Partnership formally launched on September 20, 2011, when the 8 founding governments (Brazil, Indonesia, Mexico, Norway, the Philippines, South Africa, the United Kingdom, and the United States) endorsed the Open Government Declaration, and

[6] Open Data Policy-Managing Information as an Asset. (2013). Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf

[7] http://www.nauticalcharts.noaa.gov/csdl/ctp/encdirect_new.htm

[8] http://Nowcoast.noaa.gov

[9] http://msi.nga.mil/NGAPortal/MSI.portal

announced their country action plans. Since 2011, OGP has welcomed the commitment of 67 additional governments to join the Partnership.

In total, over 70 OGP participating countries and 15 subnational governments have made over 2,500 commitments to make their governments more open and accountable. Additional information regarding the OGP can be found at: https://www.opengovpartnership.org/

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

Effective “Transparency” as it relates to the OGP 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.

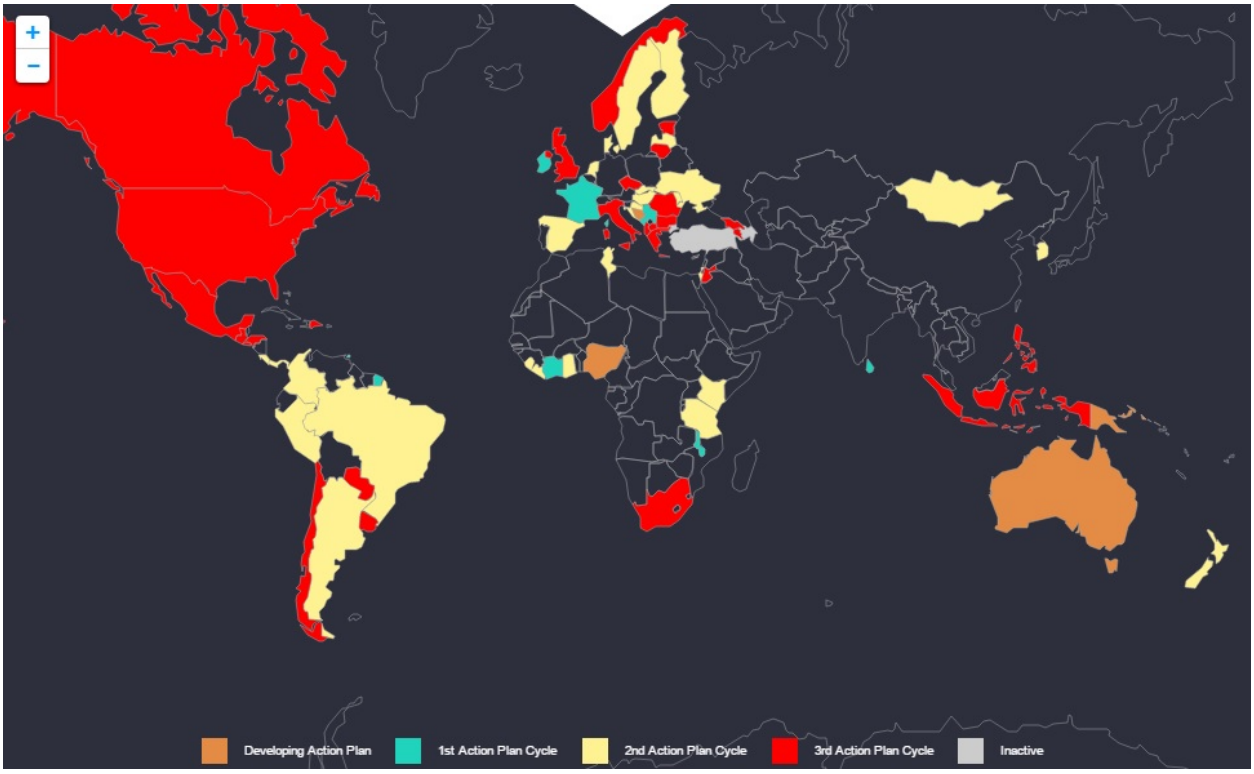


Figure 1 OGP Member States Map

Figure 1: 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 Exclusive Economic Zone ("EEZ") and along its 95,000 miles of shoreline.

