20TH MEETING OF THE SOUTH WEST PACIFIC HYDROGRAPHIC COMMISSION (SWPHC20)
Meeting, 22-24 February 2023 – Wellington, New Zealand

NATIONAL REPORT FROM AUSTRALIA TO THE SWPHC20

1. Executive summary

The Australian Hydrographic Office (AHO) is the Australian Department of Defence agency responsible for the publication and distribution of nautical charts and other information required for the safety of vessels navigating in Australian waters.

The key focus throughout 2022-23 has been the continued implementation of the HydroScheme Industry Partnership Program, an innovative government-industry arrangement supporting the collection, assessment and publication of nautical information products in the Australian Charting Area. 2022 saw the continued development of data and information release policies which will underpin the AHO moving towards a modern data and customer-focused organisation.

2. Surveys

a) HydroScheme Industry Partnership Program

As outlined in the 2016 Defence White Paper, Defence is replacing it's hydrographic capability with a more efficient combination of military and commercial hydrographic and oceanographic survey capabilities. This initiative led to the establishment of the HydroScheme Industry Partnership Program (HIPP). Through the HIPP, the Australian Government is partnering with industry to meet the National Survey Function (NSF) obligations that will, over the medium to long term, help drive fundamental change in the delivery of defence hydrographic and oceanographic services and the development and innovation of environmental data collection capabilities.
After a competitive tender evaluation process, seven commercial providers were identified as successful candidates to undertake hydrographic surveys for HIPP and are collectively referred to as the 'HIPP panel' which came into effect on 28 Feb 20.

b) Current activity

The AHO is in the third year of implementing the Hydrographic Industry Partnership Program (HIPP). Initial Operating Capability (IOC) has been achieved, and Full Operational Capability (FOC) is targeted for 2023. IOC and FOC are normally associated with introducing new Defence equipment and systems into service. HIPP fundamentally consists of a rolling annual survey program contracted out to a preselected panel of Hydrographic Survey companies. Each annual program is referred to as a HydroScheme. HydroScheme 2020 and 2021 are complete. HydroScheme 2022 is currently underway and HydroScheme 2023 has been released to the HIPP Panel. Each HydroScheme includes a cycle of:

- risk assessment and identification of survey areas
- prioritising
- stakeholder agreement at the inter-departmental level via the Hydrographic Review Board (includes the AHO, AMSA, Australian Antarctic Division, Geoscience Australia)
- defining specific surveys and standards required
- releasing for tender
- assessing tender responses
- issuing contracts
- monitoring progress (including embarking client representatives)
- receipt, assessment and contractual acceptance
- Application to charts.

Planning for a HydroScheme begins in February each year for the financial year commencing the following year, with final submissions for inclusion to be provided by Jun 30 each year. Requests for an area to be considered for inclusion into a HydroScheme can be submitted via the AusSeabed Survey Coordination Tool. The HydroScheme Review Panel (HRP) endorses a proposed HydroScheme in August each year for release in October. Operations for that HydroScheme commence the following July. The HRP provides oversight and endorsement of HIPP Survey activity to support the National Survey task and the National Charting task. Endorsement of HydroScheme 2023 (FY23-24) was achieved in Aug 22. HydroScheme 2023 tender evaluations will commence in February 2023 for contract activities commencing FY23/24.

Annual HydroScheme programs overlap and 8 surveys are currently underway. Details of current and past HydroScheme activities are published on the AHO website at www.hydro.gov.au/NHP/ as Story Maps.

Royal Australian Navy Surveys

2022 surveys were carried out in support of the Government of Timor-Leste and within the Australian EEZ, with a focus on military exercise areas in the Bass Strait and Shoalwater Bay. Foundation surveys were also conducted within major ports around the country.

c) AusSeabed

The AusSeabed geospatial portal is a method of promoting collaboration between groups and organisations that have an interest in maritime data collect around Australia. There is an ability for users to input spatial Areas of Interest (AOI), objectives to be achieved in the area, and whether they are open to collaboration or have funding to contribute. Over time, additional AOIs build upon an area, potentially increasing the importance of the area for data collect or bringing together more contributors to combine resources and beneficially conduct the data collect activity.

The HIPP leverages the AOI build and incorporates them within a Risk Assessment Tool to enable future survey priorities. This is achieved through both the public AOI build or via a specific HIPP Request Tool. The request tool requires a business case be put forward to the National Hydrography Directorate. This is a less public forum as there may be sensitivities around the request.

Following assessment of requests for inclusion in the charting programme, subsequent contract survey datasets are uploaded to the AusSeabed portal for general use at a 30m resolution. This being another function of the portal, ease of access to marine data holdings or the ability to contact an organisation who has access to data within an AOI. AusSeabed is a collaborative tool to increase data holding awareness and promote collaboration in the acquisition of marine geospatial data.

3. Nautical Charting

The AHO continues to be committed to an ENC first approach with ENC updates for Maritime Safety priorities being actioned first. Paper chart Notices to Mariners complement this approach whilst maintaining the Paper Chart Portfolio. The AHO has commenced a digital transformation program which should realise a complete digital nautical charting suite and process by 31 Dec 2025 – this coincides with the intent of a number of leading national hydrographic offices.

The AHO is the Primary Charting Authority (PCA) for two Pacific Island Countries, as well as the national authority for Australia and its territories. Australia currently publish ten paper charts within Timor-Leste. The AHO is continuing with production of a full-suite of products covering Timor-Leste including new paper charts and electronic navigational charts of Hera, Approaches to Hera and Approaches to Caitehu, utilising recent surveys conducted by HMAS Leeuwin.

In early 2022, the AHO established an International Charting and Development (ICD) team focussing on the work we do outside Australian Waters as primary charting authority for Papua New Guinea and Solomon Islands as well as Timor-Leste and Antarctica.

a) ChartScheme

ChartScheme is the annual program of Charting projects to be undertaken by the AHO. It is very closely aligned with the HydroScheme activities as they are delivered to the Charting team. ChartScheme details the AHO's planned activities for the Financial Year (FY) in both, Australian waters and in waters of countries for which the AHO is the Primary Charting Authority (PCA - See CHARTSCHEME 2023 (arcgis.com)).

b) Papua New Guinea (PNG)

The AHO is focused on Pacific regional engagement, partnering with PNG via a bilateral MoU on hydrographic survey, specialist training and nautical cartography projects.

In partnership with PNG, Australia maintains 80 PNG paper nautical charts and 168 PNG (PG) electronic navigational charts, supporting maritime safety and environmental protection in PNG waters.

A project was established in 2020 to rebrand PNG charts and ENC's with a PNG/ PG prefix. The project was completed in April 2022 with all 80 paper charts rebranded to PNG prefix and all 168 ENC renamed to PG prefix.

c) Solomon Islands (SI)

The AHO is the Primary Charting Authority (PCA) for Solomon Islands and in partnership produces nautical charts and publications to support safe navigation in Solomon Islands. As the PCA for Solomon Islands, Australia maintains 17 SLB paper nautical charts and 43 SB electronic navigational charts, supporting maritime safety and environment protection in Solomon Islands waters.

d) Timor-Leste

Letters were exchanged between Australia and Timor-Leste in November 2021, enabling Australia to provide increased hydrographic capacity building support to Timor-Leste. AHO have recently published new charting products covering the Port of Tibar, Dili, Approaches to Caitehu and Approaches to Hera utilising recent surveys conducted in Timor-Leste by HMAS Leeuwin in 2022.

The total AHO portfolio as of 1st Feb 2023 includes:

Nation	Paper Charts	ENCs	Total
Papua New Guinea	80	168	**248**
Solomon Islands	17	43	**60**
Australia	280	706	**986**
Total	377	917	**1294**

