Australian Hydrographic Service
The Passage to ENCs

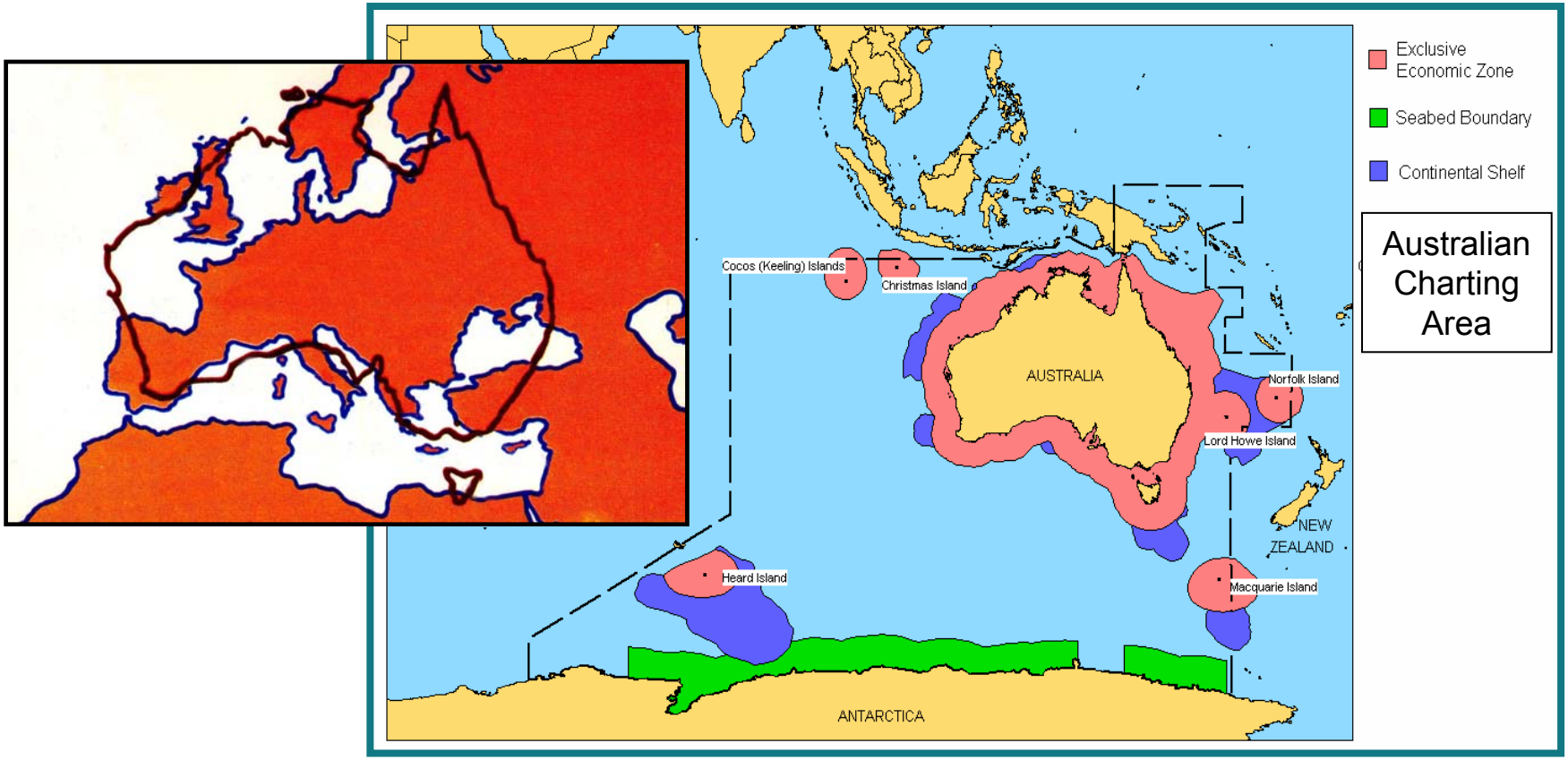
5 Nov 08

Mr Jeff Wootton, Manager Charting Specifications and Standards, for
Mr Mike Prince, Director Charting and Information Management
AHS

Scope

- **Requirement**
  - Australian Charting Area
  - Shipping
  - Study into ship safety
- **Starting point & decisions**
- **Paper Chart & ENC schemes**
- **Production**
- **Status**
- **The future**

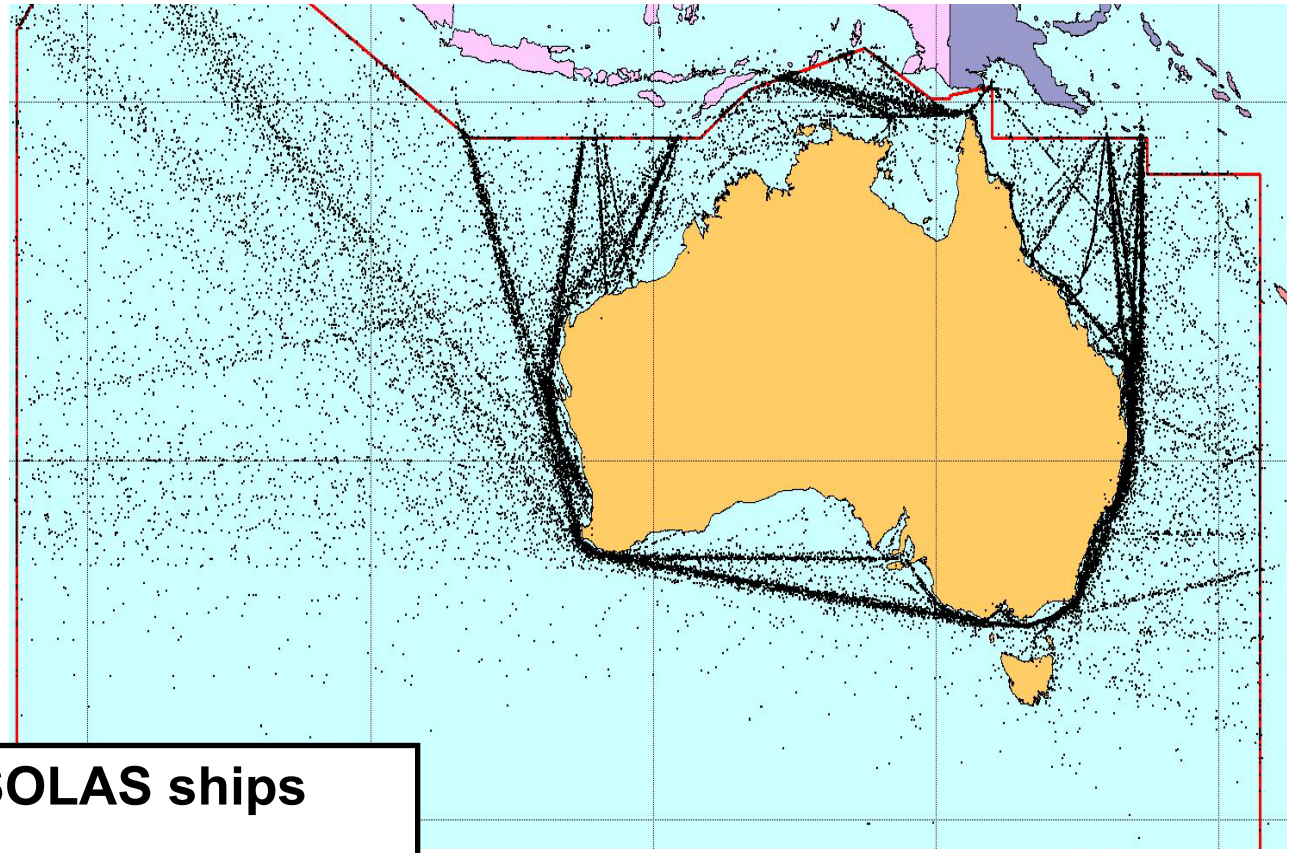
Australian Charting Area



- AUS Charting Area — 13 335 470 nm^2
- Australian EEZ — 2 609 596 nm^2
- Areas < 200 m deep — 762 640 nm^2
- Coastline Mainland & Islands — 32 255 nm