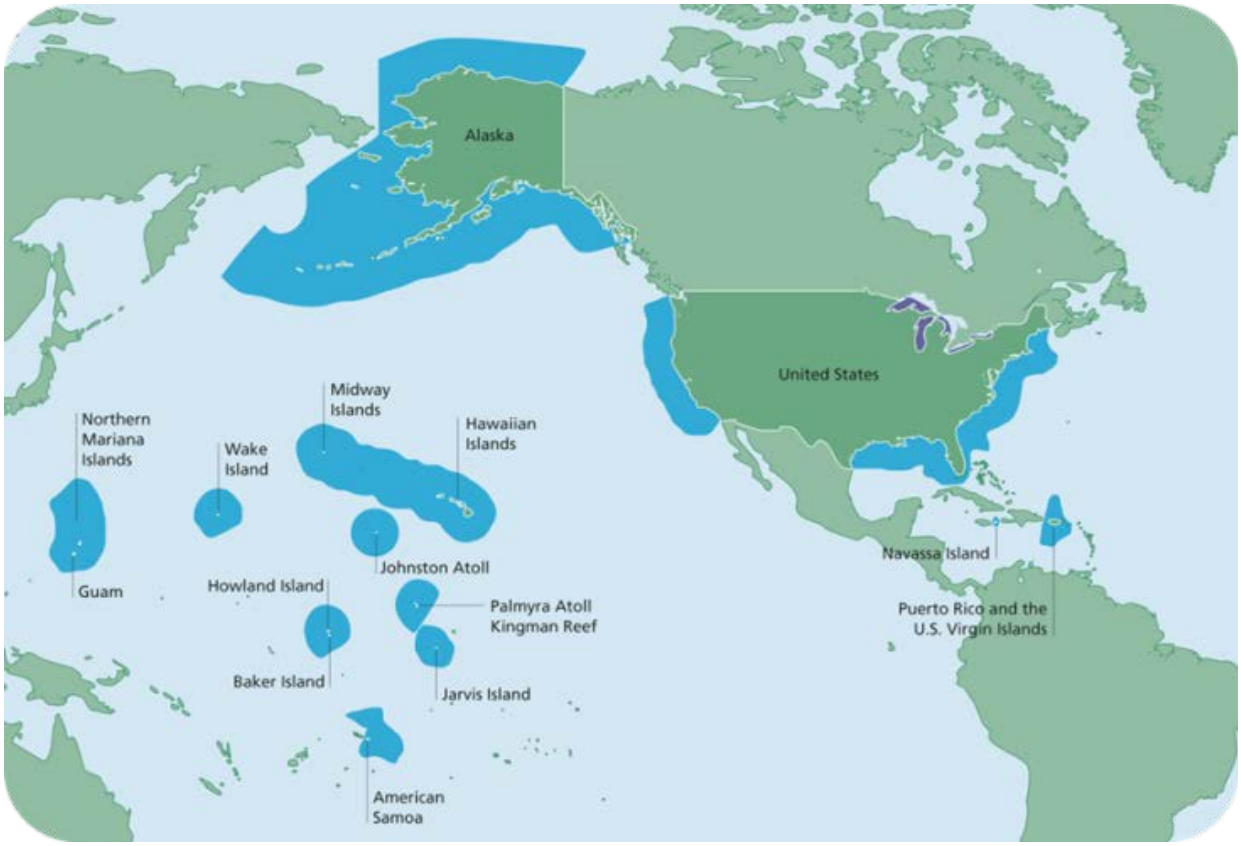
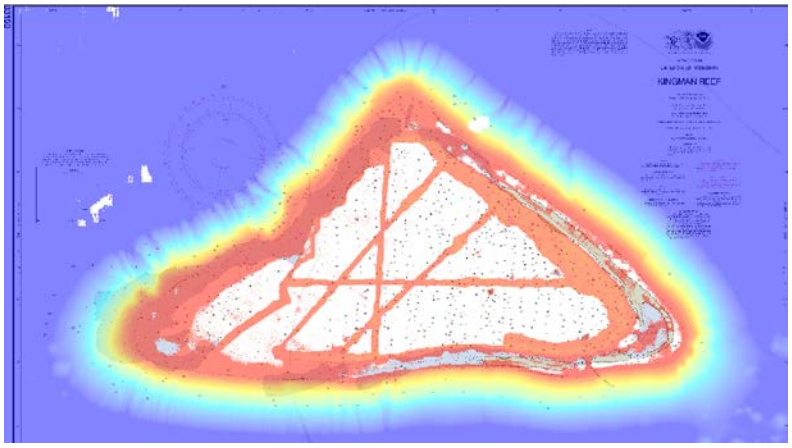


Figure 2 the U.S. EEZ

Coverage of New Surveys

While no new surveys were conducted since the last SWPHC meeting, there has been a change in policy regarding the usage of survey data collected by platforms other than the six ships operated by the Naval Oceanographic Office or the four hydrographic ships operated by NOAA.



There are extensive holdings of bathymetric data available, much of it collected by or for NOAA for missions other than traditional hydrographic surveying. Review and application of this data is anticipated to produce a substantial modernization of the

data coverage on many US charts where the most recent hydrographic surveys date to the 1940s or even earlier. Kingman Reef is representative of many areas in the South West Pacific, with sparse soundings and substantial white space on the chart, that have been surveyed with modern multibeam sonars by vessels like NOAA ships *Hi'ialakai* and *Okeanos Explorer*, NOAA R/V *Ahi*, and others in recent years.