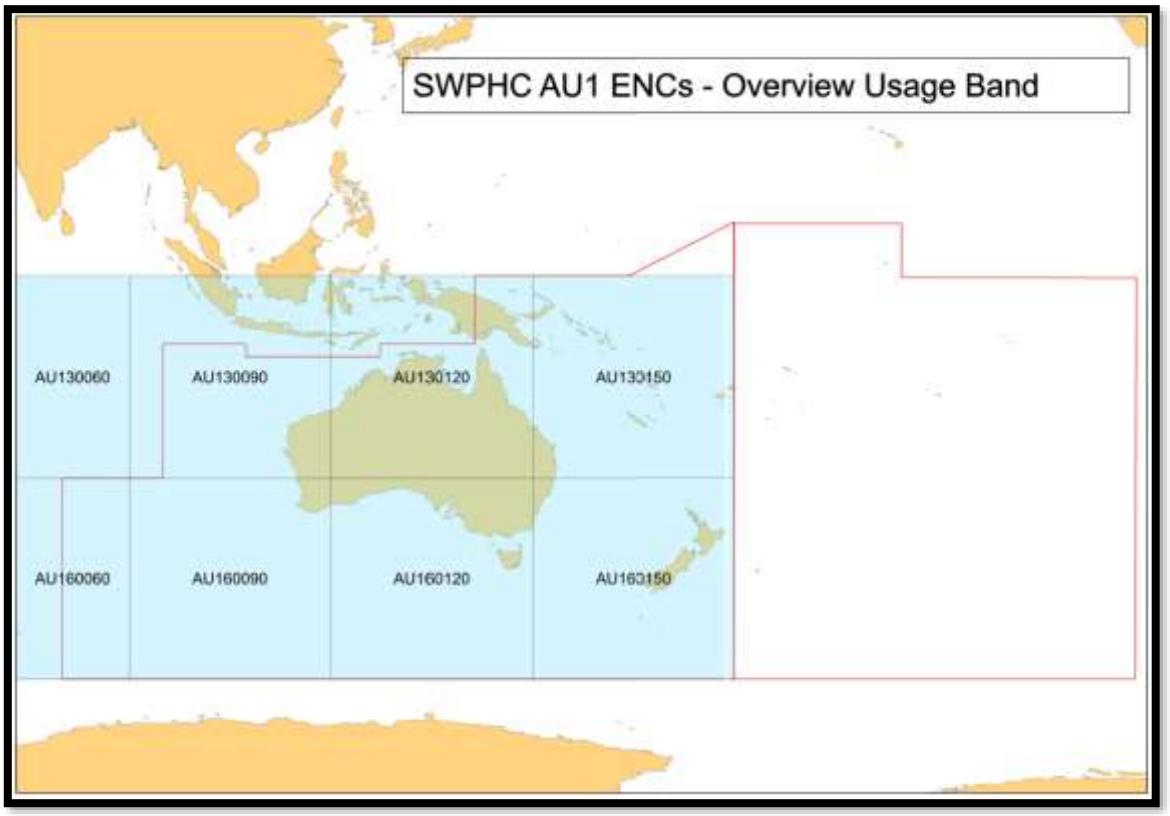
e) Electronic Navigation Charts

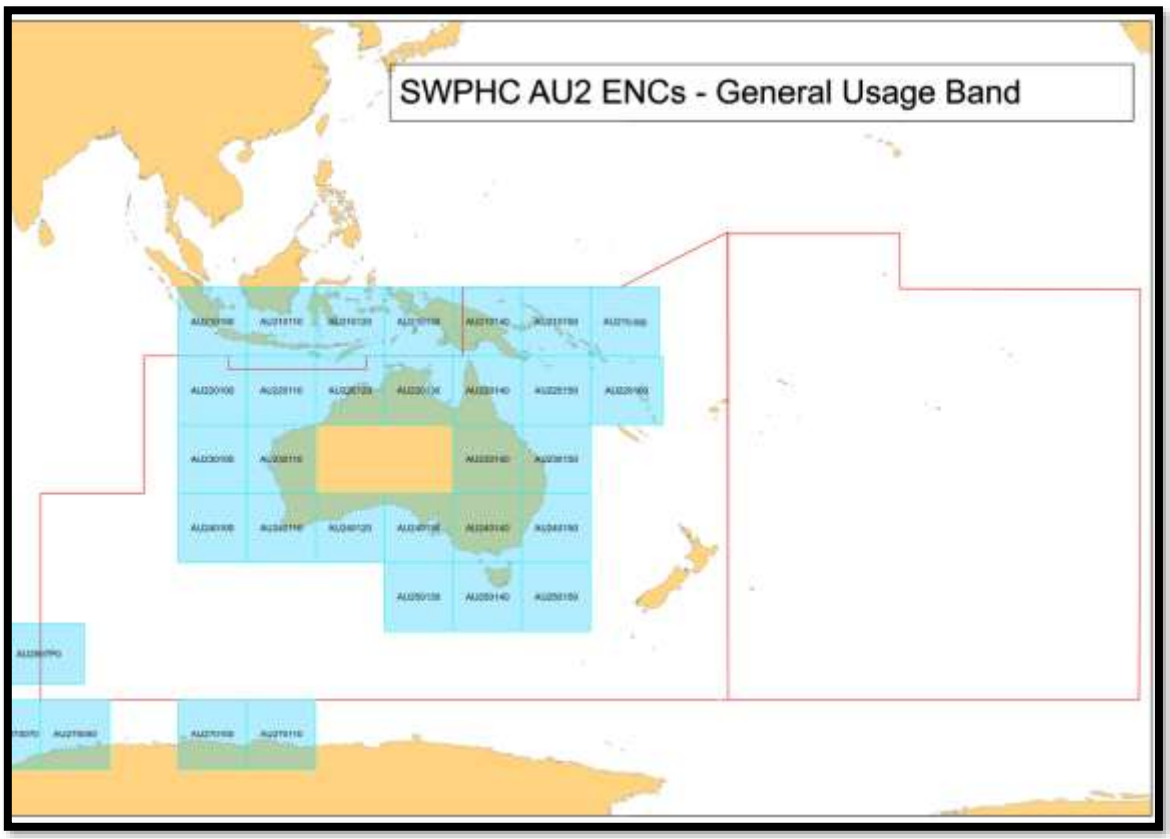
There are a total of 917 ENC cells published by the AHO. These include AU, PG and SB ENC cells. All ENC cells covering Papua New Guinea waters have been updated and reissued as 'PG' ENC cells. A project has been undertaken to update all usage code 5 ENCs to incorporate the new naming convention for Harbour ENCs based on the UN Location code system in lieu of previous naming convention based on large scale paper charts (e.g. AU5PKL01 – Port Kembla). To date 161 AU cells have been renamed with 43 cells remaining.

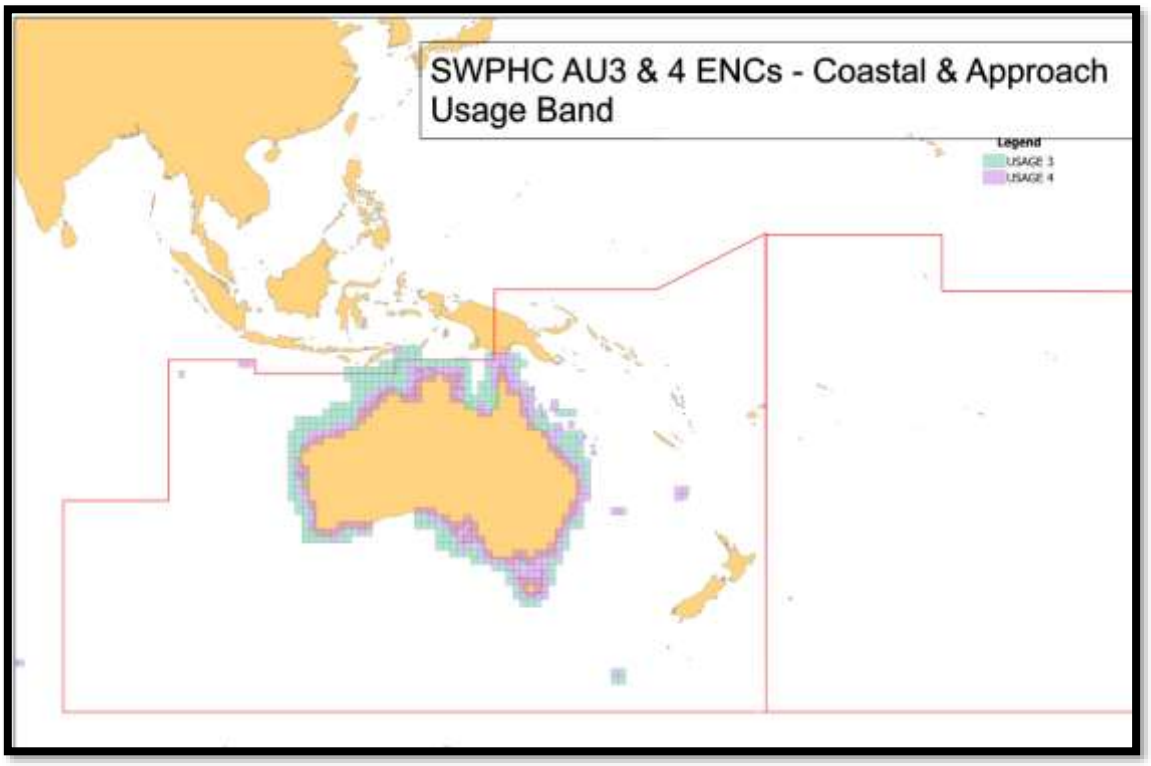
Currently the AHO has published 16 HDbENC's for ports of Brisbane, Townsville, Cairns, Sydney Harbour and Botany Bay. ENC project was completed in 2022 to update all Overview and General usage ENC's - AU130060, AU130090, AU130120, AU130150, AU160060, AU160090, AU160120 and AU160150 and encompassing AU2 cells from larger scale coastal cells.