NAVY

Annual shipping



- 3500+ SOLAS ships
- 25 000 port entries

Study into shipping safety

- **240 ATSB* marine accident investigation reports, 1982 – 2007**
- **118 lapses in the conduct of vessels**
- **71 incidents (60%) involved groundings**

Loss of situational awareness (lost, no fixes on chart, inaccurate DR / EP, loss of fixing marks, wrong fixing marks, not paying attention)	**36**
Ship handling (wrong wheel orders, wrong rudder applied)	**10**
Machinery failure (propulsion, steering)	**9**
Poor bridge procedures (Ignored charts, no charts or corrections, falling asleep)	**8**
Weather (dragging anchor, excessive leeway)	**5**
Uncharted rocks or obstructions	**3**

- **50% of all groundings could have been avoided by the correct use of an ECDIS and up to date ENC, if the technology had been available.**

*Australian Transport Safety Bureau

NAVY

Starting point – ENC Production Program

- **Commenced in 1997**
  - Establishment of ENC Production and Management Plan and formation of ENC Steering Committee and ENC Working Group.
- **First target area the Inner Route of the Great Barrier Reef.**
- **One metre contour interval between 5 and 20 metres from source covering the route. The remainder paper chart conversion.**
- **ECDIS fitted to commercial vessel for testing and user feedback purposes.**
- **Scheduled for completion 2002.**

NAVY

Starting point – ENC Production Program

- **Training:**
  - Software training conducted in-house by AHO cartographers trained as facilitators.
  - No formal S-57 training – compilers expected to learn on the job.
- **Resource allocation:**
  - 8 compilation staff
  - 2 supervisors/editors
  - 1 manager
  - No adjustment to total product compilation staff levels

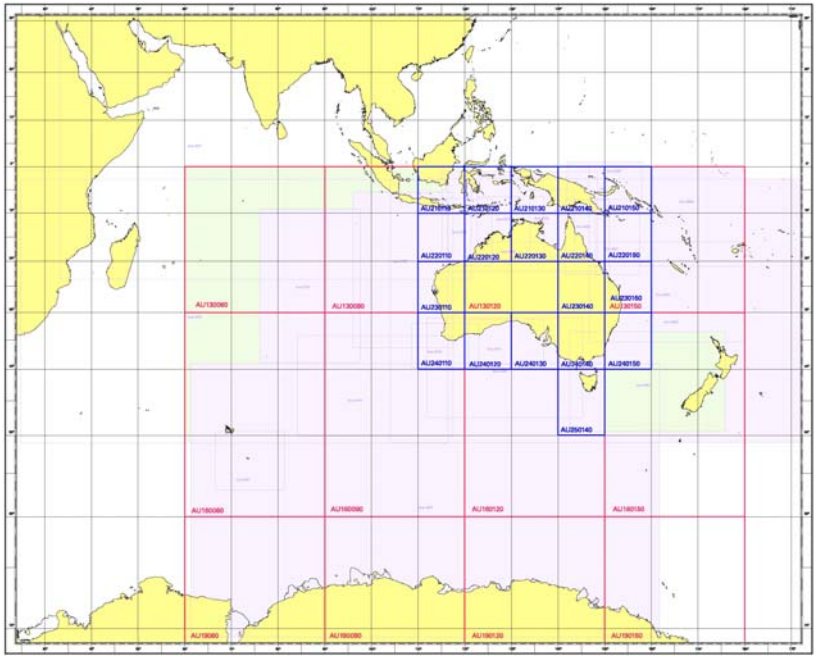
NAVY

Starting point – ENC Production Program

- **Issues with the GBR Project**
  - Resource issues with one metre contour compilation
  - User feedback
  - ENC cell scheme
  - Cell naming
  - Consolidation of the various paper chart scales
- **Project completed in September 2002**
  - 2 navigation Purpose 2 ENCs
  - 72 Navigation Purpose 3-4 ENCs
  - 23 Navigation Purpose 5 ENCs

ENC scheme – 1, 10 and 30 degree cells

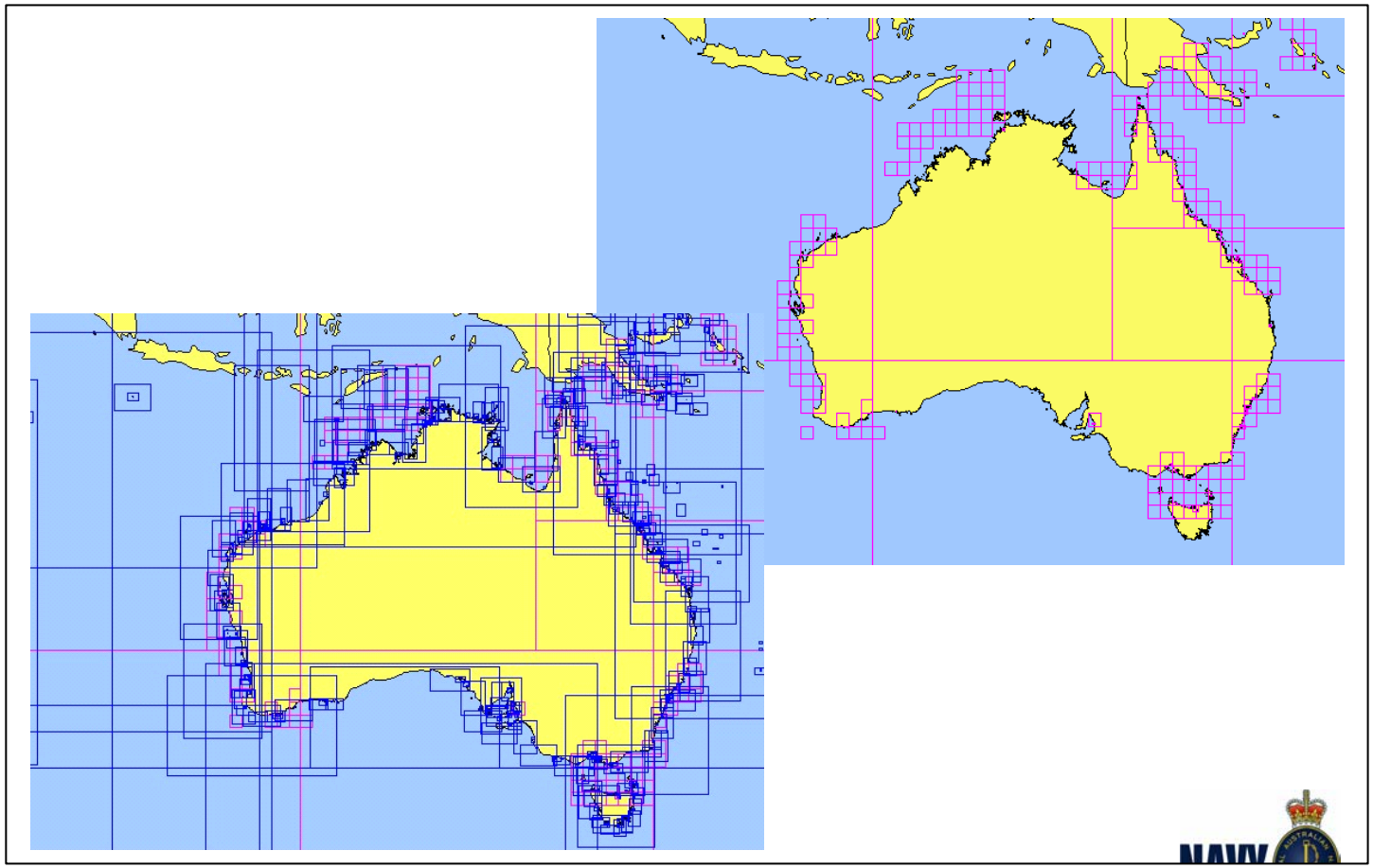
- **Cell based approach adopted for Usage Codes 1 to 4**
  - ENCs are not charts
  - ENCs do not need to match charts (mariners will buy one or other when coverage complete)
  - Matrix improves catalogue use
  - Mariners rarely buy only one chart for a passage leg (do not need port to port)
  - Avoids odd shapes associated with clipping paper charts to avoid overlaps
  - Eases maintenance
  - Cell name includes lat / long of SW corner
  - Can be easily linked to data management
  - Data within cells can be clipped to join other nations