While it will take time to assess and apply these data holdings, US charts will see substantial improvements in the SWPHC region in the coming years.

3. New Charts and Updates

Electronic Nautical Charts (ENC)

NGA, in coordination with NOAA produced a total of six (6) ENC cells to provide complete coverage in the waters around Palau. ENC coverage for the Palauan waters include one ENC at coastal scale, one ENC at Harbor scale, and four ENC cells at Approach scale. See Appendix A for figures and tables.

ENC Distribution

U.S. ENCs, including newly created NGA ENCs, are distributed directly from NOAA on the web[10]. They are also available through NOAA ENC® Distributors[11].

NOAA ENC® Distributors

Company	Certification Type[12]
Baker Lyman and Co, Inc	CED
C-MAP Norway A/S	CEVAD
ChartWorld	CEVAD
CherSoft	CED

[10] https://nauticalcharts.noaa.gov/charts/noaa-enc.html
[11] https://nauticalcharts.noaa.gov/publications/print-agents.html#enc-distributors
[12] 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.

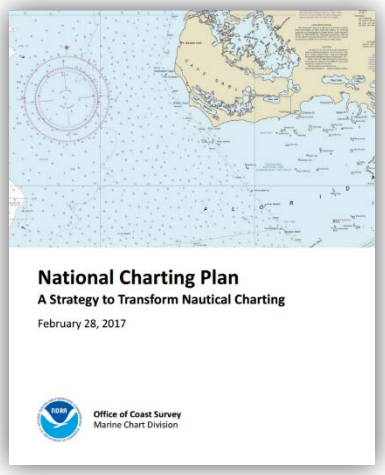
Creative Map Corp.	CED
Maris AS	CED
National Geospatial-Intelligence Agency (NGA)	CED
United Kingdom Hydrographic Office	CED
Primar	CED
Titafin LLC (Subsidiary of Baker Lyman and Co, Inc)	CED
Transas Ltd.	CEVAD

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.

National Charting Plan (NCP)



The NCP[13] is a strategy to improve NOAA nautical chart coverage, products, and distribution. The NCP briefly describes the evolving state of marine navigation, data collection, and chart compilation and explains how changes in technology will affect both the raster and vector NOAA marine chart suites. The plan also describes some of the steps that NOAA will be taking to improve chart products in the short term, including changes to chart formats, scales, data compilation, as well as some considerations on the future of NOAA navigational products beyond the short term. The goal of NOAA's Office of Coast Survey is to deliver products that are more useful, more up-to-date, and safer to navigate with, and at the same time optimize the use of the government resources employed to maintain the navigational products and services that are increasingly required to support higher levels of precision and timeliness.

ENC Rescheming

As part of the NCP, it was identified that the current suite of ENCs derived from the raster charts presented many challenges and did not comply with IHO recommendations on navigational usage bands. As part of the "ENC first" effort, an ENC rescheming approach was developed to provide a seamless, tiled coverage that can easily be segmented or extended based on geographic location, available data and scale. In this new regular gridded ENC coverage approach, only a limited number of chart scales are used, down from the current 131 different scales. This standardization will allow for faster production of new charts, easier maintenance, faster application of new data, and a better user experience for the mariner.

Digital Nautical Chart (DNC)

The National Geospatial-Intelligence Agency (NGA) produces the DNC which is an unclassified, vector-based, digital database containing maritime significant features essential for safe marine navigation. The DNC uses the Vector Product Format (VPF), which is a NATO standard for digital military map and chart data. DNC consists of 29 libraries in a variety of scales for complete worldwide coverage. Additional details can be located at:

NGA: http://msi.nga.mil/NGAPortal/DNC.portal

NOAA: http://www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml

[13] National Charting Plan. (2017). https://www.nauticalcharts.noaa.gov/mcd/docs/NationalChartingPlan.pdf

DNC in SWPHC Waters

The U.S. (NGA) produces DNCs providing full coverage in SWPHC waters. Seven (7) DNC libraries overlap the geographic boundaries of SWPHC waters. (*Figure 4)*.

SWPHC DNC data lies predominantly within DNC regions 3, 4, 5, and 6 and also portions of regions 11, 12, and 13. See DNC regional coverage below: (*Figure 3)*