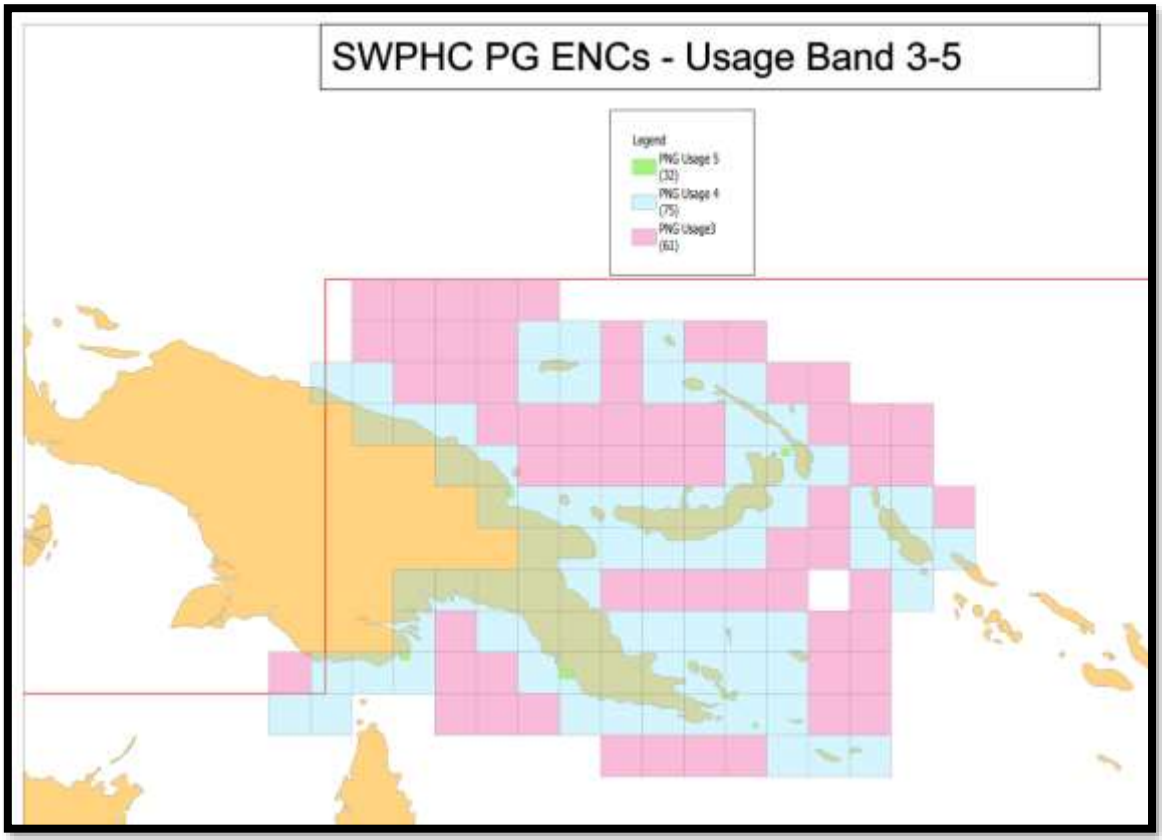
Australia ENCs published since the SWPHC19 Meeting		
Australia	**Solomon Islands**	**PNG**
Total: 923 New ENC: 12 NE ENC: 117 Updates: 122 MSI Updates: 672	**Total: 21** New ENC: 2 NE ENC: 1 Updates: 1 MSI Updates: 17	**Total: 56** New ENC: 9 NE ENC: 1 Updates: 6 MSI Updates: 40

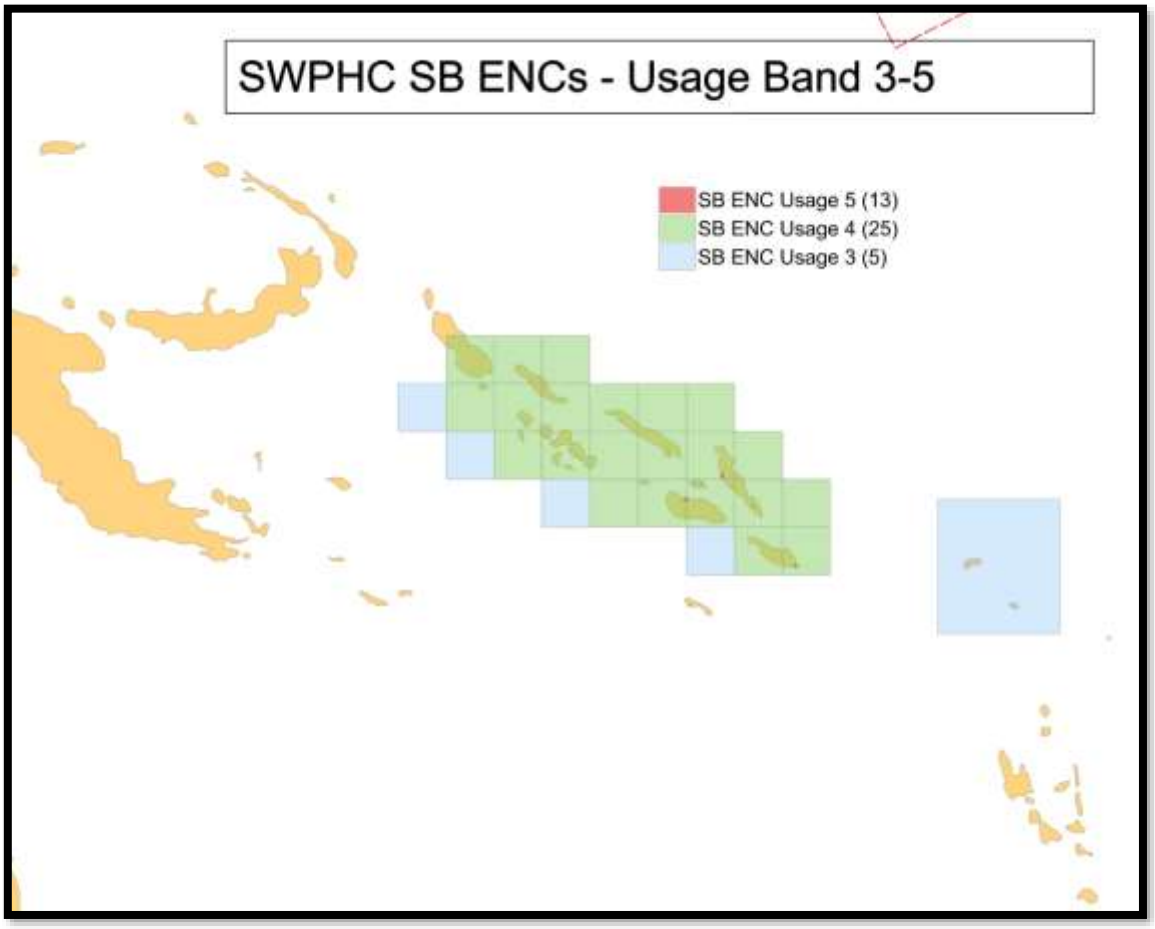
f) Australia ENC coverage by Usage Band






SWPHC AU3 & 4 ENCs - Coastal & Approach Usage Band
Legend
USAGE 3
USAGE 4


SWPHC PG ENCs - Usage Band 3-5
Legend
PNG Usage 5 (31)
PNG Usage 4 (75)
PNG Usage3 (61)



g) ENC Distribution

Australia is a member of IC-ENC and distributes its full portfolio of AHO published ENCs through IC-ENC Australia.

View the IC-ENC World Catalogue here:

http://geosig.hidrografico.pt/flexviewers/ICENC/

Australia also has a national ENC service, known as 'AusENC'. This supports vessels operating within Australian, Papua New Guinea, Solomon Islands, Timor Leste and surrounding waters and is priced to encourage use by domestic vessel operators, including coastal and port pilots. To support cross-Tasman operations, Toitu te whenua LINZ published ENC of North and South Island New Zealand have also been included in the service since Jan 2021.

For more information visit the AHO website at:

www.hydro.gov.au/prodserv/digital/ausENC/enc.htm

h) Raster Nautical Charts

The AHO does not produce RNC. RNC are derived by the UKHO from UKHO copies of paper charts produced by the AHO. Only those charts adopted by the UKHO are available as RNC.

i) INT paper nautical charts (1:1 500 000 and smaller)

A review was undertaken in 2021 regarding future requirements for INT paper nautical charts. A number were indentified as suitable for withdrawal without replacement. For most areas, coverage will remain available at 1: 3 500000 only. One 1:10M and three 1:1 500000 charts are likely to remain from within the existing portfolio. The intention is that remaining INT paper charts will be the minimum necessary to:

Facilitate route planning and monitoring in areas not fully covered by the coastal series (e.g. offshore reefs, neighbouring countries and Antarctica).

Display maritime claims (EEZ and Continental Shelf limits).

