NIOHC21 – 10.2k

21ST MEETING OF THE NORTH INDIAN OCEAN HYDROGRAPHIC COMMISSION (NIOHC21)
Bali, Indonesia, 22-25 August 2022

NATIONAL REPORT FROM AUSTRALIA TO THE NIOHC21

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 through data and services, required for the safety of vessels navigating in Australian waters. The key focus throughout 2021-22 had been the continued implementation of the HydroScheme Industry Partnership Program, an innovative government-industry arrangement providing a commercial data acquisition solution for the Australian Charting Area. 2021 saw the continued development of data and information release policies which will underpin the AHO moving towards a modern data driven and customer-focused organisation.

2. Surveys

HydroScheme Industry Partnership Program

As outlined in the 2016 Defence White Paper, Defence is replacing it's hydrographic capability with a more efficient commercial hydrographic and oceanographic survey capabilities delivered through a partnering with industry. This initiative led to the establishment of the HydroScheme Industry Partnership Program (HIPP). Through the HIPP, the Australian Government is meeting the National Survey Function (NSF) obligations that will, over the medium to long term, help drive fundamental change in the delivery of 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 February 2020.

Current activity

The AHO is in the second year of implementing the 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 who bid for tendered work. Each annual program is referred to as a HydroScheme. HydroScheme 2020 is complete, HydroScheme 2021 data is being applied to nautical charts and products, and HydroScheme 2022 contracted hydrographic surveys are currently underway. 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 30 June each year. Each HydroScheme includes a cycle of:

- risk assessment, identification and prioritisation of survey areas
- 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

Endorsement of HydroScheme 2023 (FY23-24) is programmed for August 2022. HydroScheme 2022 contract survey activities for FY22/23 are underway, with three activities mobilising in northen Australian waters, one activity nearing completion in Bass Strait, and others commencing later in the FY.

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 planned within the Australian EEZ as well as Papua New Guinea, Solomon Islands and Timor Leste. The Timor Leste survey in the vicinity of Port Tibar was completed in March 2022.

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 Papua New Guinea and the Solomon Islands, as well as the national authority for Australia and its territories. Australia currently publish four paper charts within Timor-Leste and have received a request by government of Timor-Leste to produce new charts covering the new port of Tibar Bay. In October 2021, the AHO established an International Charting and Development (ICD) Section focussing on the work we do outside Australian waters as PCA for Papua New Guinea, Solomon Islands, Antarctica and Timor-Leste. The ICD Section cover aspects of ENC and Paper Chart production, Publications, capacity building

activities, risk assessments, country capacity reviews and involvement with South West Pacific Hydrographic Commission working groups.

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.

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 all PNG charts and ENC 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.

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.

Current Portfolio

The total portfolio as of 1 August 2022 includes:

Nation	Paper Charts	ENC	Total
Papua New Guinea	80	168	**248**
Solomon Islands	17	43	**60**
Australia	287	697	**988**
Total	**384**	**908**	**1292**

a) Electronic Navigation Charts

There is a total of 908 ENC cells published by the AHO. A project has been undertaken to update all usage code 5 ENC to incorporate the new naming convention for Harbour ENC based on the UN Location code system in lieu of previous naming convention based on large scale paper charts (eg. AU5PKL01 – Port Kembla). To date 154 Usage 5 cells have been renamed with 48 cells remaining. Currently the AHO has published 11 HDbENC for the ports of Townsville, Cairns, Sydney Harbour and Botany Bay.

b) ENC Distribution

Australia is a member of IC-ENC and distributes all AHO published ENC through IC-ENC Australia. View the IC-ENC World Catalogue at http://geosig.hidrografico.pt/flexviewers/ICENC/. Australia also has a national ENC service, known as 'AusENC'. This supports vessels operating exclusively within Australian, Solomon Islands and Papua New Guinean waters, and is priced to

encourage use by domestic vessel operators, including coastal and port pilots. To support cross-Tasman operations, LINZ published ENC of North and South Island New Zealand have also been included in the service since January 2021. For more information visit the AHO website atwww.hydro.gov.au/prodserv/digital/ausENC/enc.htm.

c) 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.

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

A review is currently underway regarding future requirements for INT paper nautical charts. A number have been identified as suitable for withdrawal without replacement. The intention is that, for most areas, coverage will remain available at 1:3.5M only. One 1:10M and one 1:1.5M chart 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).

Small scale 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.

e) Paper Nautical Charts

There are currently 384 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

Rationalising large scale paper charts

With the IMO's mandatory ECDIS carriage requirement now fully in force, as well as the future introduction of S-101 ENC 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. The largest scale paper chart offered in those areas will be adequate to serve as ECDIS backup and it will show the limits of the areas where additional detail exists in ENCs. It will still allow mariners to plan pilotage, continue their navigation as planned or to deviate to a waiting area (open sea or anchorage) or pilot boarding place.