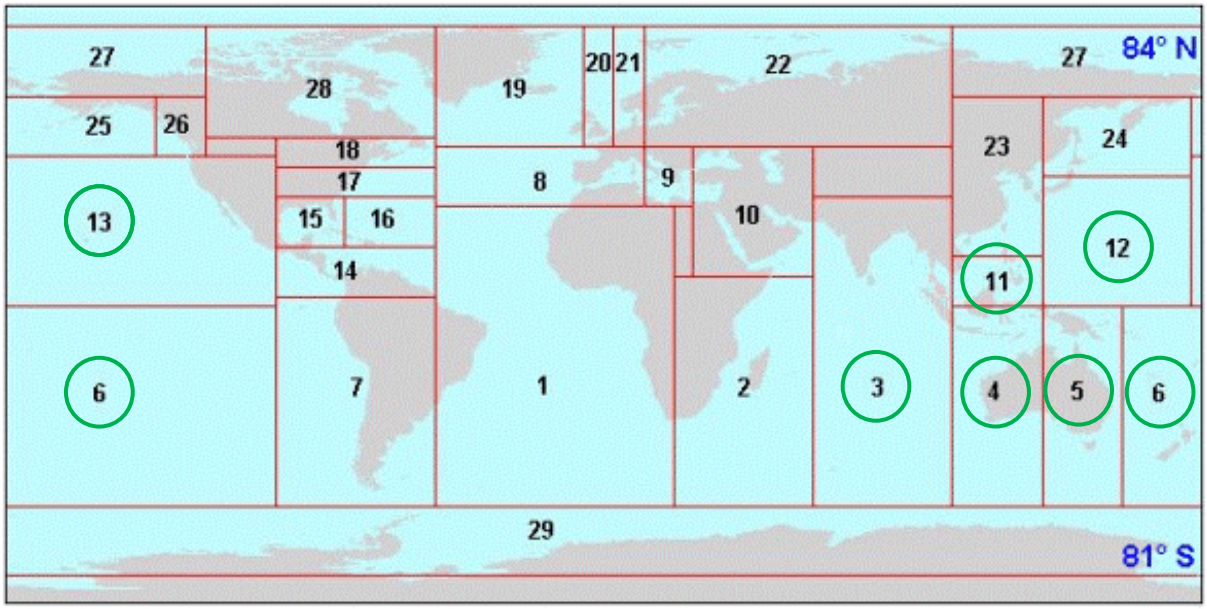


Figure 3 DNC Regions

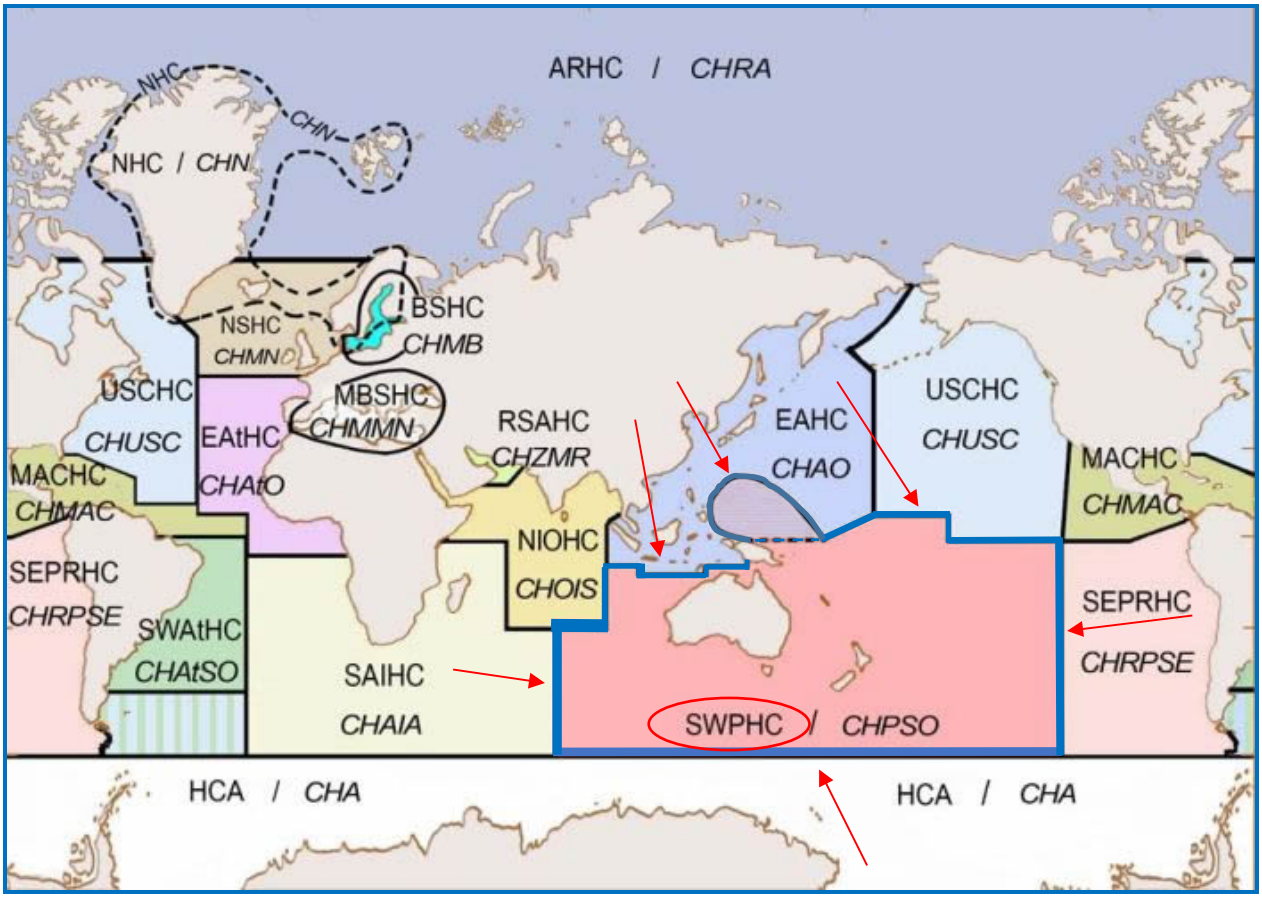


Figure 4 SWPHC Waters

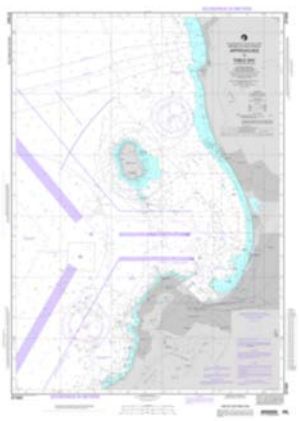
DNC Maintenance and Updates

NGA maintains DNC with new source information from the U.S. and prime foreign hydrographic authorities. With exception of selected U.S. waters and applicable updates, other "VPF Database Update (VDU) Patches" published on its website[14], are only available for DoD customers who have authorized access to baseline DNCs. As such, some DNC products are considered "Limited Distribution" and are not available for public sale or download.

Requests for information regarding DNC can be made at: MCDDNC@nga.mil

[14] https://dnc.nga.mil/

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 U.S. 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 U.S. 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

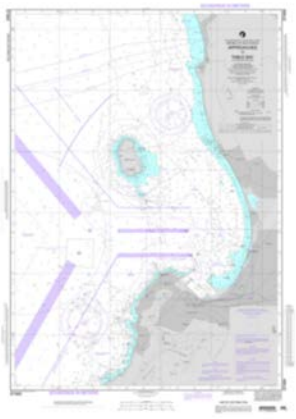
Raster Navigational Charts (RNC)

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 https://nauticalcharts.noaa.gov/publications/print-agents.html#paper-charts .