- **Chart based approach retained for Usage Code 5**
  - Meets mariner requirement for pilotage ("I want to enter Sydney Harbour")

NAVY

A simpler scheme



Full coverage – Capacity (2004 – 2005)

Average annual output 2000 - 2005:

- Paper charts, in-house – 35
- Paper charts, out-sourced – 10
- Chart modernisation – 5 (increase to 10)
- ENC – 29 (increase to 45)

Problem:

At existing rate, ENC coverage would not be complete until at least 2017

Constraint:

Existing demand for new and maintained paper charts cannot be switched off

Full coverage – Portfolio

Target

- 450+
  (rationalised from 600)
- All metric / WGS84 / LAT
  all surveys incorporated

Reality

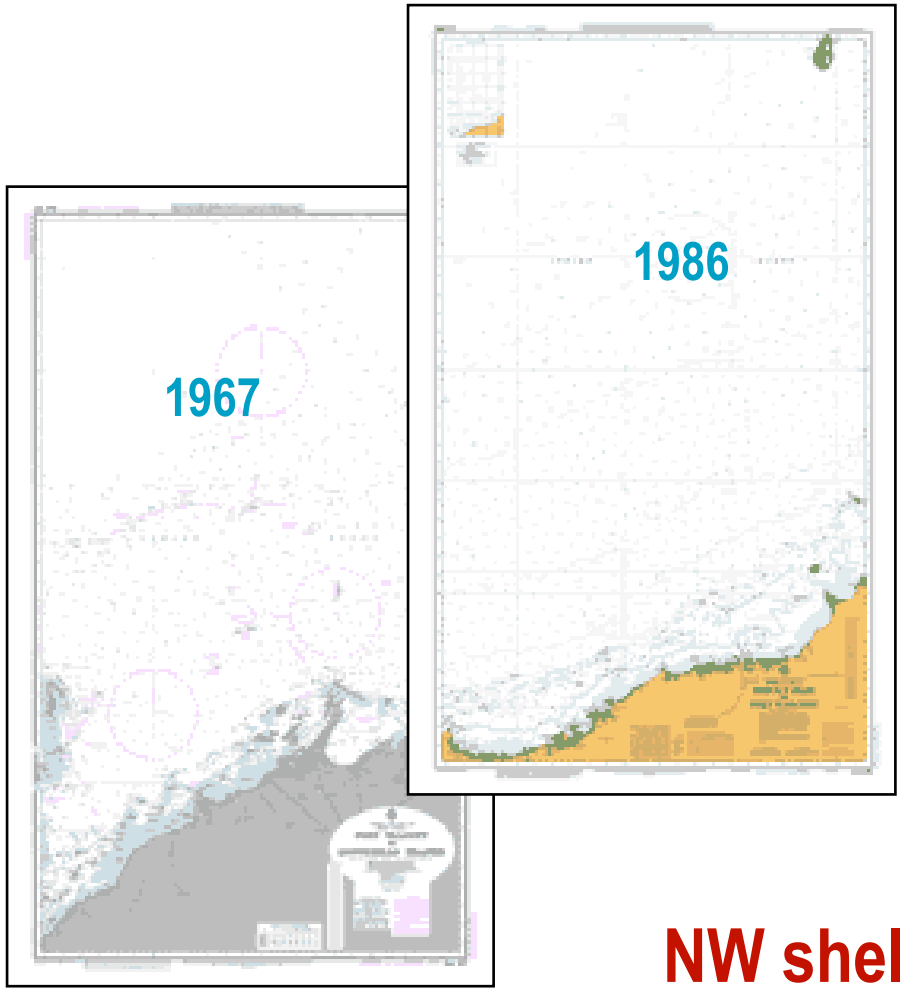
- 454 published
  (but not all the right ones)
- 277 metric / WGS84 / LAT
  (159 with surveys to be incorporated)
- 137 x Aus, 40 x PNG fathoms / other datums (require recompilation)

Full coverage - Systems

- **Digital Hydrographic Database – no 'system' can solve legacy issues, only people and time can**
  - Delivered late & empty
  - Slow system speed (improving)
  - Highly complex to operate
  - Previous 'product' focus
- **'One dataset → multiple products' necessitated a staff restructure**
  - Shift from product focused teams (paper or ENC) to
  - Improved source data management (registration, validation and assessment), and
  - Area focused teams (paper and ENC)
  - Notices to Mariners and Chart Maintenance merged
- **Late delivery of DHDB coincided with ENC program**