Following this wide stakeholder consultation, as well as an online questionnaire to domestic commercial vessel operators and discussions with the yachting community, 126 paper nautical charts considered to be no longer required have progressively been withdrawn once any necessary detail has been transferred to remaining charts. To date 101 Australian paper nautical charts have been withdrawn throughout 2021/2022. The remaining 25 charts will be retired from within the existing portfolio in 2022. The list of coastal and large scale charts for withdrawal was released to the public via Notice to Mariners on 7 February 2020. Paper nautical charts covering Papua New Guinea and Solomon Islands will remain unaffected.

Custom Chart Builder

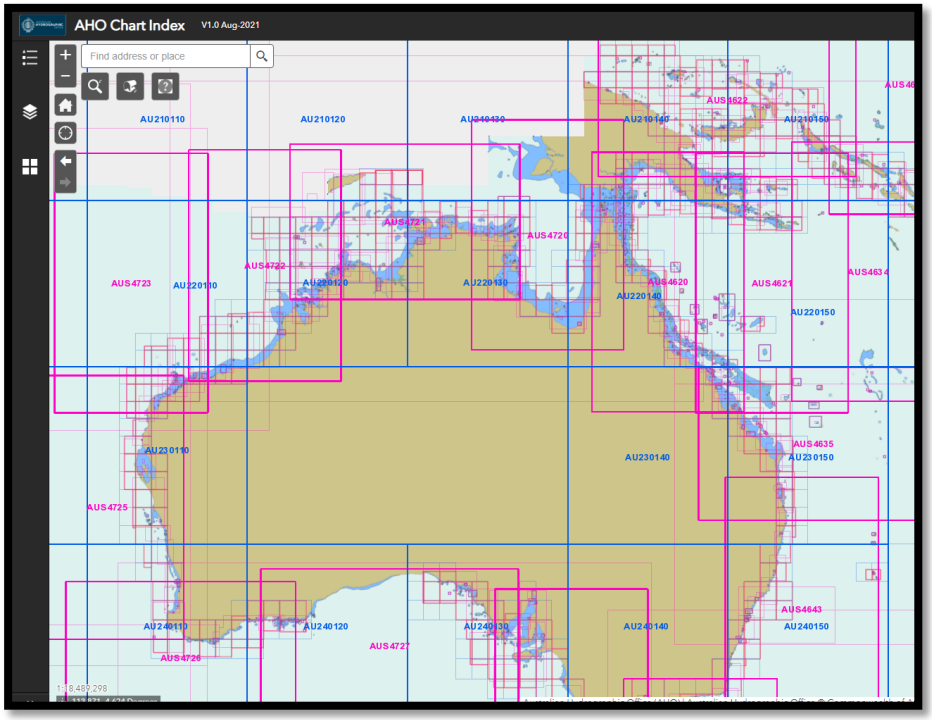
The AHO is investigating options to implement an automated online solution for the provision of paper products. An analysis was carried out of potential viable software applications that would meet the needs for the AHO in the automation of Paper Chart production. The ESRI Maritime Custom Chart Builder has been deployed to the AHO production environment as part of a concept development activity; in doing this the team was able to assess the suitability for auto generation of paper chart creation, however it has to be noted that a default install of the system has been

deployed at present, there will need to be considerable development and customisation to the system for it to meet the AHO's needs. The plan for the AHO is to further develop this capability over the next three years to coincide with the AHO planned Paper Chart withdrawal in 2025.

f) Australian Chart Index Application

On 15 October 2021, the AHO released a new web service to facilitate the discovery of our charting products (both 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 and Update numbers). This information will be updated fortnightly in line with the Notice to Mariner publication and AusENC service. The Chart Index App has the option to display an ENC image service as background and the plan is to update its content twice a year in July and January.

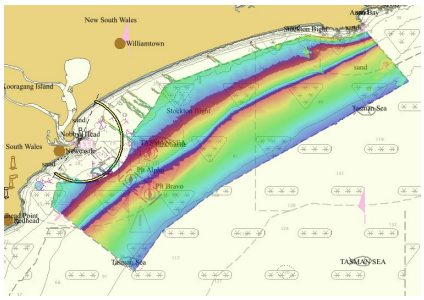
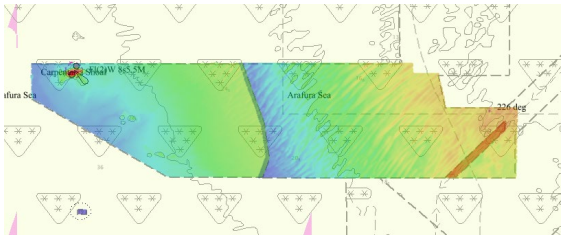
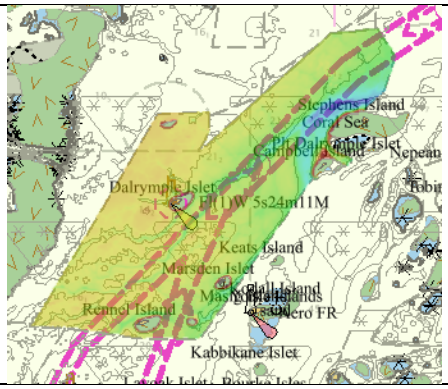
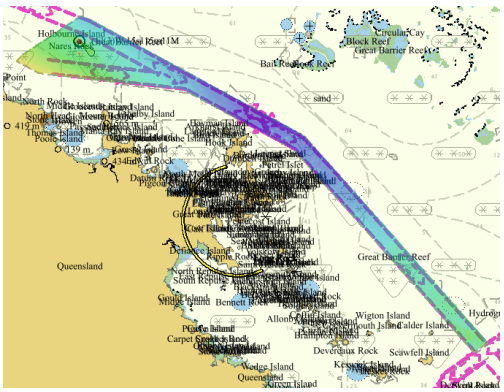
With the introduction of this new service, our paper chart indexes (Aus 5000 and Aus 5001) and the GoogleEarth version of the Australian Chart Index will be discontinued. The Solomon Islands and PNG paper chart and ENC indexes (SLB1001, SLB 1002, PNG 2000 and PNG 2001) will continue to be published as hard copies until further notice. An online user guide has been linked to the application at https://services.hydro.gov.au/AHOChartIndexPUBLICApplication/.