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 approximately 350 paper or “Standard Nautical Charts” (SNC) for the SWPHC region. 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 paper charts in the SWPHC region. The charts and the dates of latest editions are updated weekly can be obtained at the NOAA chart library: https://nauticalcharts.noaa.gov/charts/noaa-raster-charts.html#full-size-nautical-charts

International (INT) Charts

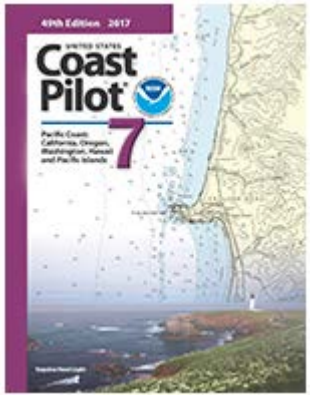
NGA shares INT chart responsibility within the SWPHC region, primarily over U.S. Trust Territories and builds its chart schema and DNC library limits from these INT schema, if practical. NGA is responsible for 7 of the 8 INT Charts for which the U.S. is responsible in the SWPHC Region (charts 5712, 5090,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

In addition, NOAA's National Ocean Service publishes both flat and 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.

Chart Library Source: https://nauticalcharts.noaa.gov/

4. New Publications and Updated Publications

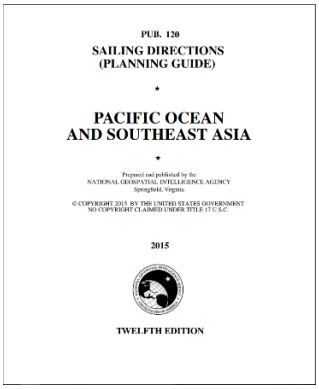
United States Coast Pilot



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 U.S. 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. U.S. Coast Pilot now offers completely updated publications every week.