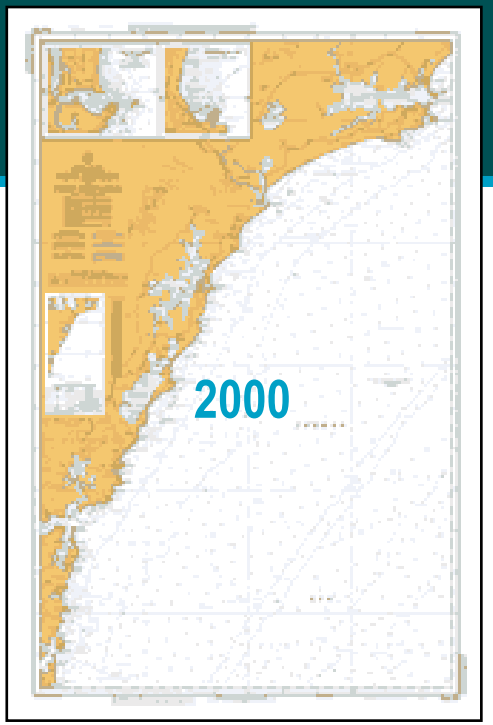
NAVY

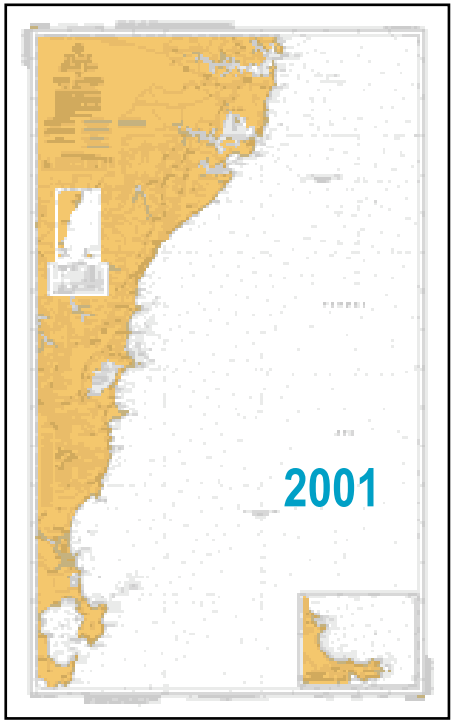
Full coverage - Existing charts

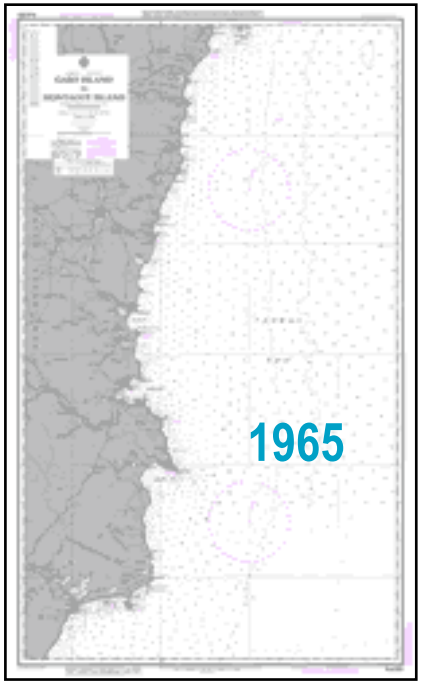


NW shelf

Full coverage - Existing charts



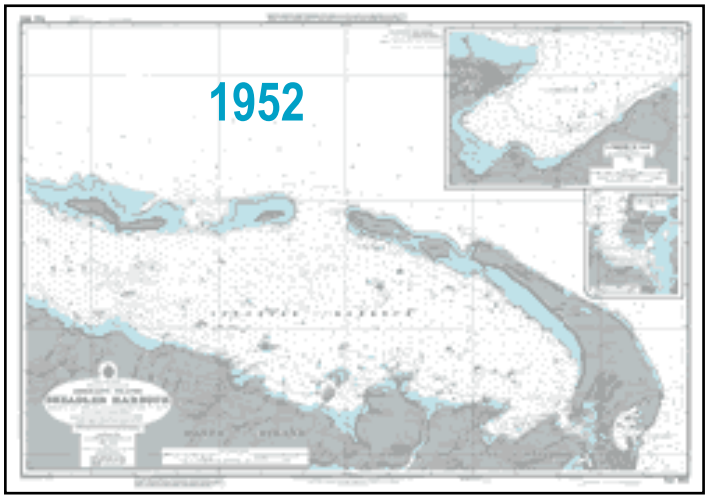


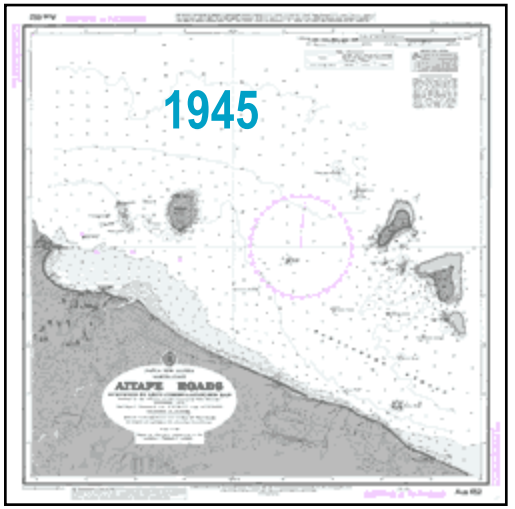


NSW

NAVY

Full coverage - Existing charts





PNG

Decisions

- **Long term view – we need to be able to live with this**
  - DHDB system limitation – can't handle fathoms, must be WGS84
  - Zones of Confidence (required by mariners, AMSA, AHS)
  - Consolidate multiple legacy metadata sets
  - Datums critical to users (GPS as primary positioning system)
  - Aids to Navigation, maritime boundaries
  - S57 bathymetric data to become default dataset in DHDB (requires seamless, non-overlapping data)
  - Need long term increase in data management and maintenance capacity
  - Need short term increase in new production capacity
- **Additional staff to meet long term requirements (21)**
  - Data management and assessment (5 → 10)
  - Nautical information (5 → 8)
  - Tides and geodetics staff (3 → 5)
  - Outsourcing supervisors (0 → 7)
  - Maintenance staff (and NtM merged with maintenance) (6 → 10)
  - Production staff (23)
  - Training (basics plus both paper and ENC)
- **Increase production capacity to meet short term requirements**
  - Increased outsourcing 2006 – 2010

NAVY

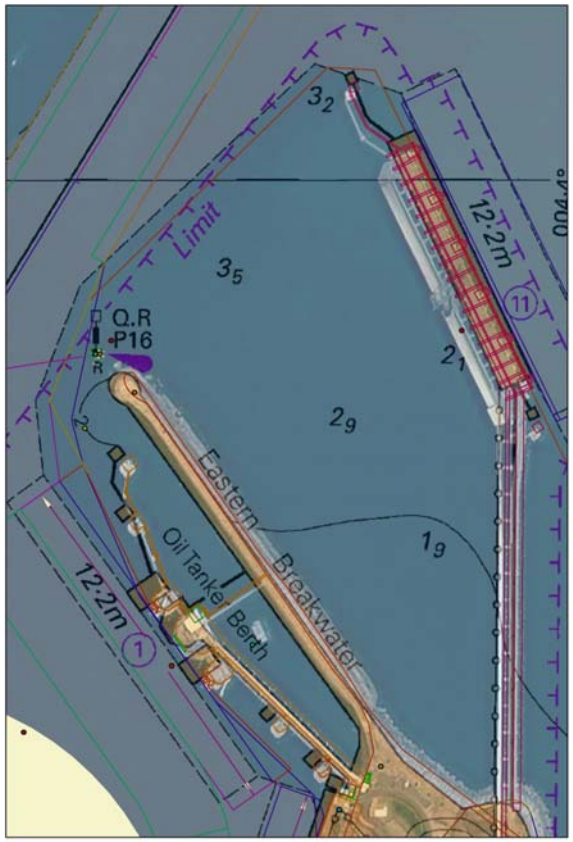
Decisions

- Initial plan (2005):
  - all ENC to metric / WGS84 / LAT
  - ZOCs essential
  - Port charts and constrained channels from source, compile in house
  - Capture charts already metric / WGS84 / LAT
  - Recompile all other charts from source, large scale to small, derive ENC
  - All source data to be assessed and added (not just changes, dangers and features)
  - Over-estimated own capacity (DHDB / staff numbers)
  - Limited faith in outsourcing, all important ones done in house
  - Combination of high ambitions, over-estimating own capacity and reluctance to outsource meant the important ones were delayed

