

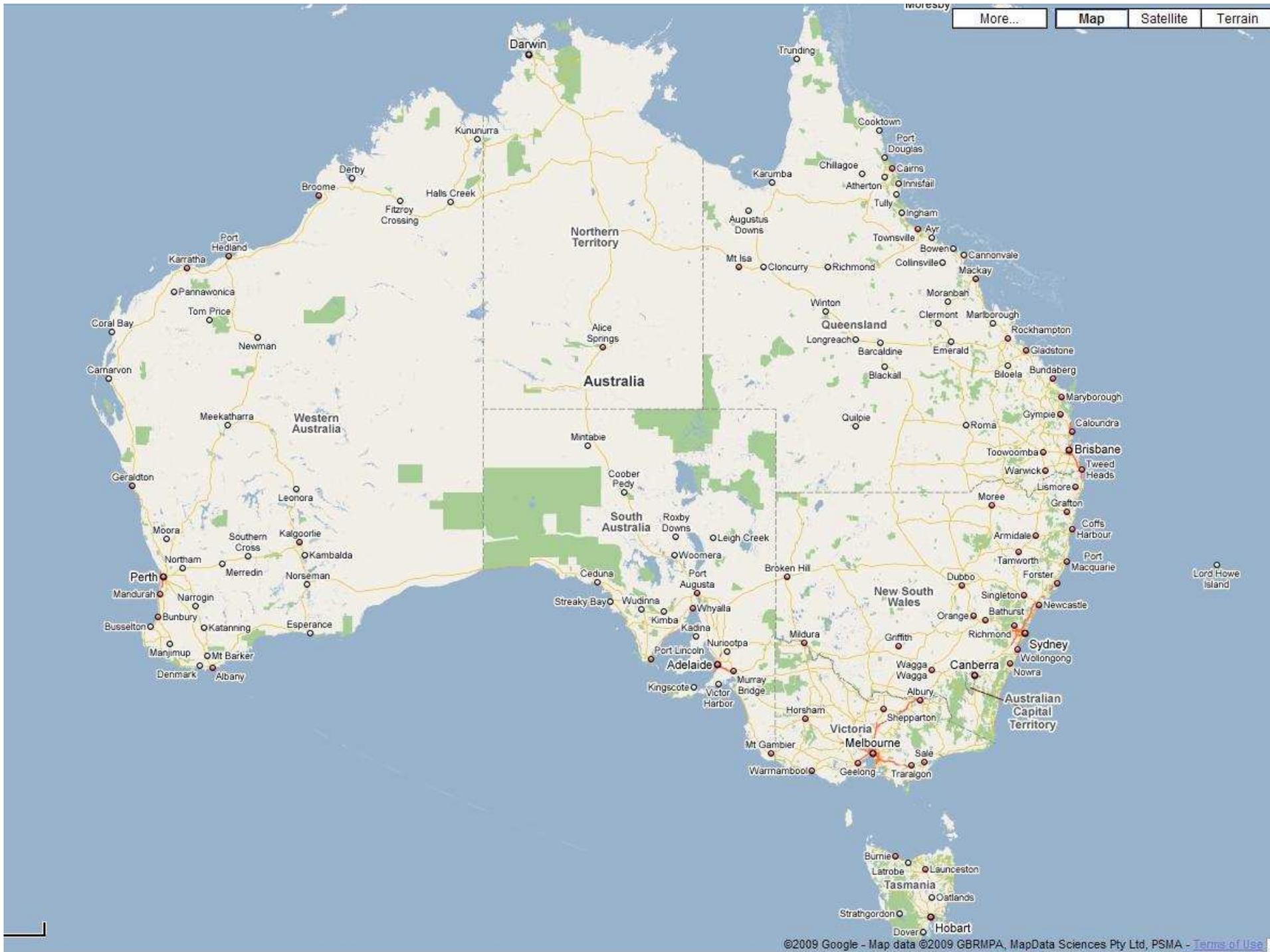


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