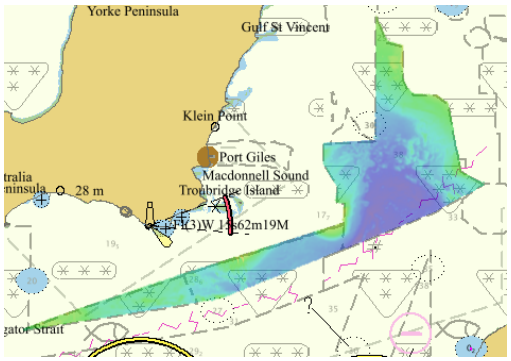
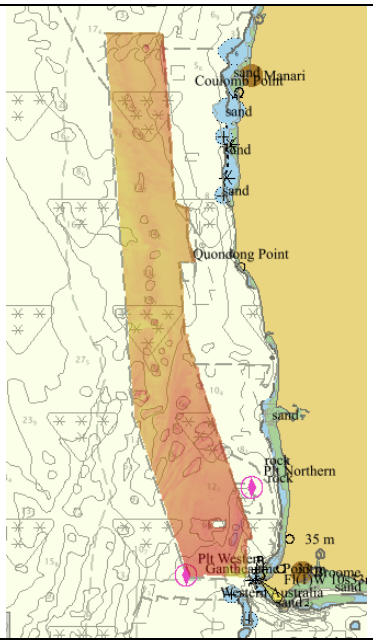
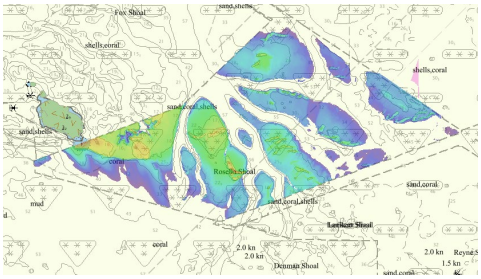
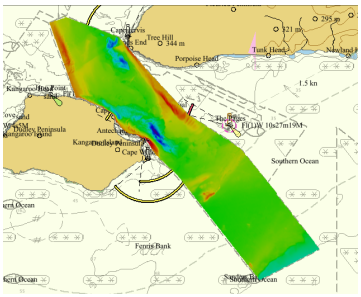


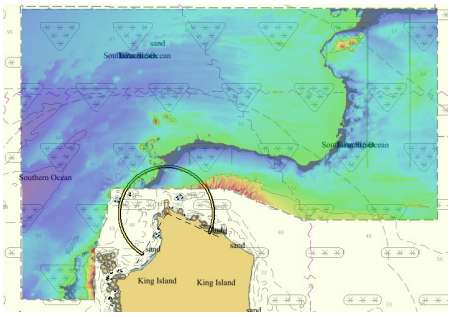
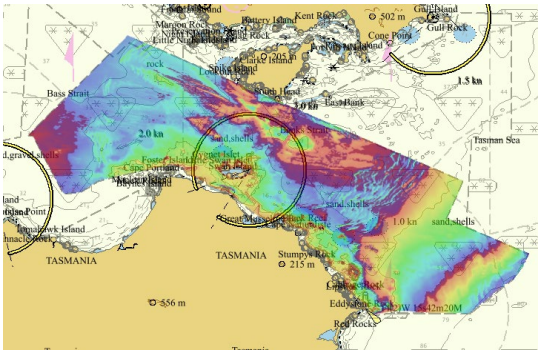
We encourage users to provide feedback and suggestions for improvements to international.relations@hydro.gov.au.