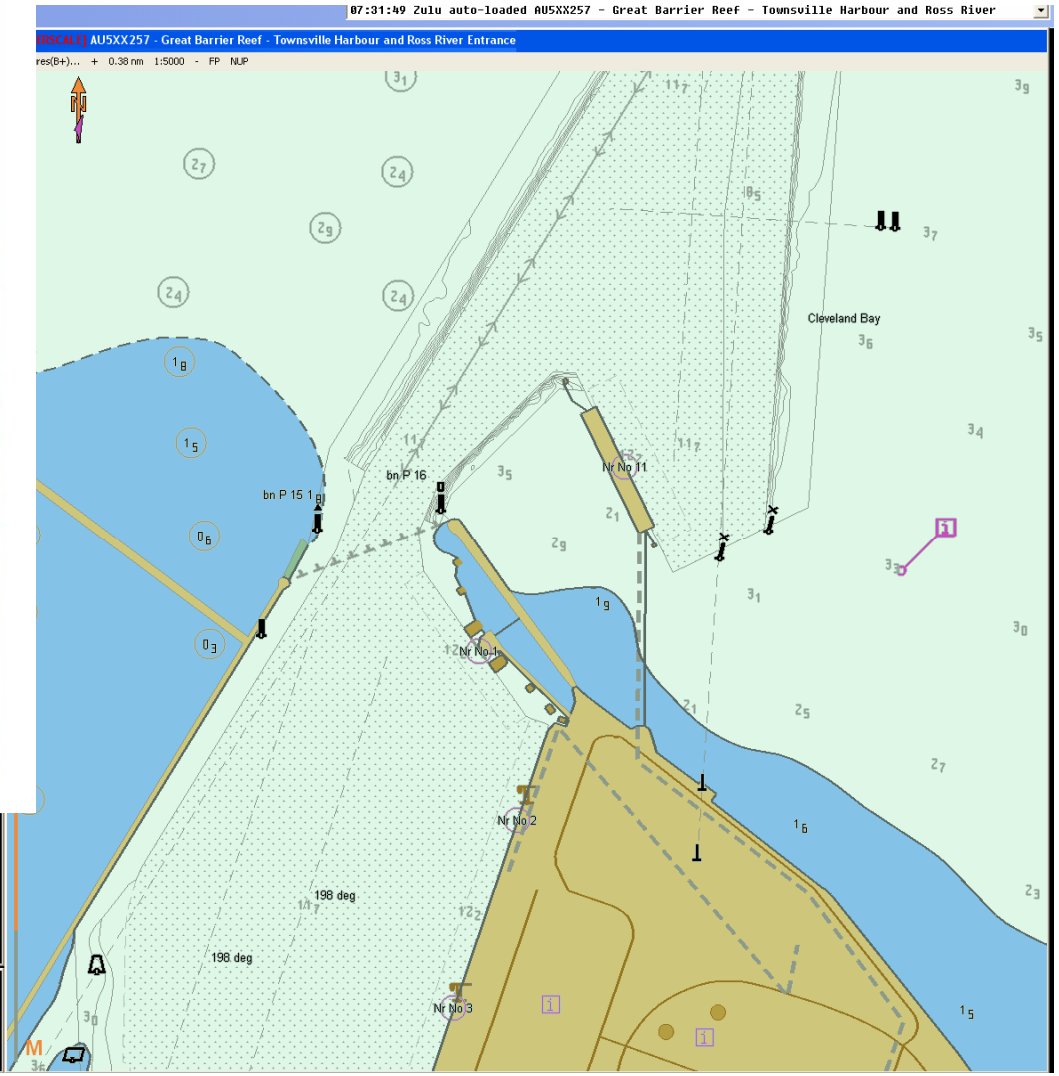
- Revised plan (2007):
  - all ENC to metric / WGS84
  - ZOCs essential
  - Port charts and constrained channels from source, compile in house
  - Capture charts already metric / WGS84 / LAT
  - Capture all other metric charts if within 0.2m of LAT
  - Source data added based upon risk assessment
  - Steep learning curve for one-shot data-pack preparation (AHS used to iterative process)
  - Steep learning curve for contract production
  - Recompile from source only as last resort
  - Accept that New Editions will be required after 2010 to add non-critical source data

NAVY

Port ENCs from source



Cursor:	2.0-5.0 m
Brg:	N/A
Rng:	N/A
Lat:	19° 14.439' S
Lon:	146° 50.031' E
TTG:	N/A
Sensor:	NO FIX
HDOP:	N/A
Sats:	N/A
Anti-Gr:	N/A



Outsourced programmes

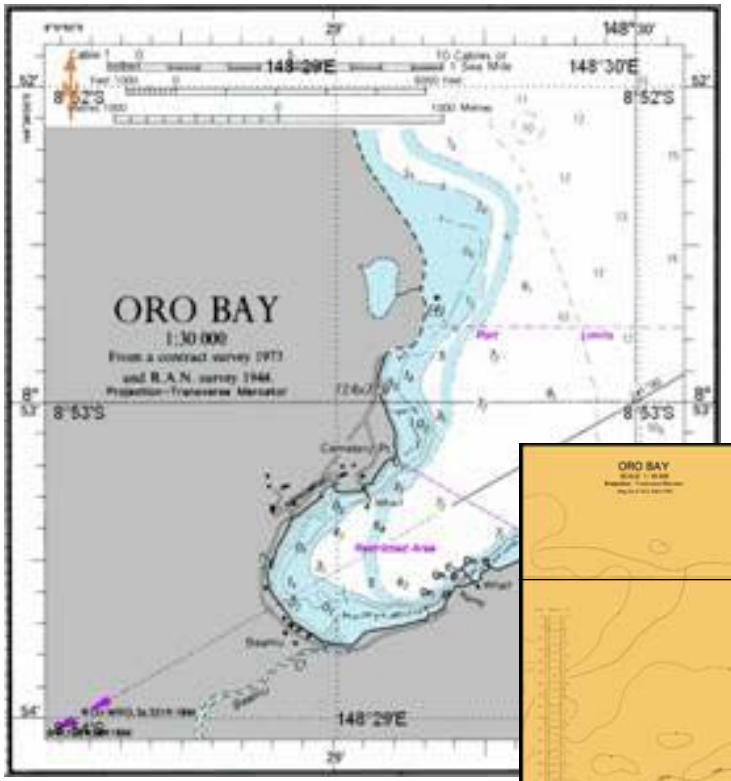
- **PNG Charting Program:**
  - $8M – Asia Development Bank funded
  - 40 charts recompiled + ENC conversion
  - 20 charts direct ENC conversion
  - Completed Feb 08
- **Accelerated ENC Program:**
  - $9M - Defence funded
  - 38 charts direct ENC conversion
  - 200+ charts recompiled + ENC conversion
  - Forecast completion 2010