The AHO withdrew a number of the 1.5 million series INT charts in September 2022. These include INT620, INT621, INT623, INT634, INT635, INT643, INT644, INT720, INT721 and INT725-728.

j) Paper Nautical Charts

There are currently **377** paper nautical charts produced and maintained by the AHO. Detailed information of the full Australian chart portfolio can be found on the AHO website at:

http://www.hydro.gov.au/prodserv/paper/auspapercharts.htm

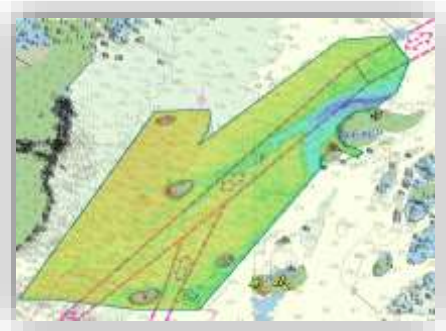
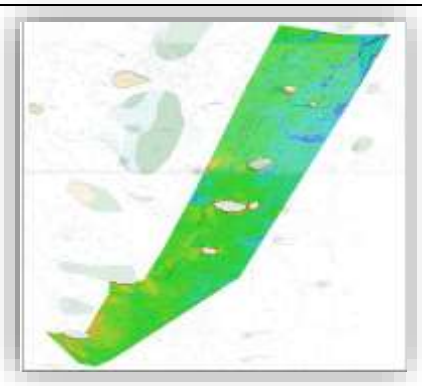
Australia Paper Charts published since the SWPHC19 Meeting			
Australia **Total: 211** NC: 5 # NE: 13 Updates: 193	**Solomon Islands** **Total: 8** NC: 0 NE: 1 Updates: 7	**PNG** **Total: 37** NC: 2 NE: 1 Updates: 34	**INT** **Total: 12** NC: 0 NE: 2 Updates: 10

Timor-Leste Charts

Australia

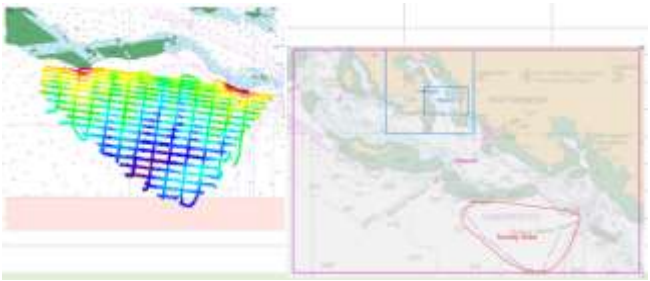
Some of the major updates are shown below:

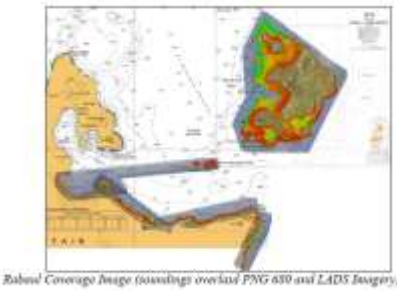
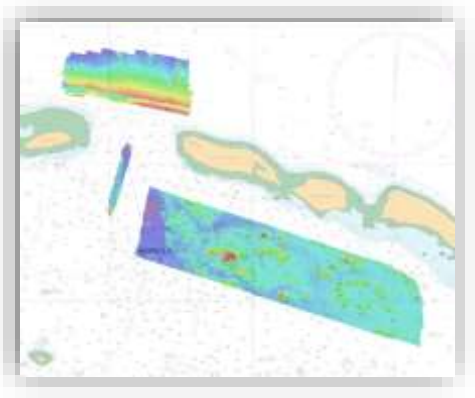
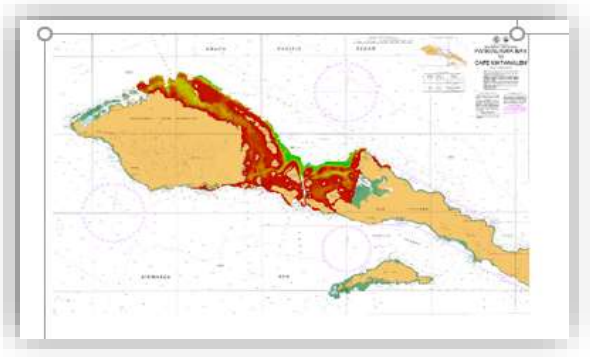
Survey Details	Thumbnail	Products	Published
HIPP SI 1005 Torres Strait Under Keel Clearance Management Area QLD		AU5TIS01 AU411141 AU411142 Aus292 Aus293 Aus296 Aus299 Aus839 Aus841 Aus842 Aus700	10 Nov 22 10 Nov 22 10 Nov 22 Underway 08 Dec 22 08 Dec 22 08 Dec 22 Underway Underway Underway Underway

Survey Details	Thumbnail	Products	Published
HIPP SI 1004 Western Approaches to Torres Strait QLD		AU411140 AU411141 AU220140 Aus700 Aus301	07 Apr 22 07 Apr 22 12 May 22 26 May 22 23 Jun 22
HIPP SI 1006 Great North East Channel - Torres Strait QLD		AU410143 Aus840	07 Apr 22 07 Jul 22
HIPP SI 1018 Great North East Channel QLD		AU410143 AU411142 AU411143 Aus292 Aus837 Aus839 Aus840 Aus841	Underway

Papua New Guinea

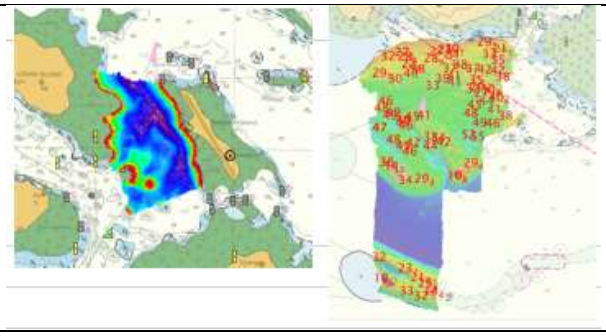
Some of the major updates are shown below:

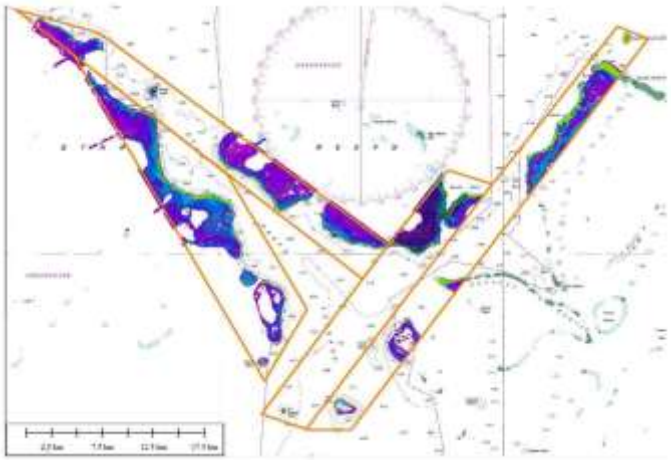
Survey Details	Thumbnail	Products	Published
Bathymetry survey of Nadeara Reef, PNG 2021		PG5621P0 PG410147 PNG621	9 Feb 23 15 Feb 23 Underway Expect completion Mar 23

Survey Details	Thumbnail	Products	Published
Rabaul PNG LADS Survey	 Rabaul Coverage Image (soundings overlaid PNG 630 and LADS Imagery)	PG5679P0 PG405152 PNG554 PNG679	Underway Expect completion Apr 23
RAN GI 041 Manus Island, Papua New Guinea		PG402147 PG403147 PNG662 PNG391	Underway Expect completion Mar23
Kavieng PNG LADS Survey 2018 RAN HI 612 conducted between the 21st of May and the 22nd June 2018		PG5666P1 PG403150 PNG666P1 PNG666 PNG543	9 Jun 22 9 Jun 22 07 Feb 23 07 Feb 23 Expect completion Apr 23

Solomon Islands

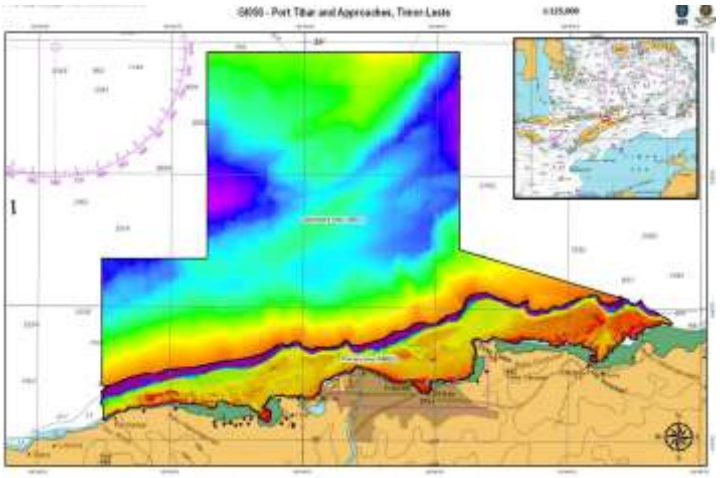
Some of the major updates are shown below:

Survey Details	Thumbnail	Products	Published
Gizo Island Solomon Island Hydrographic Survey 2019 RAN GI 018		SB409156 SLB102	Underway Expect completion Apr 23

Port Noro - Solomon Islands - MBES - HMAS LEEUWIN (SMB Tom Thumb and SMB Geographe) - 2020 (13th-15th Feb)		SB5102P3 SB409157 SLB102	10 Nov 22 10 Nov 22 09 Dec 22
Amphlett Group PNG Satellite Derived Bathymetry		PG409149 PNG519	Underway Expect completion Apr 23

Timor-Leste

Some of the major updates are shown below:

Survey Details	Thumbnail	Products	Published
GI050 Survey MBES - HMAS LEEUWIN - 2022		AU5CA2HE Aus908 Aus907 Aus901 Aus911 Aus910 Aus906 Aus909 Aus904 AU409125 AU409126	25 Aug 22 02 Sep 22 02 Sep 22 11 Nov 22 11 Nov 22 20 Jan 23 03 Feb 23 03 Feb 23 17 Feb 23 Expect Feb 23 Expect Feb 23

k) S-100

The AHO has been actively collaborating and engaging with other Hydrographic Offices and industry partners on S-100 products and services. The AHO have established project Theseus, which is looking at our S-100 implementation plan with focus on our path to duel fuel ENC production from 2025.