Australian Projects completed recently

Some of the major updates are shown below:

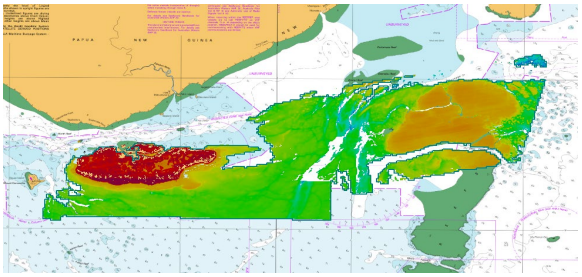
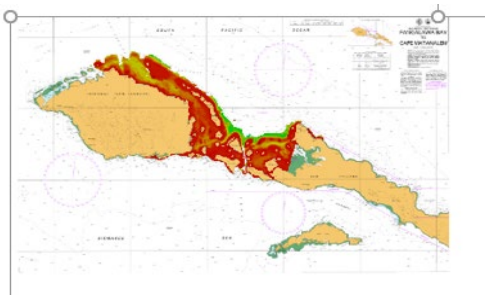
Survey Details	Thumbnail	Products	Published
SI 1001 – Approaches to Newcastle		AU5NTL01 AU433151 AU434151 AU433152 Aus207 Aus209	14 Oct 21 14 Oct 21 14 Oct 21 07 Oct 21 29 Oct 21 12 Nov 21
SI 1004 – Western Approaches to Torres Strait		AU411140 AU411141 Aus700 Aus301	07 Apr 22 07 Apr 22 13 May 22 10 Jun 22
SI 1006 – Great North East Channel		AU410143 Aus840	07 Apr 22 08 Jul 22
SI 1007 – Whitsunday Group to Hydrographers Passage		AU5255P0 AU421148 AU421149 AU320148 AU320149 Aus251 Aus252 Aus255	07 Oct 21 14 Oct 21 14 Oct 21 14 Oct 21 14 Oct 21 20 Jan 22 10 Dec 21 20 Jan 22

SI 1008 – Gulf St Vincent		AU435138 AU436137 AU436138 Aus130 Aus780 Aus781	13 Apr 22 13 Apr 22 13 Apr 22 13 May 22 09 Jun 22 09 Jun 22
SI 1010 - Northern Approaches to Broome		AU5050P0 AU418122 AU318121 Aus50	25 Nov 21 06 May 21 06 May 21 03 Sep 21
SI 1011 – Mavis Reef		AU416123 AU416124 Aus730 Aus732	03 Feb 22 03 Feb 22 14 Apr 22 18 Mar 22
SI 1012 – Backstairs Passage		AU436137 AU436138 AU337138 Aus780	24 Feb 22 24 Feb 22 24 Feb 22 17 Mar 22

SI 1013 – North of King Island		AU440143 AU440144 Aus789	18 Nov 21 18 Nov 21 10 Dec 21
SI 1020 – Banks Strait		AU442148 AU441147 AU441148 Aus798 Aus800 Aus767	31 Mar 22 31 Mar 22 31 Mar 22 13 May 22 13 May 22 13 May 22

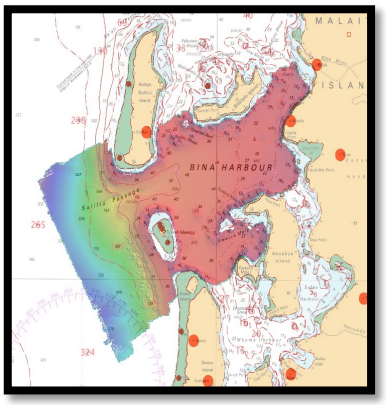
Papua New Guinea

Some of the major updates are shown below:

Survey Details	Thumbnail	Products	Published
Saibai Island - Torres Strait LADS Survey 2018 RAN HI 617A - Laser airborne depth survey conducted between the 17 Sep - 13 Dec 18		AU410142 AU410143 Aus840 Aus841	11 Mar 21 15 Apr 21
Kavieng - PNG LADS Survey 2018 RAN HI 612 - Laser Airborne Survey conducted between the 21 May – 22 Jun 18		PG5666P1 PG403150 PNG666P1 PNG666 PNG544	In Compilation

Solomon Islands

Some of the major updates are shown below:

Survey Details	Thumbnail	Products	Published
Bina Harbour Solomon Islands HMAS Leeuwin Survey - 2019		SLB104 SB5104P6	29 Oct 21 27 May 21

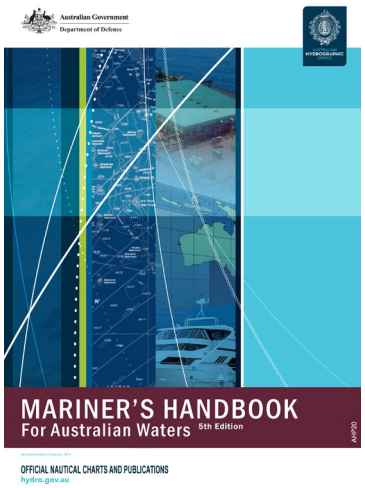
g) Other charts

Nil.