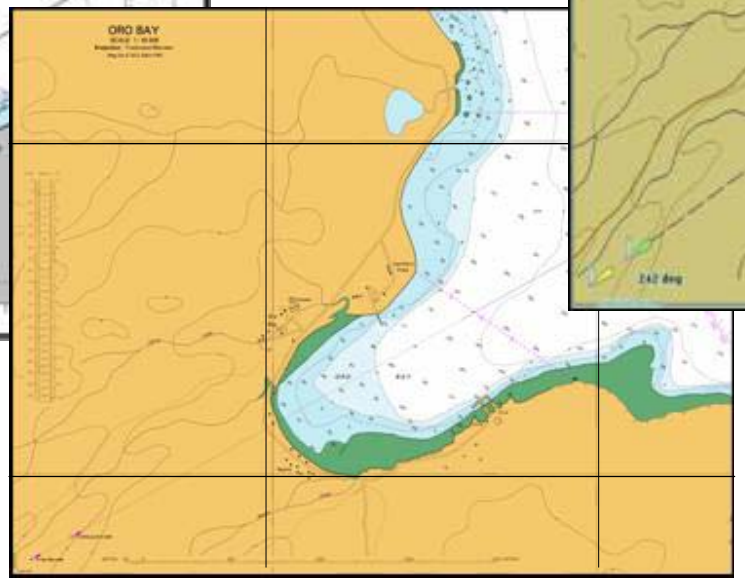
PNG program includes surveys

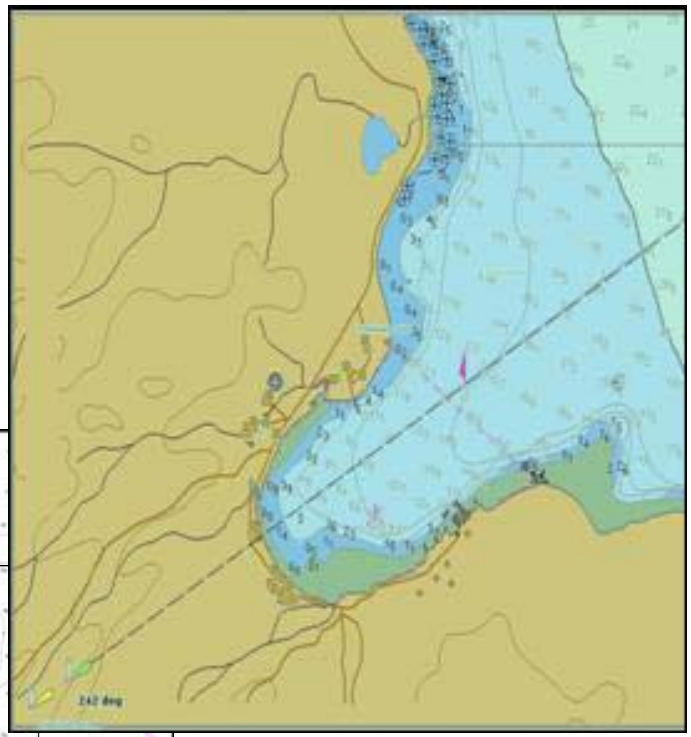
Imperial

ENC

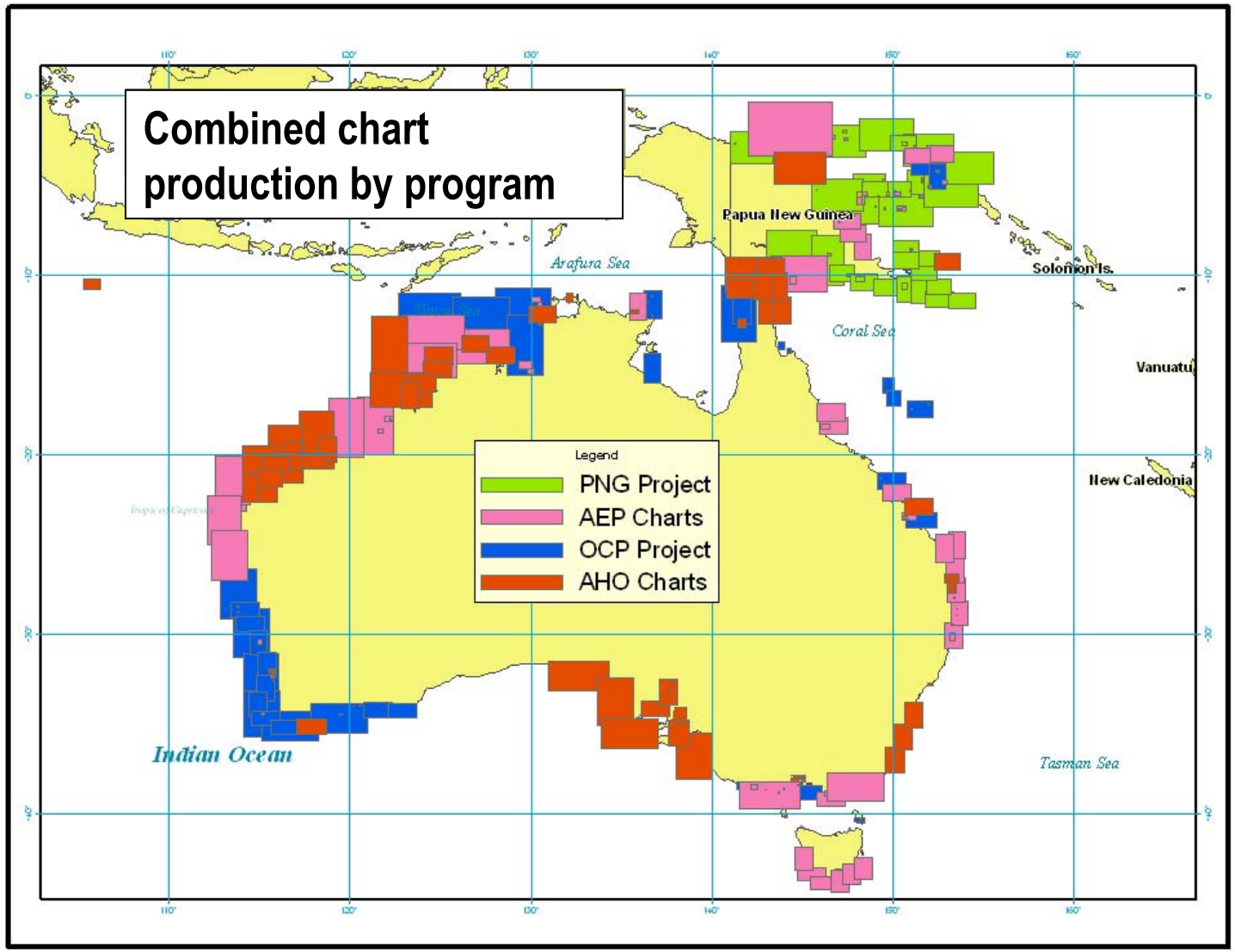