S-102 datasets have been created and are being tested by the Port of Melbourne with a focus on creation of S-102 products in areas where we currently have HDENCs.

In November 2022 the Australian Hydrographic Office (AHO) hosted the inaugural meeting of the National S-100 stakeholders working group. This first meeting aimed at introducing the audience to the IMO's eNavigation strategy and the S-100 framework as well as sharing similar initiatives currently underway in other countries. It is planned that the next meeting of the S-100 stakeholders working group will endorse the creation of a focus group to start working on the development of a TestBed project plan with the aim being coordinating resources and allocating responsibilities for the creation of a number of different S-100 product prototypes. The S-100 stakeholders forum has recently been approved to become an ICSM working group.

l) Rationalising large scale paper charts

With the IMO's mandatory ECDIS carriage requirement now fully in force as well as the near future introduction of S-101 ENCs the AHO is looking to reducing its paper chart portfolio. The AHO is currently in the process of withdrawing some of the multiple large scale port paper charts, retaining full detail in the ENC products only.

To date 110 Australian paper nautical charts have been withdrawn throughout 2021/22. The remaining 10 charts will be retired from within the existing portfolio in 2023. The list of coastal and large scale charts for withdrawal was released to the public via Notice to Mariners on 7 Feb 2020. Paper nautical charts covering Papua New Guinea and Solomon Islands will remain unaffected.

m) Paper Chart automation

The AHO is investigating options to implement an automated solution for the generation and updating of paper charts from validated S-57 product data. A preferred solution will be selected in 2023, and the plan is to further develop this capability over the following years with the aim of stopping manual paper chart compilation and updating by the end of 2025.

n) Australian Chart Index Application

On 15 October 2021, The AHO released a new web service to facilitate the discovery of our charting products (paper charts and ENC) in an easy to use graphical interface that has the option to display our ENC content as background. The Chart Index Application provides the capability for chart agents, mariners and other stakeholders to search and discover the AHO portfolio of both ENC and Paper chart limits online and query basic metadata information (e.g. Product number, Title, Edition, Update number, links to NtM and AusENC Pack information). This information is updated fortnightly in line with the NtM publication and AusENC service. The Chart Index App has the option to display an ENC image service as background.

See https://services.hydro.gov.au/AHOChartIndexPUBLICApplication/

o) Other charts

Nil.

p) Problems encountered

A low level of resistance to withdrawing many large scale and coastal paper charts has been encountered. This is being managed through continued consultation and engagement with stakeholders.

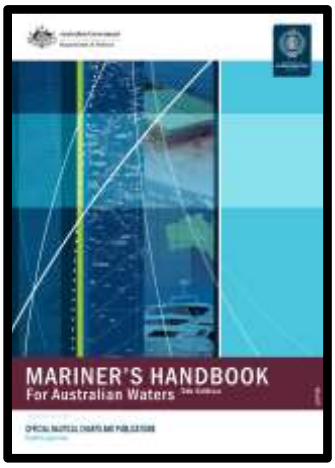
4. New publications & updates

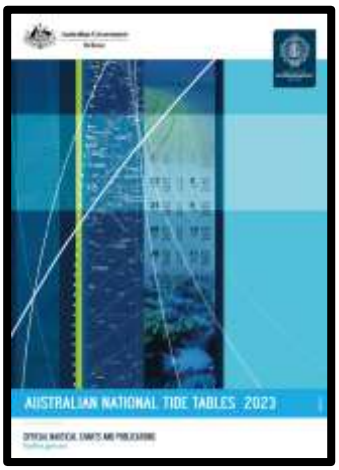
2023 Australian National Tide Tables were released as a digital (.pdf) download from the AHO website only. Downloads incorporate the latest applicable Notice to Mariners update.

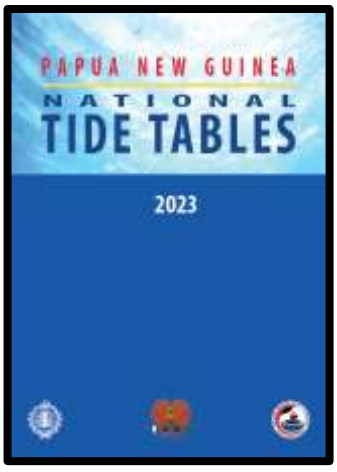
AusTides has been upgraded to provide better functionality. It now incorporates a feature where if the user's computer is connected to the internet upon launch, AusTides will perform an auto check for new updates published on the AHO website and automatically install them. 2023 AusTides is only available as a digital download from the AHO website.

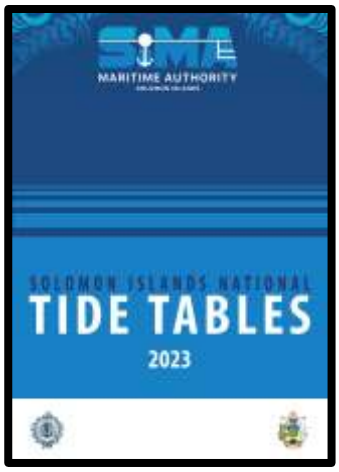
Separate 2023 National Tides Tables for Papua New Guinea, the Solomon Islands and Timor-Leste have been published. 2023 Papua New Guinea National Tide Tables were released as a digital (.pdf) download from the AHO website only. The 2023 Solomon Islands and Timor-Leste National Tide Tables were released as printed books available from the Solomon Islands Hydrographic Authority and Timor-Leste Government.

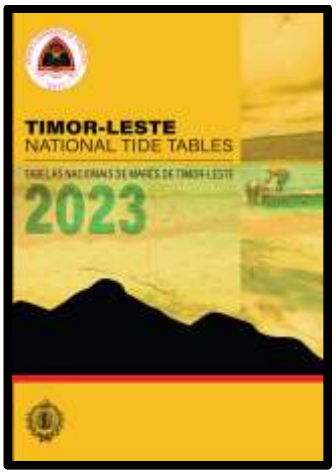
Work is underway on The Mariner's Handbook for Australian Waters AHP20 6th Edition with publication now planned for 2023.



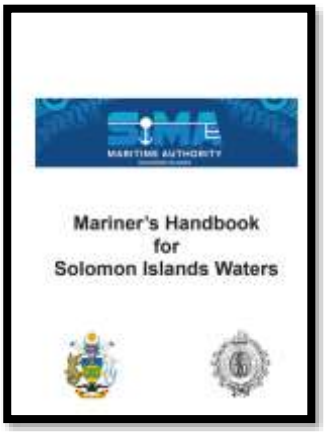








The AHO is in the process of producing a Mariners Handbook for Solomon Islands Waters. The work is expected to be published later this year.



The AHO Digital Products Portal is being developed to enable AHO publication users to download publications and their updates, receive portfolio based update notifications, compare the currency of their last download with the latest published version and download compliance certificates for their vessels. Publications initially to be included are Australian National Tide Tables, AusTides, The Mariners Handbook for Australian Waters and the Australian Chart and Publication Maintenance Handbook. Launch is planned in 2023.

5. Maritime Safety Information (MSI)

Australia is the coordinator for NAVAREA X with services delivered by the Australian Maritime Safety Authority (AMSA). AMSA is Australia's national agency responsible for maritime safety, protection of the marine environment, and maritime aviation search and rescue. Outline maps of NAVAREA X are available from the Australian Hydrographic Office (AHO) Seafarers Handbook for Australian Waters (AHP20) publication. Existing infrastructure for MSI dissemination of long-range and coastal warnings include Inmarsat SafetyNET, HF digital selective calling (DSC) and radiotelephone. Australia is also progressing with implementation of Iridium SafetyCast services.