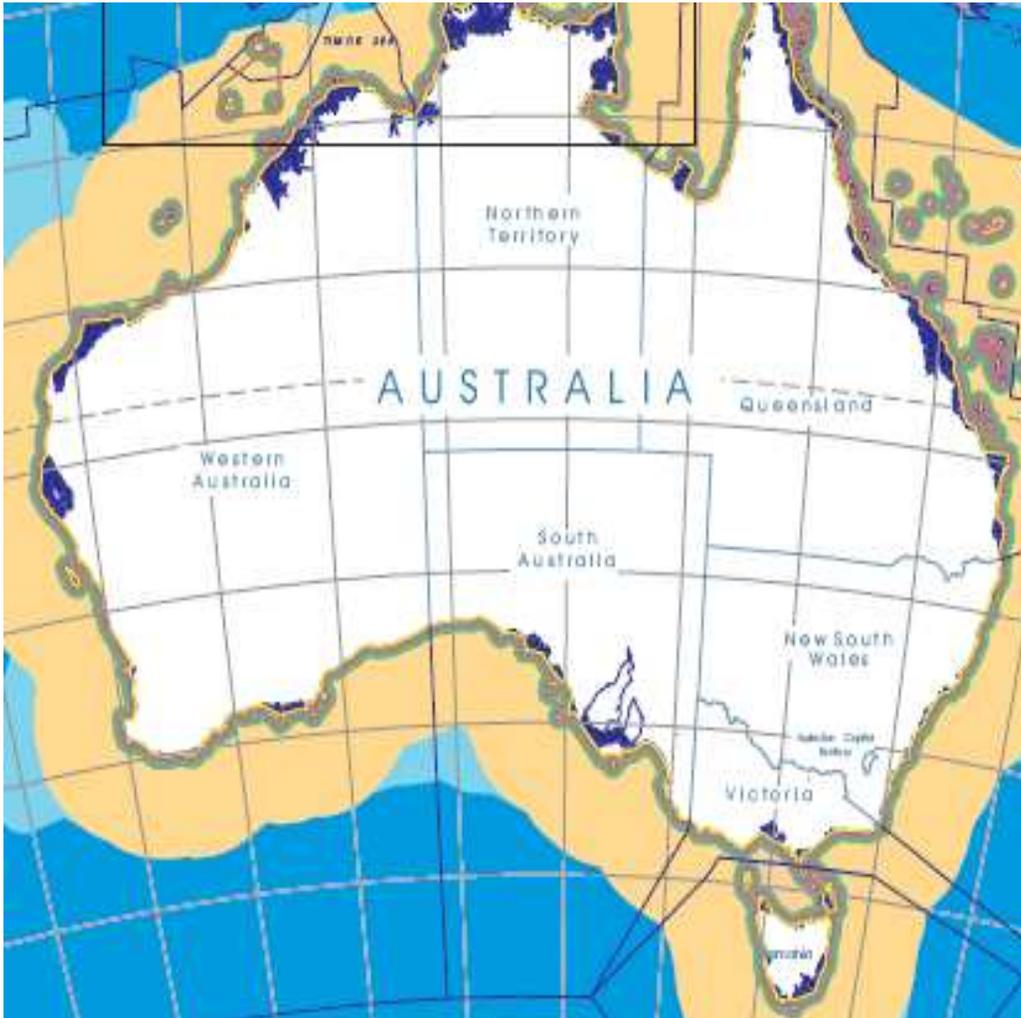
# AIS Developments in Australia