Sailing Directions

(Planning Guide)


PUB. 120
SAILING DIRECTIONS
(PLANNING GUIDE)

PACIFIC OCEAN
AND SOUTHEAST ASIA

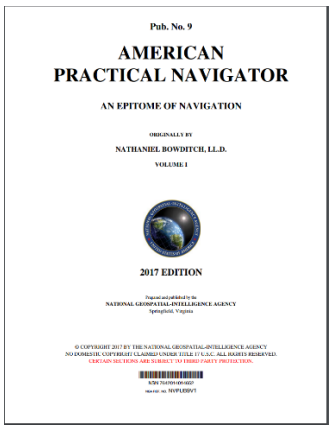
2015

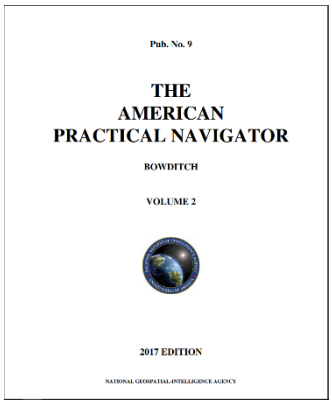
TWELFTH EDITION

Pub. 120, Sailing Directions (Planning Guide) Pacific Ocean and Southeast Asia, Twelfth Edition, 2015, is issued for use in conjunction with the following Sailing Directions (Enroute) Publications: Pub. 125, Pub. 126, Pub. 127, Pub. 153, Pub. 154, Pub. 155, Pub. 157, Pub. 158, Pub. 159, Pub. 161, Pub. 162, Pub. 163, and Pub. 164. Digital Nautical Charts 5, 6. 7, 11, 12, 13, 14, 23, 24, 25, 26, and 27 provide electronic chart coverage for the area covered by this publication. This publication is corrected to 31 January 2015, including Notice to Mariners No. 5 of 2015. Subsequent updates have corrected this publication to 9 December 2017, including Notice to Mariners No. 49 of 2017.

Bowditch

The American Practical Navigator, (Pub No. 9) – 2017 edition





Volume1 and 2

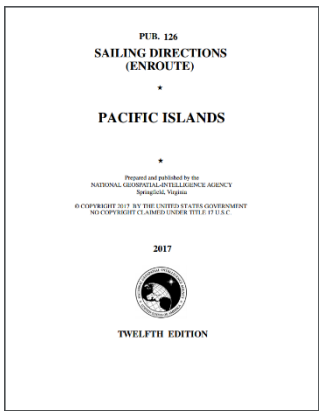
The American Practical Navigator, or as most mariners refer to it, “Bowditch” continues the noteworthy legacy of the navigational expertise first introduced by Nathaniel Bowditch 215 years ago.

NGA along with subject matter experts throughout the world collaborated to create this contemporary edition that stands ready to address the challenges faced by today's navigators and mariners. Since the last edition, there have been huge advancements in positioning methodologies and navigation systems. Considerable effort went into improving the celestial navigation and piloting chapters. New sections covering Electronic Chart Display and Information Systems (ECDIS) that continuously tell you where you are, provide warnings when standing into danger, and display radar and Automatic Identification System information to heighten situational awareness. Newer, higher resolution images replace older graphics to better illustrate the purpose of the text. From inception, this project aimed at making this invaluable nautical resource more accessible by creating it in an electronic format which allows easier updating and online publication. While NGA understands the desire for a hard copy Bowditch, high publishing costs necessitated tough decisions. NGA decided in favor of a lower cost digital product that contained more useful information to the mariner. This resulted in a return to a two-volume set.

The American Practical Navigator is available to the public and posted at the NGA Maritime Safety website, at

The American Practical Navigator

Sailing Directions



NGA produces and maintains *Sailing Directions*. It consists of useful information important to navigators of coastal waters. Sailing Directions that contain information for the SWPHC region are as follows:

Publication 126 – Pacific Islands

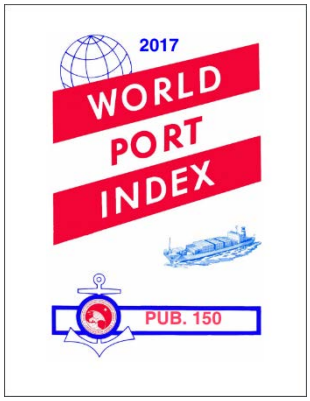
Publication 127 – East Coast of Australia and New Zealand

Publication 175 – North, West and South Coasts of Australia

NGA provides digital updates through downloads at:

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

World Port Index

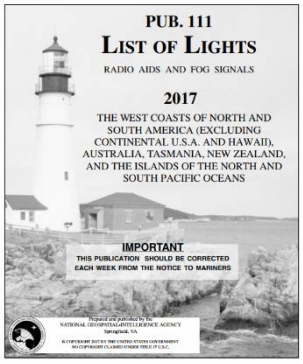


NGA *produces* and maintains the *World Port Index* (Pub150). It contains the location and physical characteristics as well as the facilities and services offered by major ports and terminals world-wide.