h) 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

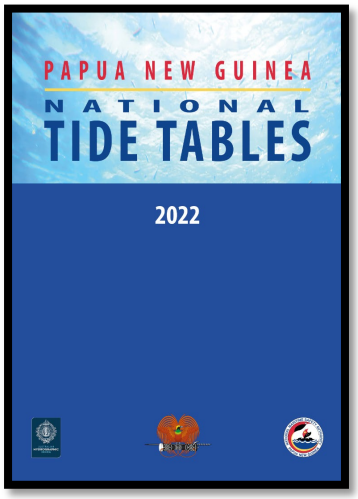


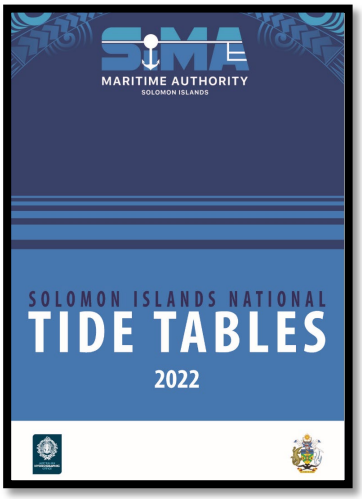
2022 Australian National Tide Tables were released as a digital (.pdf) download from the AHO website in addition to printed books sold by AHO Distribution Agents. 2022 will be the last printed edition and has been printed in colour. Editions from 2023 onwards will only be available as website downloads. Downloads incorporate the latest applicable Notice to Mariners update.

AusTides has been upgraded to provide better functionality. The 2022 version has been released as an app and incorporates a new 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. 2022 AusTides is available as a digital download from the AHO website in addition to on CDs sold by AHO Distribution Agents.

Following significant development of AusTides, Tide tables for 2022 were published in late 2021 for Australia (including Solomon Islands and Papua New Guinea), alongside separate publications for Solomon Islands and Papua New Guinea. In addition to these, work has commenced on the publication of the Timor Leste National Tide Tables 2023

Work has commenced on The Mariner's Handbook for Australian Waters AHP20 6th Edition with publication planned for 2023. Stock of the printed AHP20 5th Edition has been exhausted and is no longer available for purchase. Current and future editions of AHP20 are only available as downloads.





5. Maritime Safety Information (MSI)

a) Existing infrastructure for transmission

In Australia, MSI is provided via long-range and coastal warnings. NAVAREA X enhanced group call (EGC) broadcasts are promulgated via the recognised mobile satellite service provider, Inmarsat, through Burum land earth station (LES).

Navigational warnings, including NAVAREA X, AUSCOAST and Sea Safety Messages, are also made via high frequency (HF) radiotelephone using transmitters located at Charleville (QLD) and Wiluna (WA) under the callsign 'VIC' with MMSI 005030001.

Local navigational warnings may be made by volunteer or local-government marine organisations using VHF.

b) New infrastructure in accordance with GMDSS Master Plan

Australia is 'under trial' for NAV, MET and SAR services. The GISIS GMDSS Master Plan module for Iridium SafetyCast service has been updated. This information is also reflected on the IHO webpage for Iridium SafetyCast Implementation Status (https://iho.int/en/iridium-safetycast-implementation-status).

c) Problems encountered

Nil

6. C-55

Navigationally significant areas within Australian area of jurisdiction.

Navigationally significant area	Location	Chart
Approaches to Darwin	Beagle Gulf, NT	Aus722
Clarence Strait, Van Diemen Gulf	South of Melville Island, NT	Aus20, Aus720, Aus722
Torres Strait Two Way Route	Torres Strait	Aus299, Aus293, Aus296
Western Approaches to Torres Strait	Gulf of Carpentaria, Torres Strait	Aus842, Aus700
Great North East Channel	Coral Sea	Aus839, Aus840
Adolphus Channel	Torres Strait	Aus292
Hydrographers Passage	Great Barrier Reef, Coral Sea , QLD	Aus821
Two Way Route Inner GBR:	Great Barrier Reef, QLD	Numerous 150K
Approaches to Newcastle	East Coast, Newcastle	Aus207, Aus809
Gulf St Vincent	Adelaide	
Backstairs Passage, SE Kangaroo Island	Approach to Adelaide	Aus780
Banks Strait	Bass Strait, between NE Tasmania and Furneaux Group	Aus798
East Flinders and Cape Barren Islands, offshore	Tasman Sea	Aus179, Aus800 Aus767, Aus798
Furneaux Group Inshore	Bass Strait	Aus179, Aus800
Bass Pyramid to Wright Rock	Bass Strait	Aus800, Aus487
King Island	Bass Strait, North of King Island	Aus789
Northern Approaches to Broome	West Coast, Indian Ocean	Aus50, Aus324
Bonaparte Arcipelago, Camden Sound	Kimerley Coast	Aus730, Aus732
Lacepede Channel to King Sound	Kimerley Coast	Aus323
Cape Leeuwin, WA	Indian and Southern Ocean	Aus335

MSI and GMDSS

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

7. Capacity Building

Maritime Geospatial Training Centre (MGTC)

The Maritime Geospatial Training Centre (MGTC) 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 region under the Defence Cooperation Program. It also provides meteorological and oceanographic training to the Royal Australian Navy (RAN).