A Coordinated Approach

AMSA - Jillian Carson-Jackson; Peter Pokorny; Mahesh Alimchandani



More... Map Satellite Terrain



## Australian Maritime Structure

### Federal / Commonwealth

- Beyond territorial sea

### State and Territories

- Baseline to territorial sea

### Ports and Port Corporations

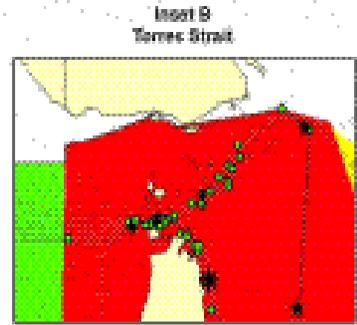
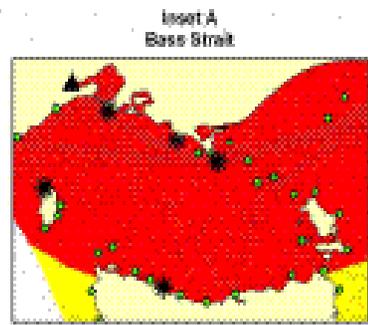
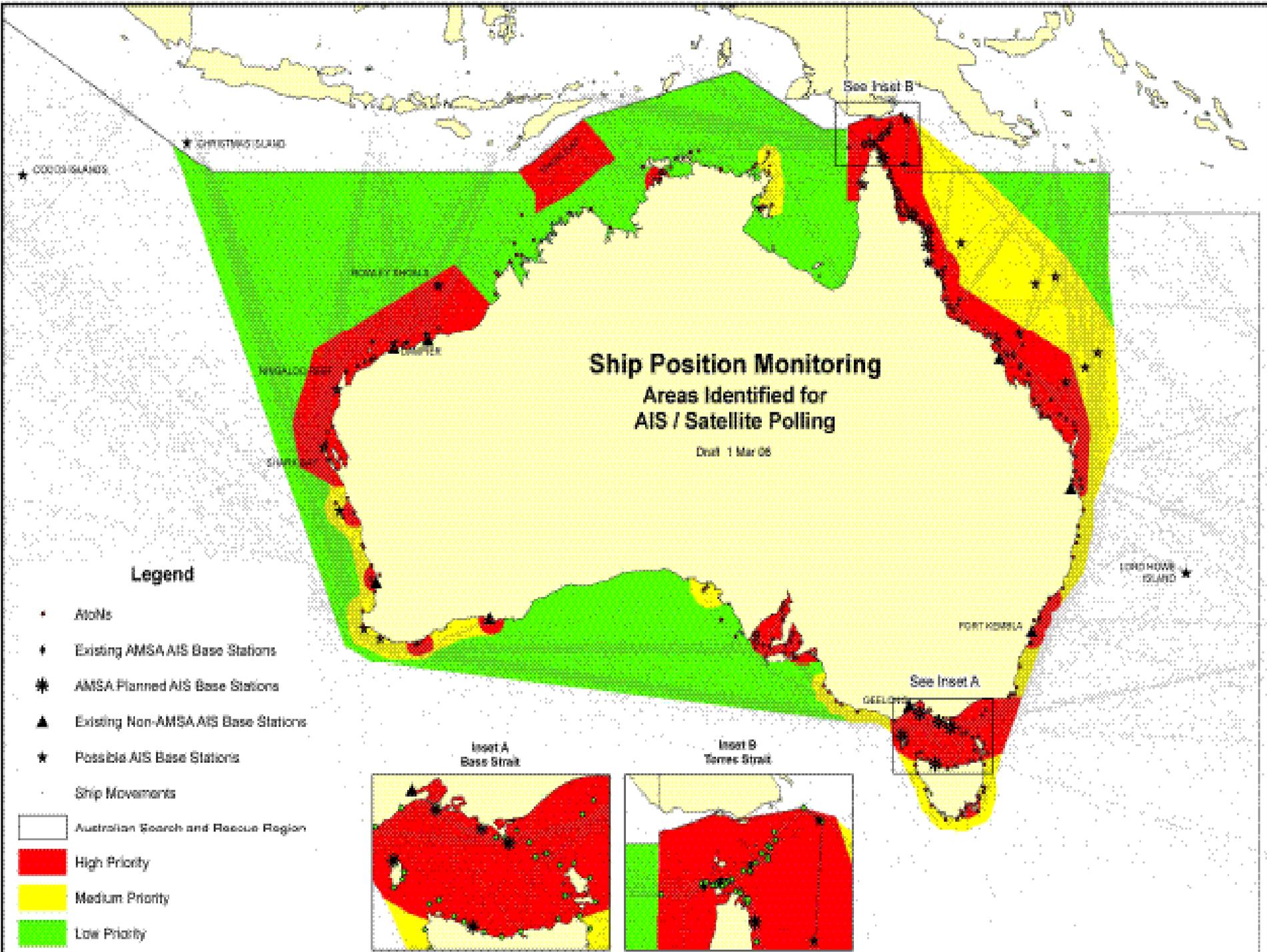
- Harbour limits

# Ship Position Monitoring Areas Identified for AIS / Satellite Polling

Dist 1 Mar 06

## Legend

- Atolls
- † Existing AMSA AIS Base Stations
- ✱ AMSA Planned AIS Base Stations
- ▲ Existing Non-AMSA AIS Base Stations
- ★ Possible AIS Base Stations
- Ship Movements
- ◻ Australian Search and Rescue Region
- High Priority
- Medium Priority
- Low Priority





AIS base stations encompass all areas.