The MSI Assessment for NAVAREA X for the period 1 January 2021 to 31 December 2021 was submitted to the Fourteenth IHO World Wide Navigational Warning Service (WWNWS) Sub-Committee Meeting (WWNWS14) held in parallel with the Advisory Group on the Worldwide Met-Ocean Information and Warning Service (WWMIWS) Sub-Committee (AG-WWMIWS-SubC) at the World Meteorological Organization (WMO) HQ in Geneva, Switzerland from 12 to 16 September 2022. An update for the period 1 January 2022 to 31 December 2022 has been submitted for consideration under the SWPHC20 Meeting agenda item 10 (doc. SWPHC20-10B).

Current NAVAREA X MSI can be obtained from the AMSA website at: https://www.amsa.gov.au/safety-navigation/navigation-systems/maritime-safety-information-database.

6. C-55

Navigationally significant areas within Australian area of jurisdiction.

Navigationally significant area	Location	Products
Approaches to Darwin	Beagle Gulf, NT	Aus722, AU5025X6, AU413130
Clarence Strait, Van Diemen Gulf	South of Melville Island, NT	Aus20, Aus720, Aus722, AU412130 AU412131, AU413130 AU413131
Torres Strait Two Way Route	Torres Strait	Aus299, Aus293, Aus296, AU5299P0 AU411141, AU411142
Western Approaches to Torres Strait	Gulf of Carpentaria, Torres Strait	Aus842, Aus700, AU411140, AU411141
Great North East Channel	Coral Sea	Aus839, Aus840, AU410143
Adolphus Channel	Torres Strait	Aus292, AU411142
Hydrographers Passage	Great Barrier Reef, Coral Sea , QLD	Aus251, Aus252 Aus255, Aus821, AU5255P0, AU421148 AU421149
Approaches to Newcastle	East Coast, Newcastle	Aus207, Aus809, AU5NTL01
Gulf St Vincent	Adelaide	Aus 130, AU435138 AU436137, AU436138
Backstairs Passage, SE Kangaroo Island	Approach to Adelaide	Aus780, AU436137, AU436138
Banks Strait	Bass Strait, between NE Tasmania and Furneaux Group	Aus798, AU442148 AU441147, AU441148
East Flinders and Cape Barren Islands, offshore	Tasman Sea	Aus179, Aus800 Aus767, Aus798, AU440148, AU441148
Furneaux Group Inshore	Bass Strait	Aus179, Aus800, AU5FIW01, AU5LAB01
King Island	Bass Strait, North of King Island	Aus789, AU440143, AU440144
Northern Approaches to Broome	West Coast, Indian Ocean	Aus50, Aus324, AU5050P0, AU418122 AU318121
Bonaparte Arcipelago, Camden Sound	Kimberley Coast	Aus730, Aus732, AU416123, AU416124
Lacepede Channel to King Sound	Kimberley Coast	Aus323, AU417122 AU418122
Cape Leeuwin, WA	Indian and Southern Ocean	Aus116, Aus335, AU334114, AU335114

MSI and GMDSS

The changes to MSI and GMDSS information in C-55 are indicated in Annex B to this report.

7. Capacity Building

a) Maritime Geospatial Training Centre (MGTC)

The Maritime Geospatial Training Centre is located at HMAS Penguin in Sydney on the North Shore. MGTC provides training courses in Hydrographic surveying for officers and sailors from Australia and the SW Pacific region under the Defence Cooperation Programme. It also provides meteorological and oceanography (METOC) training to the RAN.

The hydrographic training consists of three levels: basic, intermediate and advanced level. The basic and intermediate courses are traditionally attended by Australian sailors while the advanced level course (H2) is attended by sailors and officers from Australia and the region.

In 2022 the advanced level H2 course ran for 25 weeks and consisted of students from Australia (9), Indonesia (1), and Fiji (1)- (*see photo above*).

The Basic Courses (12 weeks duration) normally conducted for RAN sailors (9), also included 2 international students from Fiji in 2022. The Intermediate course (10 weeks duration) conducted earlier in the year was attended by 10 RAN students.

At the end of the 2022 MGTC also held a Military Meteorology and Oceanography (Mil METOC) Course over 12 weeks; where 3 students in total attended, 2 were RAN METOC students and the other was an Indian student.

b) S-5B Hydrographic Surveyors Course and S-8B Category B Marine Geospatial Information Program (IIC)

AHO have two staff enrolled in the S-5B Hydrographic Surveyors Course and five staff enrolled in the S-8B Marine Geospatial Information Program. The AHO are also sponsoring two Fijian Hydrographic Service officers to attend the S-8B course. The courses run by IIC Technologies are accredited by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) and is designed to maximize the advantages of online delivery.

The S-5 Category B program program, designed primarily for entry level hydrographic surveyors, particularly those involved with emergent national hydrographic offices wishing to conform to the IHO standards. The program components include: introduction to nautical science, bathymetry, tidal flows, geodesy and map projections, hydrographic practice, hydrographic data management, environmental science and legal issues.

S-8 Category B program is to prepare candidates with the theoretical and practical competencies necessary to carry out the planning and implementation of nautical chart production effectively. The course follows a modular program that follows the IHO IBSC S-8 Category B Standards of Competence for Nautical Cartographers.

c) Fiji Hydrographic Service Technical Visit

In March 2022 a contingent of AHO personnel conducted a technical assessment of the Fiji Hydrographic Service (FHS) capability. AHO representatives met with FHS staff to determine baseline capability assessment, benchmark for informing future capacity building programs and assist FHS to meet future hydrographic and charting needs including future development.

An outcome of that review was that the FHS needed assistance to get the RFNS Volasiga operational which has been completed. Support included Assistance to Fiji HS Survey Operations, Set to work DGNSS Systems, RFNS Volasiga + SMB, Install ICT RAID storage on vessels and in Office.

Two Fijian Hydrographic Officers visited the AHO in August 2022 to review Chart production workflows and participate in on the job training with AHO staff. In Dec 2022 the Fijian Hydrographer visited the AHO to review the FHS Technical assessment report.

d) Solomon Islands Navigation Safety Workshop and Tripartite Meeting – Aug 2022

In Aug 2022 AHO personnel attended the Solomon Islands Maritime Authority (SIMA) Navigation Safety Planning and the Tripartite meeting between AHO, SIMA and Japan International Cooperation Agency (JICA) in Honiara, Solomon Islands. The Navigation Safety Planning Workshop focussed on charting and surveying priorities with the aim of raising awareness and support for SIMA and determine charting priorities for Solomon Islands waters for inclusion in next years charting projects as part of Australia's enduring commitment to the Solomon Islands charting under the MoU between the Department of Defence of Australia and the Solomon Islands Maritime Authority.

The Tripartite meeting took place in Honiara and was attended by AHO, SIMA and JICA representatives in Honiara. Aero Asahi Corporation, who are undertaking the surveys under contract to JICA gave an outline of the project for development support of new surveys and associated products for Port Noro and Honiara.

8. Oceanographic activities

a) Tide gauge networks

Two permanent tide gauge networks are operated in the region by the Bureau of Meteorology.

The Australian Baseline Sea Level Monitoring Array currently consists of 14 permanent gauges monitoring sea level and ancillary meteorological parameters around the Australian coastline, including one at Cocos Island. The array is supplemented with 2 privately-operated tide gauges at Lorne and Stony Point. The locations of the gauges are shown in **Figure 1** (below).

Monthly reports and observational data are published by the Bureau and can be located on their website at: http://www.bom.gov.au/oceanography/projects/abslmp/abslmp.shtml

The Pacific Sea Level and Geodetic Monitoring Project currently consists of 14 permanent gauges monitoring sea level and ancillary meteorological parameters throughout the South Pacific region. The locations of the gauges are shown in **Figure 1** (below).

Monthly reports and observational data are published by the Bureau and can be located on their website at: http://www.bom.gov.au/pacific/projects/pslm/index.shtml