The hydrographic training consists of three levels: basic, intermediate and advanced level. The basic and intermediate courses are traditionally attended by Australian Sailors but is opening up to regional sailors starting this year while the advanced level course (H2) is attended by sailors and officers from Australia and the region. In 2021 the advanced level H2 course consisted of students from Australia (11), New Zealand (2), Malaysia (1) and Fiji (1).

MGTC is currently running two courses simultaneously - a basic and advanced level course. The Basic course is graduating on 10 Aug 22 with Australian (9) and Fijian (2) students. The Advanced course commenced a month ago and includes Australians (12) , Fijian (1) and Indonesian (1) student (graduating 01 Dec 22).

Intermediate Course held earlier in the year (2022)

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

During the past 12 months two AHO staff graduated from the pilot S-5B Hydrographic Surveyors Course and two staff graduated from the S-8B Marine Geospatial Information Program. The courses were run by IIC Technologies and are accredited by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) and is designed to maximise the advantages of online delivery. Two staff are enrolled on the next S-5B Hydrographic Surveyors Course expected to commence in September 2022 and 4 AHO staff enrolled in the S-8B Marine Geospatial Information Program to start in October. The AHO are also sponsoring two Fijian Hydrographic Service officers to attend the S-8B course.

b) 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. Two Fijian Hydrographic Officers will visit the AHO in August 2022 to review Chart production workflows and participate in on the job training with AHO staff.

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 16 permanent gauges monitoring sea level and ancillary meteorological parameters around the Australian Coastline, including one at Cocos Island. The locations of the gauges are shown in **Figure 1** (below).
Monthly reports are published by the Bureau and can be located on their website at:
www.bom.gov.au/oceanography/projects/abslmp/reports.shtml

The Pacific Sea Level 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 are published by the Bureau and can be located on their website at:
http://www.bom.gov.au/pacific/projects/pslm/index.shtml

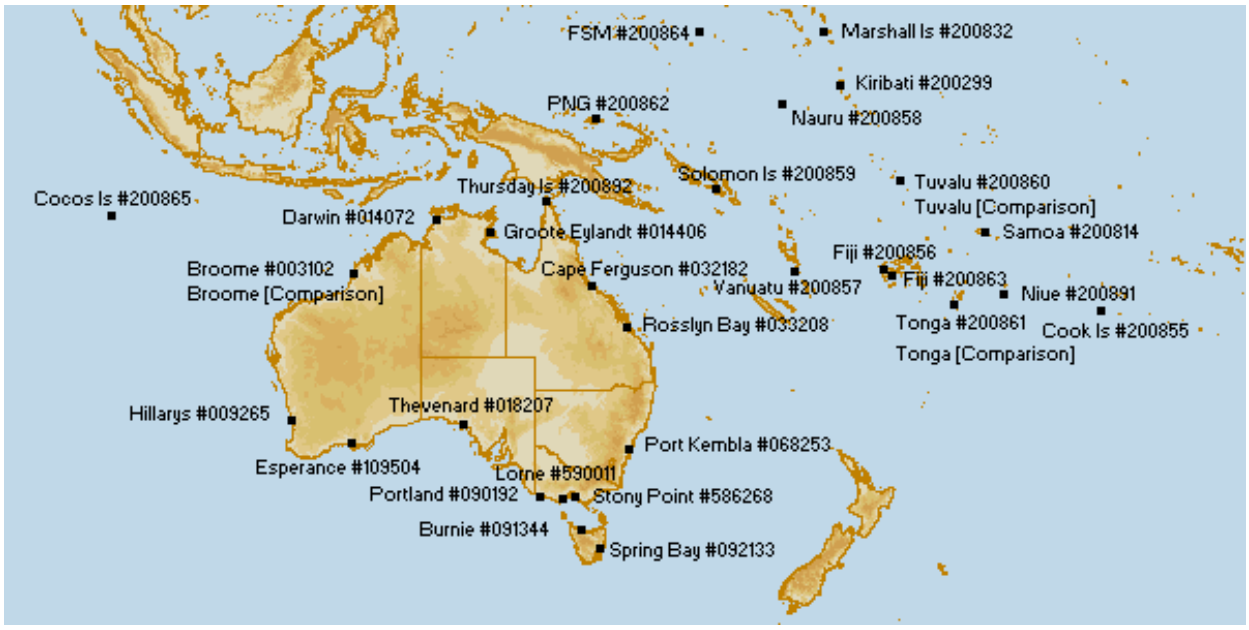


Figure 1: Permanent tide gauge network operated by the Bureau of Meteorology, including the Australian Baseline Sea Level Monitoring Array (16 sites) and Pacific Sea Level Monitoring Project (14 sites).