Digital updates are available to the public and posted at the NGA Maritime Safety website, at

World Port Index

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

NGA List of Lights

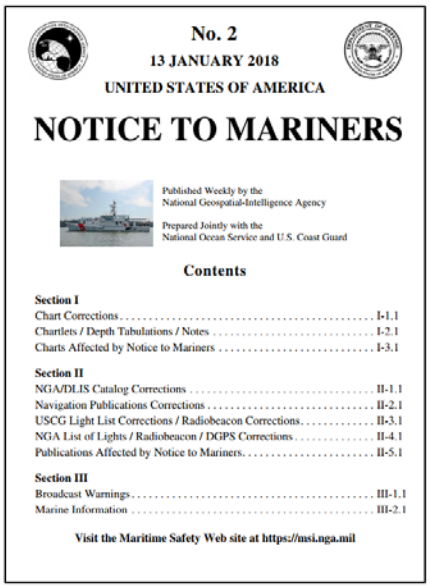
Publication 111 - The West Coasts of North and South America (Excluding Continental USA and Hawaii), Australia, Tasmania, New Zealand, and the Islands of the North and South Pacific Oceans covers the SWPHC region.

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. 2
13 JANUARY 2018
UNITED STATES OF AMERICA

NOTICE TO MARINERS

Published Weekly by the
National Geospatial-Intelligence Agency

Prepared Jointly with the
National Ocean Service and U.S. Coast Guard

Contents

Visit the Maritime Safety Web site at https://msi.nga.mil

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 NGA Maritime Safety website provides a posting of the U.S. Notice to Mariners.

6. C-55

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

A = percentage adequately surveyed

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

C = percentage lacking a system survey

INT Region K: Mariana and Wake Islands

	A	B	C
Depths < 200m	0%	19%	81%
Depths > 200m	12%	0%	88%

INT Region L: American Samoa, Johnson Atoll, Kingsman Reef, Jarvis Island, Howland and Baker Islands

	A	B	C
Depths < 200m	4%	0%	96%
Depths > 200m	0%	0%	100%

The Republic of Palau / *Beluu er a Belau*

	A	B	C
Depths < 200m	28%	52%	20%
Depths > 200m	0%	39%	61%

It is worth noting that the current C-55 estimates only take into consideration the currently charted hydrography. As mentioned earlier in this report under Coverage of New Surveys, there

are extensive data holdings currently under review that should substantially change these figures in the near future.

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 opportunities are available at various institutions in the United States. Two Category A certified hydrographic programs and one Category B program are available through:

- The University of Southern Mississippi (USM)
  - https://www.usm.edu/marine/hydrographic-science
- The University of New Hampshire (UNH)
  - https://marine.unh.edu/program/center-coastal-and-ocean-mappingjoint-hydrographic-center
- NOAA
  - Category-B Competence Training for Nautical Cartography – In March, 2017 the IBSC approved the NOAA program for Category B in Cartography. The first class started the end of August 2017 and had 10 cartographers. The second class has been selected and will begin in August 2018.
- U.S. Navy
  - 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 and USM are partners in their Category A program and NOAA has a similar arrangement with UNH for their Category A program.

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).

Chart Adequacy Workshop

In July 2017, NOAA's Office of Coast Survey hosted its third annual workshop on nautical chart adequacy. Twelve students participated in the training and learned techniques to evaluate the

suitability of nautical chart products using chart quality and publicly available information. The 2017 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

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. For more information on the Chart Adequacy Workshop contact Dr. Shachak Peeri (shachak.peeri@noaa.gov).

8. Oceanographic Activities

Tide Gauge Network

NOAA[15] operates several permanent National Water Level Observation Network (NWLON) tidal stations located throughout the Pacific Islands. The NWLON network in the South West Pacific consists of 6 active sensors, one in American Samoa, two in Guam, one in the Republic of the Marshall Islands, one on Midway Island and one on Wake Island. These stations are designed to act as long term controls for temporary water level gauges installed for hydrographic surveys. These stations produce data every six minutes which is transmitted back to headquarters in Silver Spring, Maryland, quality controlled and disseminated to the public in near real time. In most cases the primary water level sensor of these NWLON stations are generally pressure sensors and there is a normally a backup sensor in case the primary fails. Most stations also include a suite of meteorological sensors. Tide and water level data can be obtained at the following link:

https://tidesandcurrents.noaa.gov/stations.html?type=Water+Levels#PacificIslands

Historical data is also available from these stations, allowing for the tracking of long-term trends such as sea level rise.

Crowd-Sourced Bathymetry

Crowd-Sourced bathymetric data is a process, using all available resources, to identify areas where nautical charts are inadequate and there is a need for updated hydrographic survey data. 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.

[15] Primarily the Center for Operational Oceanographic Products and Services (COOPS)

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.

9. Other Activities

UN Committee of Experts on Global Geospatial Information Management (GGIM)

The US is currently working to help stand up the Marine Geospatial Working Group of the GGIM. The first meeting to establish the Terms of Reference should be going on nearly concurrently with the SWPHC15 meeting. This working group will be supporting UN Sustainable Development Goals 6 (Clean Water and Sanitation) and 14 (Life Below Water). The US highly encourages the Large Ocean States represented here at the SWPHC to participate actively, provide input, and ensure the working group is aware of the challenges and opportunities facing the Pacific Ocean.