Metric



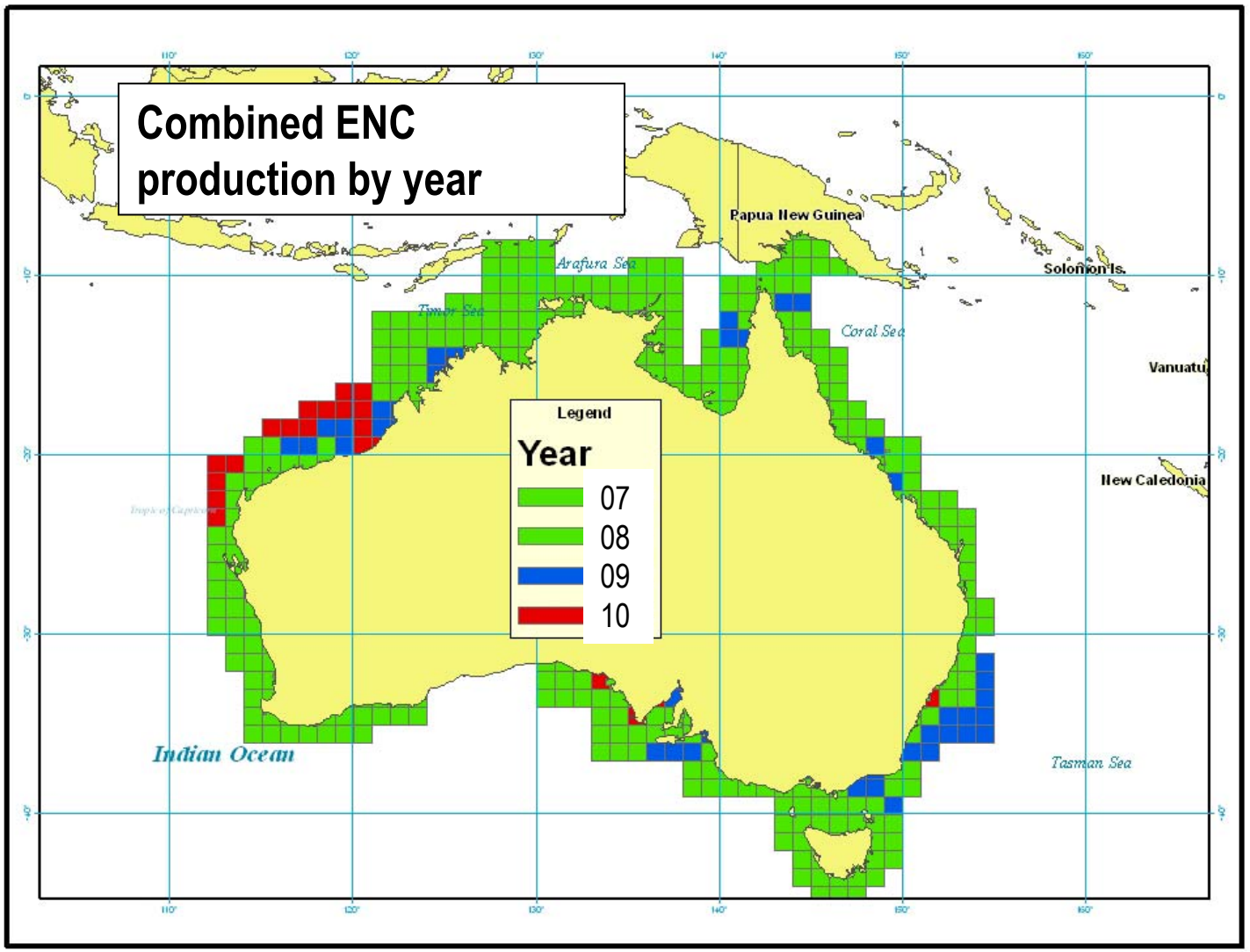




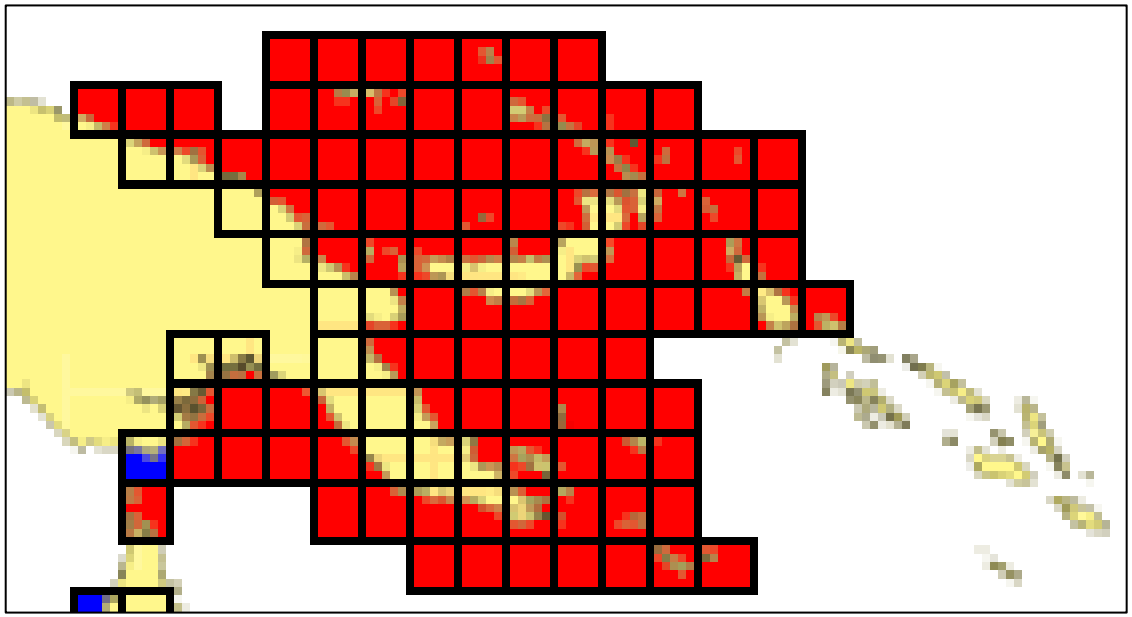
Production - Australian coastal paper chart program