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 in preparation for becoming the permanent operational tide gauges at those locations due to 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 17 radar-type tide gauges at four Pacific and 13 Australian sites as shown in **Figure 2**. An array of six deep-ocean tsunameters (DART buoys) brings the Australian tsunami-monitoring network to 53 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

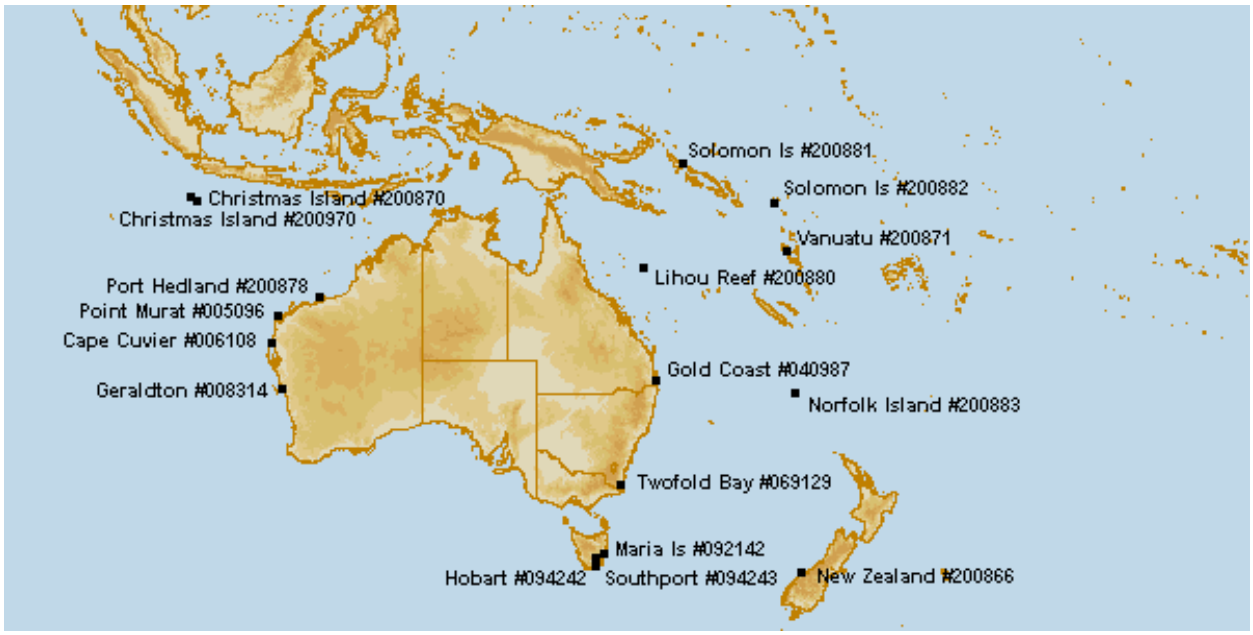


Fig. 2: Additional ATWS radar gauges (17 sites) that are used in conjunction with the permanent tide gauge network for monitoring tsunamis in the Australian region.

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 17 January 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.

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, enhanced through supporting browser based applications. This initial foray into MSDI is founded on visualisation and query of our charting products, replacing some legacy non-interoperable 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 portal
2022: https://storymaps.arcgis.com/stories/f49e40cb3cb04cb888ecac7427024317
2021: https://storymaps.arcgis.com/stories/7fcc4ba5053547aab54315f08662be39
2000: https://storymaps.arcgis.com/stories/581d578afc37498bad20cb692c36f0cd

The mission for our MSDI is to ensure our data and products follow the FAIR principles of being 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 four working group meetings 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. Australia is also an active participating member in the IHO MDSIWG, having recently sent two delegates to the 13th Working Group meeting in Singapore.

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 the 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 FAIR access, noting our core workflow is in support of navigational chart production. Unlocking, and exposing the myriad of non-navigational 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
An online shop for AHO distribution agents to place orders for AusENC, paper charts and nautical publications is expected to be trialed and rolled out by April 2022. As a precursor to this, in March 2021, the AHO upgraded its inventory and accounting system. Significant improvements have been made to the AHO's ENC distribution system were implemented late 2021 including migration to the HMIE network and automated dissemination of AusENC update notification emails.