Disaster Prevention

NOAA's Pacific Tsunami Warning Center (PTWC) has the responsibility for the dissemination of messages and the provision of interpretive information to emergency managers and other officials, news media, and the public throughout much of the Pacific Rim.

As a U.S. National Tsunami Warning Center, PTWC provides warnings for teletsunamis (tsunamis that can cause damage far away from their source) to Hawai‘i, Guam, American Samoa, Wake Island, Johnston Island, the Commonwealth of the Northern Marianas, the Federated States of Micronesia, the Republic of the Marshall Islands, and all other U.S. interests in the Pacific located outside the National Tsunami Warning Center’s (NTWC) area of responsibility.

This function is carried out under the auspices of the UNESCO/IOC International Coordination Group for the Pacific Tsunami Warning System.

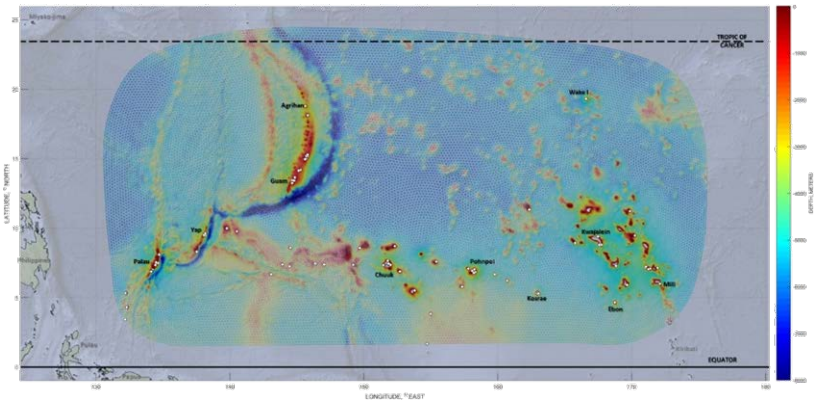
A few destructive teletsunamis are generated each century by great earthquakes around the Pacific Rim. Such tsunamis can propagate across the entire Pacific in less than 24 hours, and cause widespread destruction along shorelines located thousands of miles from the source. With ever-increasing population and development along most coastlines, there is a corresponding increase in risk.

Gravity Surveys

Hawaii and the Pacific Islands are planned for Phase II, Part 4 of the GRAV-D Project Plan[16]. Current terrestrial gravity stations are extremely sparse throughout the region and no modern geoid or gravity products are currently available. In Hawaii, each island currently uses its own local vertical datum. Once the GRAV-D products are available, the entire State of Hawaii will be on the same datum for the first time, and modern geoid products will be available for Guam, the Northern Marianas Islands, and American Samoa.

Storm Surge Modeling

The Extratropical storm Surge and Tide Operational Forecast System (ESTOFS) is one of the numerical ocean prediction products developed and maintained by the Coast Survey Development Laboratory (CSDL). ESTOFS provides operational guidance on storm surge and tidal water levels for the nation's coastal regions. Since 2012, NOS has developed and deployed ESTOFS in the Atlantic and Pacific oceans to cover the US East, West and Gulf Coasts, the Caribbean, and Hawaii. On February 13, 2018, a new ESTOFS-Micronesia system became operational in the tropical West Pacific.



ESTOFS-Micronesia is the first surge and tide operational model guidance available to forecasters in this vast mid-ocean region. With a dramatic lack of local water level observations in Micronesia, the importance of domain-wide tide and surge forecast guidance is evident. ESTOFS-Micronesia covers Palau, Guam and the Marianas, Federated States of Micronesia, Marshall Islands and Wake Island -- a territory that is home for more than half a million people and major US Naval and Air Force bases. Initial implementation provides an unstructured model grid with resolution up to 200 m at the coast, and upland nodes up to the 10m elevation contour to enable coastal inundation guidance.

The ESTOFS-Micronesia development process involved a close collaboration with local forecasting offices, as well as with partners at the NWS Environmental Modeling Center (EMC). CSDL is actively improving ESTOFS systems with regular incremental upgrades of the model grids and implementation of new physics and data assimilation methods. Future plans for ESTOFS-Micronesia upgrades include real-time bias corrections and operational coupling with wave models. Future ESTOFS expansion is planned to produce models for American Samoa and Polynesia.

[16] https://www.ngs.noaa.gov/GRAV-D/pubs/GRAV-D_v2007_12_19.pdf

Appendix A

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

The U.S. (NGA) is responsible for producing ENC cells in areas where the U.S. functions as the Prime Charting Authority outside U.S. domestic waters. NGA recently produced Six (6) ENCs within the SWPHC region in the waters surrounding the Palau Islands.