Production - Australian coastal ENC program

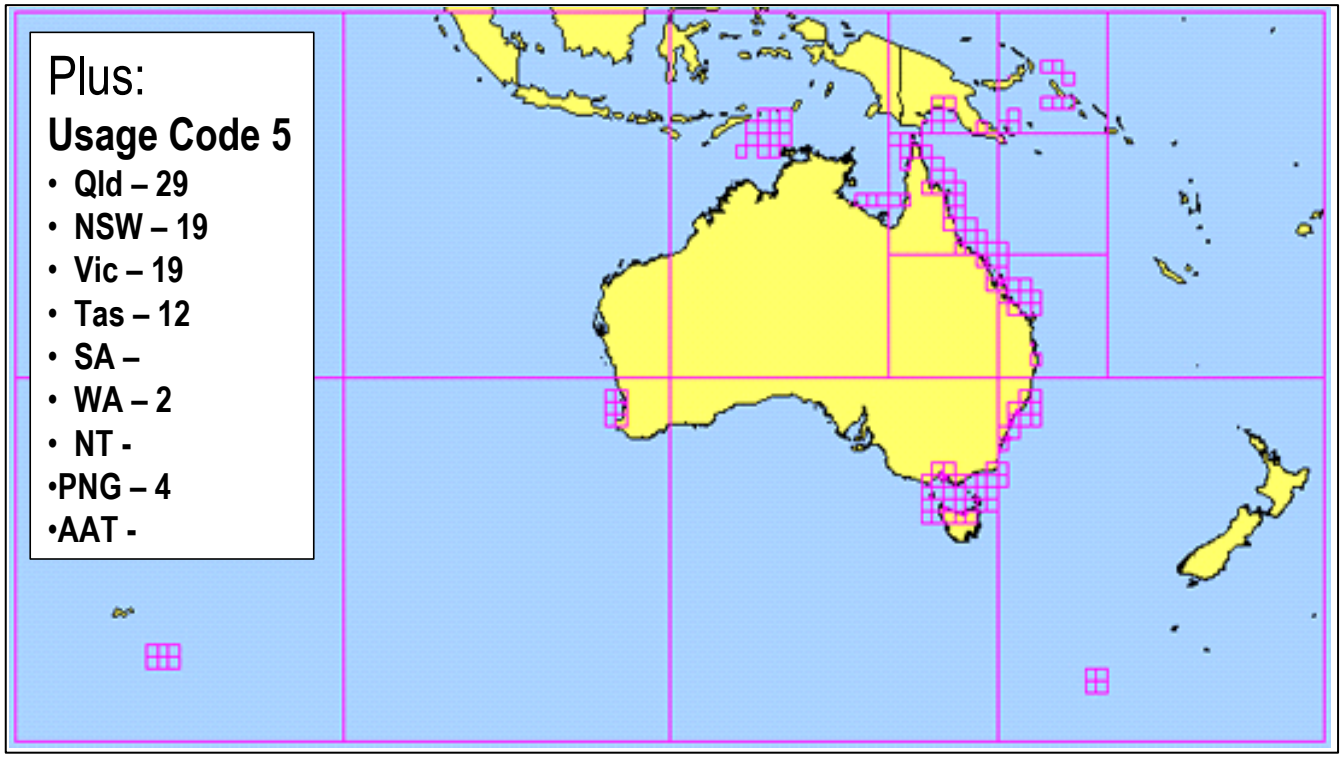


Production - PNG coastal ENC program



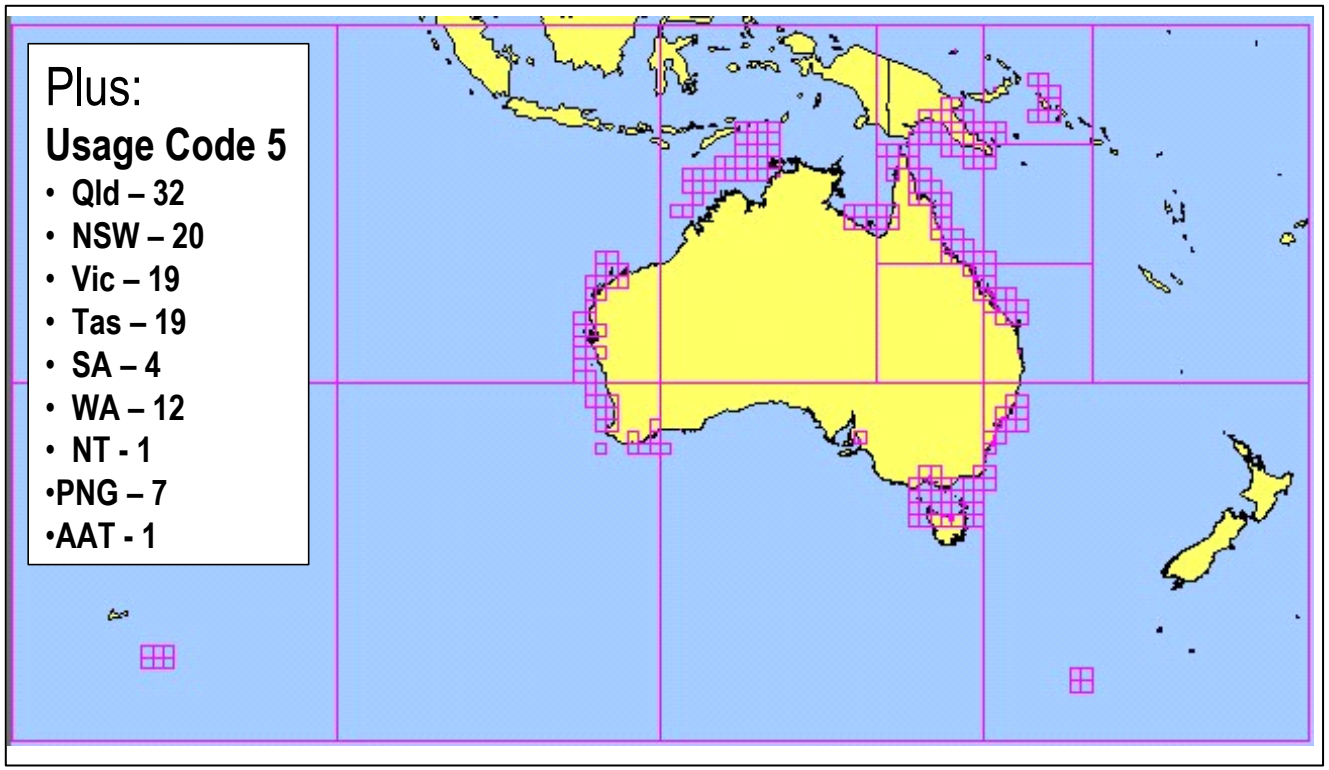
- **ENC to be derived from new charts covering PNG waters during 2008**

Status – ENC Nov 07



NAVY

Status – ENC Oct 08



Annual Production

- **Production:**

Product	00/01	01/02	02/03	03/04	04/05	06/07	07/08
Charts & RNC	57	34	67	44	25	38	62
ENC	7	5	33	16*	85	122	172
NTM	740	813	885	995	1020	1100	1192

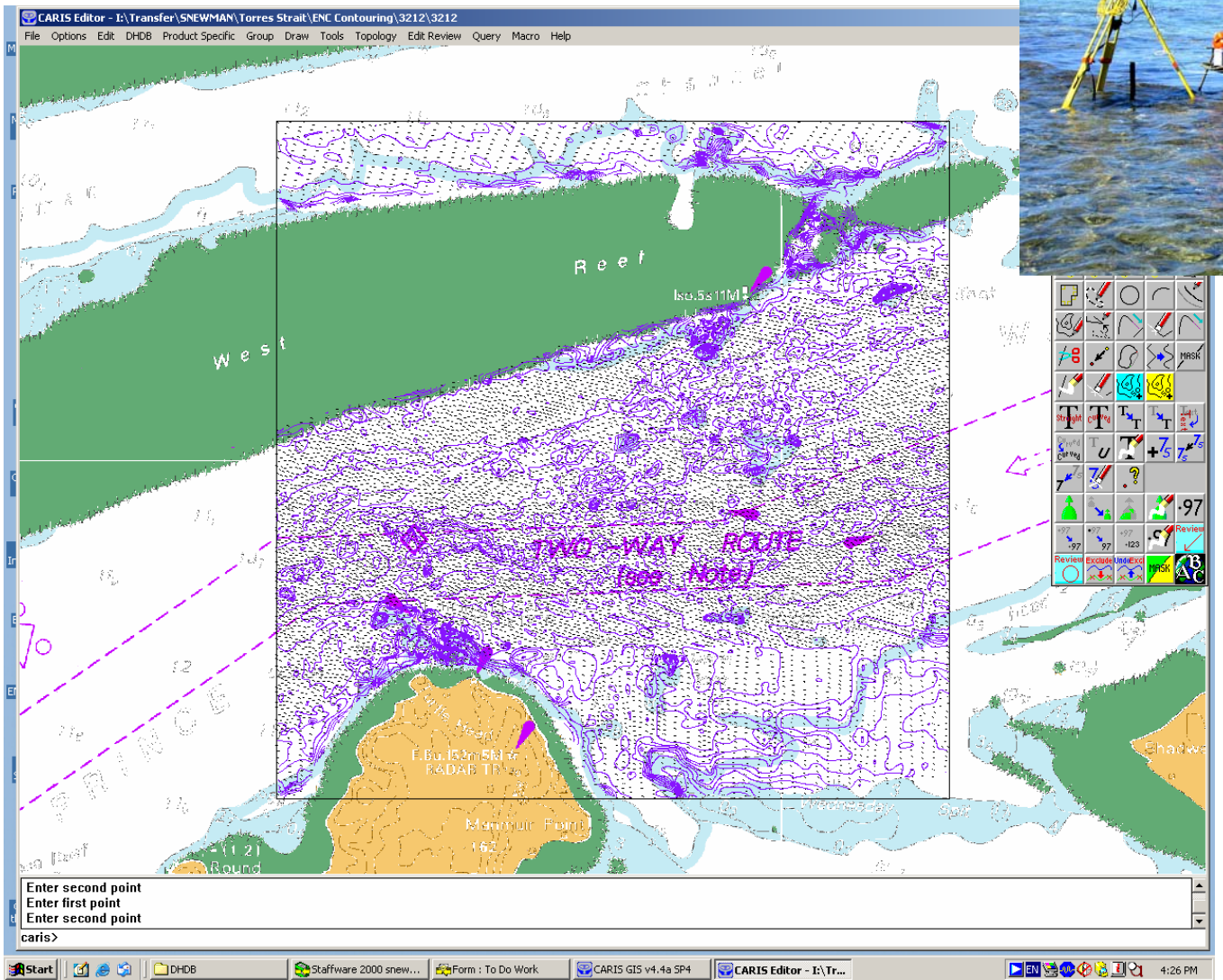
- **Maintenance:**
  - 450 paper charts, maintenance ongoing
  - Most ENCs still maintained as 'products' due to DHDB speed
  - 350 new ENCs (so far) represent real growth – need to be maintained
  - For every 10 new ENC published, a further 6 now need to be updated

* Awaiting release of S63 encryption

NAVY

1 metre contours – Torres Strait

- 1 metre contour ENC of Torres Strait approaching completion



The future

- Initial metric / WGS84 ENC coverage by late 2010 (not all to LAT, but will match paper chart datum where OK)
- S-57 data from ENCs to be loaded back into DHDB as source where data / theme has not already been loaded
- Create seamless database
- Future surveys and data to then progressively replace 2010 load
- New Editions of paper charts and ENCs to be compiled from pre-2010 charted bathymetry plus new source data
- New Editions of paper charts and ENC all to LAT
- Expand 1 metre contour areas
- ENC Berthing Charts
- Migration to S-101 ENCs

NAVY

Thank you

Questions?