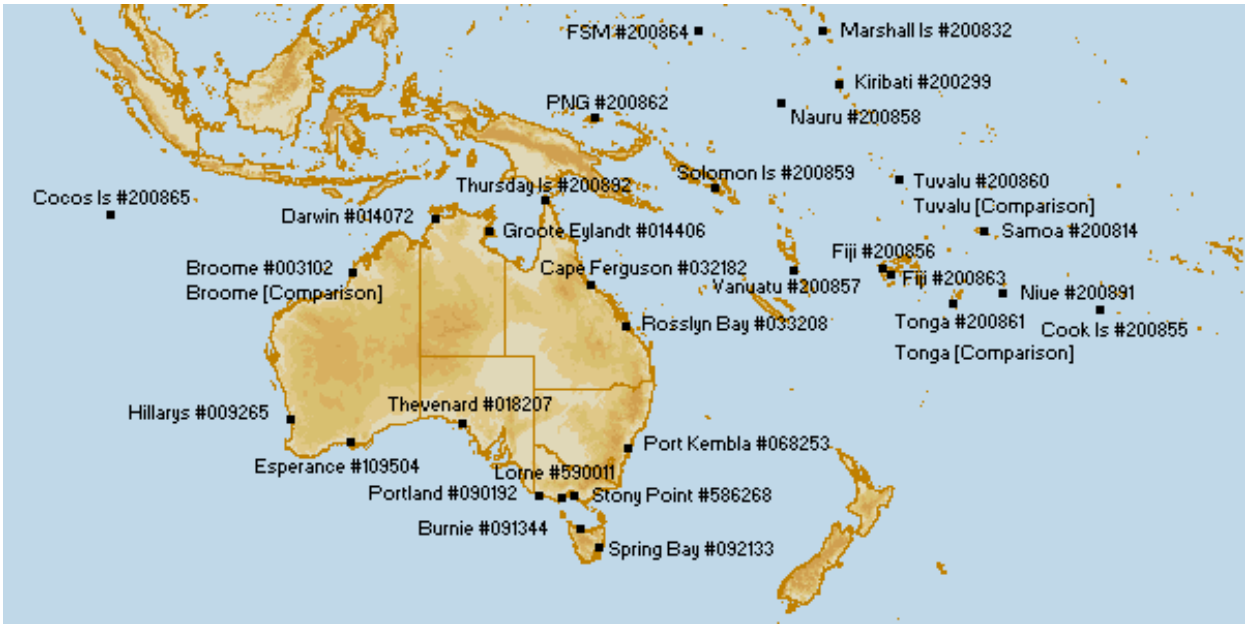


Figure 1: Permanent tide gauge network operated by the Bureau of Meteorology, including the Australian Baseline Sea Level Monitoring Array (16 sites) and Pacific Sea Level and Geodetic Monitoring Project (14 sites).

The permanent tide gauges were upgraded in 2009-2010 (Baseline) and 2011-2013 (Pacific) with modernised data loggers, real-time satellite communications and additional radar-type water level sensors. Co-located comparison stations were installed at Broome and Tuvalu in 2017 and at Tonga in 2018 and have now become the permanent operational tide gauges at those locations following the completion of wharf refurbishments.

The Australian Tsunami Warning System (ATWS) is supported by the 30 permanent Australian and Pacific tide gauges (**Figure 1**) as well as an additional network of 16 radar-type tide gauges at four Pacific and 12 Australian sites as shown in **Figure 2**. The ATWS station at Port Hedland was closed in December 2020. An

array of six deep-ocean tsunameters (DART buoys) brings the Australian tsunami-monitoring network to 52 sites in all.

The primary purpose of these additional stations is for the detection of tsunami with real time data made available to support the operations of the Pacific Tsunami Warning System. Further information about the Australian Tsunami Warning System is available at http://www.bom.gov.au/tsunami/about/atws.shtml

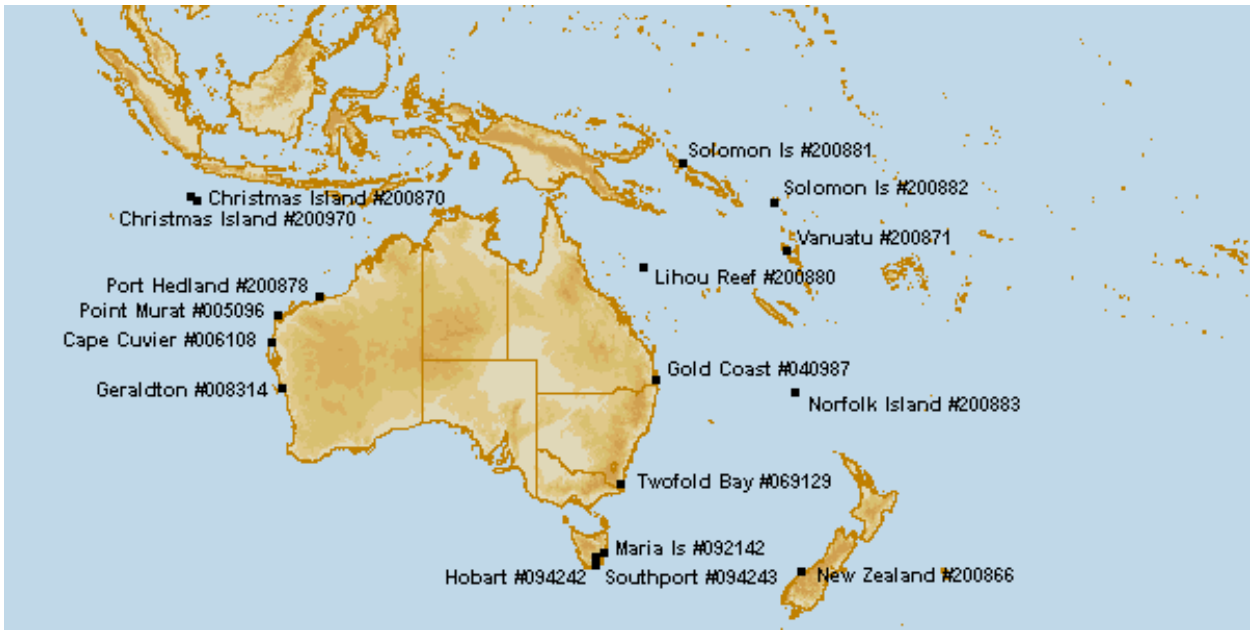


Fig. 2: Additional ATWS radar gauges (16 sites) that are used in conjunction with the permanent tide gauge network for monitoring tsunamis in the Australian region. The station at Port Hedland was closed in December 2020.

b) New equipment

Surveyable mounting of the secondary radar water level sensors and integration of mounting pillars for continuous GNSS/GPS equipment on the tide gauge infrastructure are slowly being introduced into the network, while acoustic water level sensors remain the primary sensor at most sites.

c) Problems encountered

Generally, the gauges operate autonomously in between calibration and servicing on a routine 18-month schedule, with average data return from the permanent tide gauge network exceeding 95%. The variety of day-to-day problems that do arise include power supply, data logger, data communications and sensor malfunctions, which are managed either remotely, by voluntary first in maintenance support or through contingency field trips.

The Niue tide gauge and geodetic monitoring site was completely destroyed by cyclone Tino which hit on January 17th 2020. Waves were reported to have crashed on to cliff tops between 20-30 metres high.

It was intended that reconstruction of a replacement tide gauge and GNSS sensor together with housings would commence immediately to be completed before the end of 2020. However with the restrictions on travel due to COVID, this will now not happen until 2023.

9. Spatial Data Infrastructures

a) Status of Marine Spatial Data Infrastructure (MSDI)

The AHO operate a basic public facing MSDI, serving foundation hydrographic geospatial web services, and enhanced through a couple of supporting browser based applications. The AHO currently utilise two cloud-based infrastructures to support its MSDI capability; our own sovereign capability hosting the following

https://services.hydro.gov.au/site1/rest/services

https://services.hydro.gov.au/AHOChartIndexPUBLICApplication/

and ESRI's ArcGIS Online which hosts our HIPP HydroScheme

https://www.hydro.gov.au/NHP/

The mission for our MSDI is to ensure our data and products are secure-FAIR; findable, accessible, interoperable, and reusable. The OGC standards we currently present are Web Map Service, Web Map Tile Service, Web Feature Service, and GeoServices REST.

b) Relationship with the National Spatial Data Infrastructure (NSDI)

Australia does not provide a single NSDI, rather supports and enables a federation of spatial data infrastructures that, based on a common set of interoperable standards, are able to communicate between each other. The AHO is currently focussed on Marine/Maritime SDI's rather than National SDI's.

c) Involvement in regional or global MSDI efforts

The AHO is currently the Vice-Chair of the SWPHC MSDI WG, and has been very active in the past twelve months, holding five working group meetings, including two virtual workshops and growing participation throughout the region including PNG, Tonga, SPC, France, NZ, UK (Chair), and USA. A number of Australian Government organisations have been included in working group participation, as well as industry representatives from IIC Technologies.

d) National implementation of the UN Statement of Shared Guiding Principles for Geospatial Information Management – including any national data policy and impact on marine data.

The AHO is working with the SWPHC MSDI WG to respond, and make recommendations, to Goal 2 of the IHO Strategic Plan. This feedback is forthcoming through the SWPHC MSDI WG.

e) MSDI national portal

As addressed above in reference to NSDI's, the Australian position on SDI's is to federate them rather than have a single portal. Therefore there are a number of MSDI's available from Australia as recently updated in the IHO MSDI register https://iho.int/uploads/user/Inter-Regional%20Coordination/MSDIWG/MISC/SDI-portals.pdf. The AHO is currently providing geospatial web services in support of a number of port and national Marine Spatial Planning applications. The AHO is looking to federate its MSDI with Geosciences Australia AusSeabed Data Hub, which in turn, will federate with the international GEBCO Seabed 2030 portal.

f) Best practices and lessons learned

An MSDI is only as good as the management of data that underpins it. Don't over analyse it. Start small and grow MSDI capability, this includes people, technology and infrastructure, and of course data.

g) Challenges and achievements

Basic technology and infrastructure to support the AHO MSDI has been achieved, and is slowly growing. The biggest challenge we face as a product-centric organisation, is enabling our data holdings for secure-FAIR access, noting our core workflow is in support of navigational chart production. Unlocking, and exposing the myriad of data that supports that single production line is difficult, but possible through evolving the systems to better support enterprise data management first.