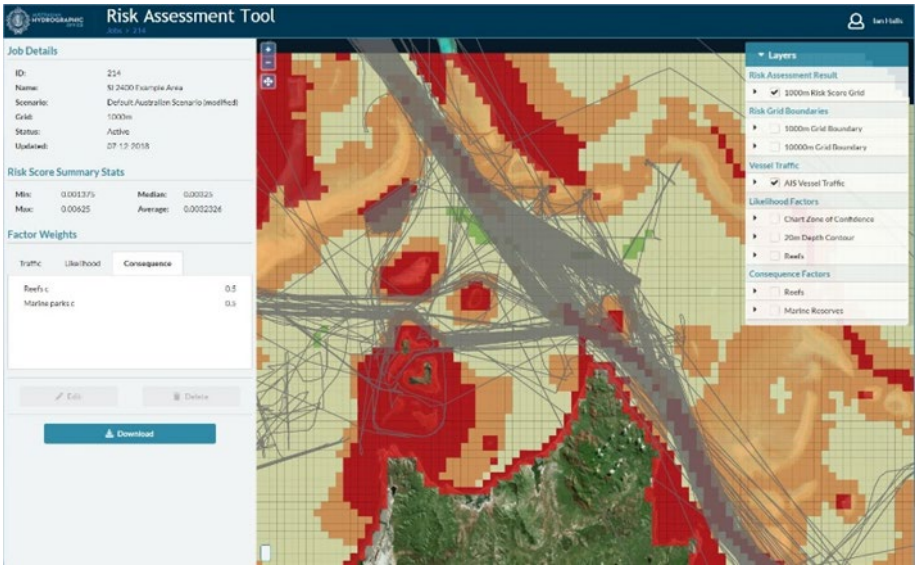
11. Other activities

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	Wold-Wide Electronic Navigational Chart Database		M
NIPWG	Nautical Information Provision Working Group		M
WWNWS-SC	Wold-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 Coordiantion 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
WWNWS	World-wide Navigational Warning Service Sub-Committee		M
IBSC	International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers	Chair	M
SCUFN	GEBCO Sub Committee on Undersea Feature Names		M

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 Antartcia and Australian offshore territories.



12. Conclusions

AHO continues to implement the HIPP with upgrades to systems and processes, workflow and data management protocols.

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 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: stewart.dunne@defence.gov.au : 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	Hydrographic Office, RAN – Established 01 October 1920 ; Commonwealth Naval Order 275 dated 14 December 1920. Navigation Act 2012

-Fecha de constitución y legislación nacional pertinente	
-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 -Fecha de ratificación de la Convención	25/11/1968
-Remarks on membership -Remarques sur l'adhésion -Comentarios sobre la adhesión	Included under “British Empire” with the UK from 1921.
Agency information/ Information sur l'agence/ Información sobre la agencia	
-Top level parent organisation -Organisme mère -Organización asocieda de nivel superior	Department 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	consult WEB site : www.hydro.gov.au
-Number of INT charts published -Nombres de cartes INT publiées -Número de cartas INT publicadas	40
-Total number of paper charts published- Nombre total de cartes papier publiées- Número total de cartas de papel publicadas	291 Aus , 17 SLB and 80 PNG charts = 388 total
-Number of ENC cells published -Nombres de cellules ENC publiées -Número de células ENC publicadas	697 AU cells, 168 PG Cells and 43 SB cells = 908 total
-Number of Other charts -Nombre d'Autres cartes -Número de Otras cartas	
-Type of publications produced -Type d'ouvrages	Australian Chart Index Application – Web Service Fortnightly Notices to Mariners (AHP18) Seafarers Handbook for Australian Waters (AHP20) – printed and digital

produits -Tipo de publicaciones producidas	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
	ASV WYATT EARP	6.3	Handed over to RAN in 1992	
-Other information of interest				

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

Navigationally Significant Areas

A table of navigationally significant areas (e.g., Charted traffic separation schemes, anchorages and channels) within Australia's area of jurisdiction is provided in Section 6 (C-55) of this report.

MSI and GMDSS

The changes to MSI and GMDSS information in C-55 is as follows (highlighted in yellow):

Country:	**AUSTRALIA**	
MSI	**Y/N**	**Comments on MSI:**
Local warning	YES	Promulgated by Jurisdictions, Port Authorities and Volunteer Marine Rescue Organisations
Coastal warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	YES	Promulgated by Port Authorities
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	YES	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia
NAVTEX	NO	
SafetyNet	YES	Australia
	AUSTRALIA – Christmas Island	
MSI	**Y/N**	**Comments on MSI:**
Local warning	YES	Promulgated by the Harbour Master
Coastal warning	NO	
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	YES	Promulgated by the Harbour Master
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia / Japan
NAVTEX	NO	
SafetyNet	YES	Australia / Japan

AUSTRALIA – Cocos (Keeling) Islands

MSI	Y/N	Comments on MSI:
Local warning	YES	Promulgated by the Harbour Master
Coastal warning	NO	
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	YES	Promulgated by the Harbour Master
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia
NAVTEX	NO	
SafetyNet	YES	Australia

AUSTRALIA – Heard Island (H)

MSI	Y/N	Comments on MSI:
Local warning	NO	
Coastal warning	NO	
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	NO	
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia
NAVTEX	NO	
SafetyNet	YES	Australia / South Africa

AUSTRALIA – Macquarie Island (L)

MSI	Y/N	Comments on MSI:
Local warning	NO	
Coastal warning	NO	
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	YES	Promulgated by the Harbour Master
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia
NAVTEX	NO	
SafetyNet	YES	Australia

AUSTRALIA – Norfolk Island

MSI	Y/N	Comments on MSI:
Local warning	YES	Promulgated by the Harbour Master
Coastal warning	NO	
Nav warning	YES	Via NAVAREA X, promulgated by Inmarsat SafetyNET and HF DSC/radiotelephone
Port warning	YES	Promulgated by the Harbour Master
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	YES	Australia
NAVTEX	NO	
SafetyNet	YES	Australia