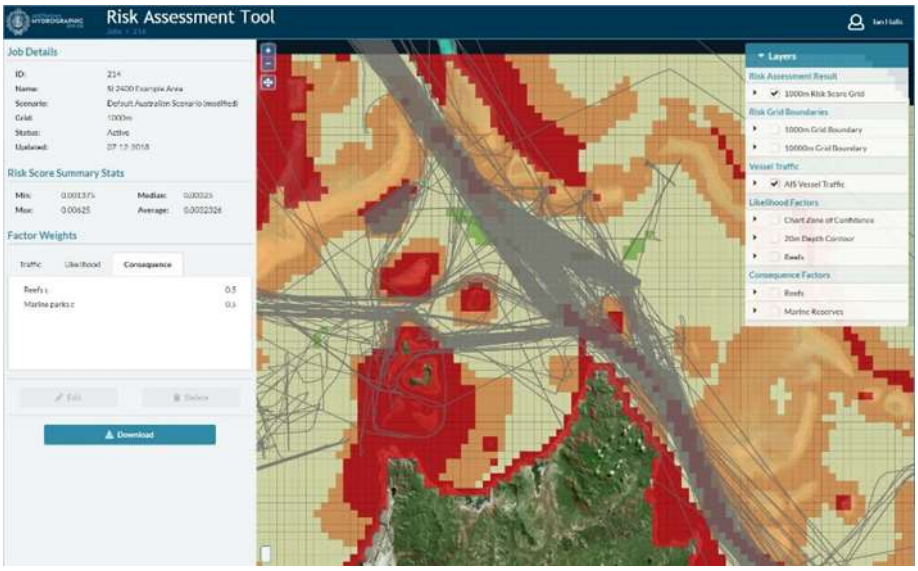
10. Innovation

a) Use of Technology

AHO is currently working to implement distributed printing of charts by Agents. This is a precursor to more automated paper chart generation and supply for regulated purposes via our agents. There are significant system changes underway to support provision of the print files; this will be followed by updated file creation processes over coming years.

b) Survey Planning Risk Assessment tool

The AHO continues to develop a Risk Assessment Tool based on the methodology adopted by LINZ. This operates on an Amazon Web Service cloud instance and was first employed during the survey planning process for HydroScheme21. It uses AIS data (supplied by AMSA) and geospatial data overlays to output a graphic risk display (see image example). The user has the flexibility to alter Traffic, Likelihood and Consequence weightings to develop Use Case Scenarios. Further development work is underway to improve the way AIS traffic data influences the output and to extend coverage to include Antarctica and Australian offshore territories.



11. Other activities

a) Participation in IHO Working Groups

	Meeting	Chair/Vice Chair	Member/ Associate/ Observer
	Council		M
HSSC	Hydrographic Services and Standards Committee		M
NCWG	Nautical Cartography Working Group		M
ENCWG	ENC Working Group		M
DQWG	Data Quality Working Group		M
MSDIWG	Marine Spatial Data Infrastructure Working Group		M

HSPT	S-44 Hydrographic surveys Project Team		M
TWCWG	Tidal, Water Level and Currents Working Group		M
WEND	World-Wide Electronic Navigational Chart Database		M
WWNWS-SC	World-Wide Navigational Warnings Service Sub-Committee		M
ABLOS	Advisory Board on the Law of the Sea		O
CSBWG	Crowd Sourced Bathymetry Working Group		O
S-100	S-100 Working Group		M
S-101	Project Team	Vice Chair	M
S-104	Development Group		M
S-111	Development Group		M
S-121	Development Group		M
S-129	Development Group		M
S-412	Development Group		M
HCA	HCA Hydrographic Commission on Antarctica		M
NIOHC	North Indian Ocean Hydrographic Commission		A
SAIHC	Southern Africa and Islands Hydrographic Commission		O
SWPHC	South-West Pacific Hydrographic Commission SWPHC International Charting Coordination WG SWPHC Marine Spatial Data Infrastructure WG SWPHC Work Plan & Priorities WG SWPHC SPI WG	 Chair Vice-Chair Chair	M M M M M
EAHC	East Asian Hydrographic Commission		O
IBSC	International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers	Chair	M
SCUFN	GEBCO Sub Committee on Undersea Feature Names		M

12. Conclusions

AHO continues to implement the introduction of HIPP with upgrades to systems and processes, workflow and data management protocols. The AHO has embarked on a digital transformation of its products and services that will see the implementation of a new geospatial standard (S-100) from 2025, the migration of all printed publications to a digital format (PDF) and the automation of the production of paper charts.

Australian Navy ships will continue to spend considerable time deployed in the South Pacific region.

Input to the IHO Publication P-5 (*Yearbook*)

Country: AUSTRALIA

Organization: Australian Hydrographic Office

Contact information/ Informations de contact / Información de contacto	
-National Hydrographer or equivalent -Directeur du service hydrographique ou équivalent -Director del Servicio Hidrográfico o equivalente	Post: Hydrographer of Australia – Director General Maritime Geospatial (DGMG) Name: Commodore Stewart Dunne, RAN Postal address: 8 Station St, Wollongong, NSW 2500, Australia Tel: +61 (0) 2 4223 6500 Fax: +61 (0) 2 4223 6599 Email: international.relations@hydro.gov.au
-Other point(s) of contact -Autre(s) point(s) de contact -Otros punto(s) de contacto	international.relations@hydro.gov.au
-Web site -site web -sitio web	http://www.hydro.gov.au
Country information / Informations sur le pays/ Información sobre el país	
-Declared National Tonnage -Tonnage national déclaré -Tonelaje Nacional Declarado	Tonnage: 1,684, 678 Date: October 2019
-National day -Fête nationale -Fiesta nacional	26 January
-Date of establishment and Relevant National Legislation -Date de mise en place et législation nationale pertinente -Fecha de constitución y legislación nacional pertinente	Hydrographic Office, R.A.N – Established 01 October 1920 ; Commonwealth Naval Order 275 dated 14 December 1920. Navigation Act 2012
-Date first joined IHO -Date d'adhésion à l'OHI -Fecha de adhesión a la OHI	21/06/1921
-Date ratification Convention -Date de ratification de la Convention	25/11/1968

-Fecha de ratificación de la Convención	
-Remarks on membership -Remarques sur l'adhésion -Comentarios sobre la adhesión	Included under “British Empire” with the U.K. from 1921.
Agency information/ Information sur l'agence/ Información sobre la agencia	
-Top level parent organisation -Organisme mère -Organización asocieda de nivel superior	Dept of Defence
-Principal functions of the organisation or the department -Attribution principales de l'organisme ou du département -Principales funciones de la Organización o departamento	Hydrographic and bathymetric surveys. Notices to Mariners Nautical charts. Tides, Tidal Streams, Currents Maritime Military Geospatial Products and Services. Australian Hydrographic Data Archive. PCA for Papua New Guinea and Solomon Islands
-Annual operating budget -Budget annuel -presupuesto anual	
-Total number of staff employed -Effectifs totaux -Número total de personal empleado	
-Number of INT charts published -Nombres de cartes INT publiées -Número de cartas INT publicadas	27
-Total number of paper charts published-Nombre total de cartes papier publiées-Número total de cartas de papel publicadas	280 AUS , 17 SLB and 80 PNG charts **= 377** total
-Number of ENC cells published -Nombres de cellules ENC publiées -Número de células ENC publicadas	706 AU cells, 168 PG Cells and 43 SB cells = **917** total
-Number of Other charts -Nombre d'Autres cartes -Número de Otras cartas	

-Type of publications produced -Type d'ouvrages produits -Tipo de publicaciones producidas	Australian Chart Index Appliction – Web Service Fortnightly Notices to Mariners (AHP18) Seafarers Handbook for Australian Waters (AHP20) – printed and digital Australian National Tide Tables (AHP11) Australian Electronic Tide Tables ('AusTides' - AHP114) Australian Chart and Publication Maintenance Handbook 4th Edition (AHP24) Maritime Gazetteer of Australia (geographic names as shown on Australian paper nautical charts) – searchable website tool			
-Detail of surveying vessels/ aircraft -Détail des bâtiments hydrographiques / aéronefs -Detalle de los buques hidrográficos / aeronaves	-Name -Nom -Nombre	-Displacement -Déplacement -Desplazamiento	-Date Launched -Date de mise en service -Fecha de botado	-Number of crew -Nombre de l'équipage -Tripulación
	HMAS LEEUWIN	2550	1997	56
	HMAS MELVILLE	2550	1998	56
	HMAS SHEPPARTON	380	1989	13
	HMAS BENALLA	380	1990	13
	Maritime Geospatial Warfare Unit (MGWU)	Vessel of Opportunity	Early 1980s	16
-Other information of interest				

Input to the IHO Publication C-55 (Status of Hydrographic Surveying and Charting Worldwide)

Country: **AUSTRALIA**