Coordinated Approach

Inventory

Education

Effective implementation

*Australian AIS Working Group*

*AIS Integrated Project Team*



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# Initiatives

## Whole of Government Approach

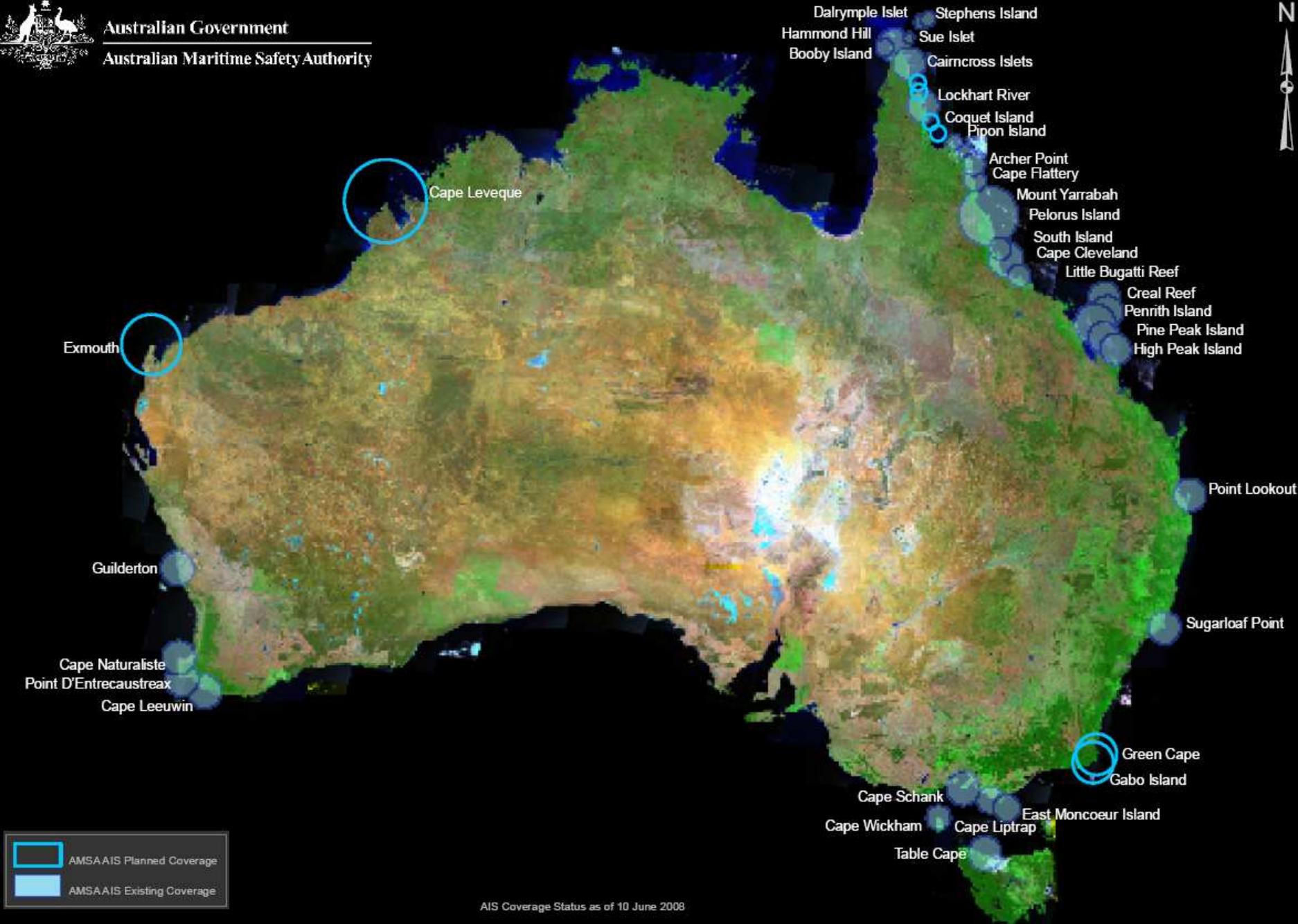
- ▶ Inventory of AIS infrastructure
- ▶ Integrating disparate systems
- ▶ AIS data sharing agreements
- ▶ Development of NOMAD (non-AMSA AIS data sharing project)

## AIS Study – DSTO

Engagement with ACMA on spectrum and licensing issues



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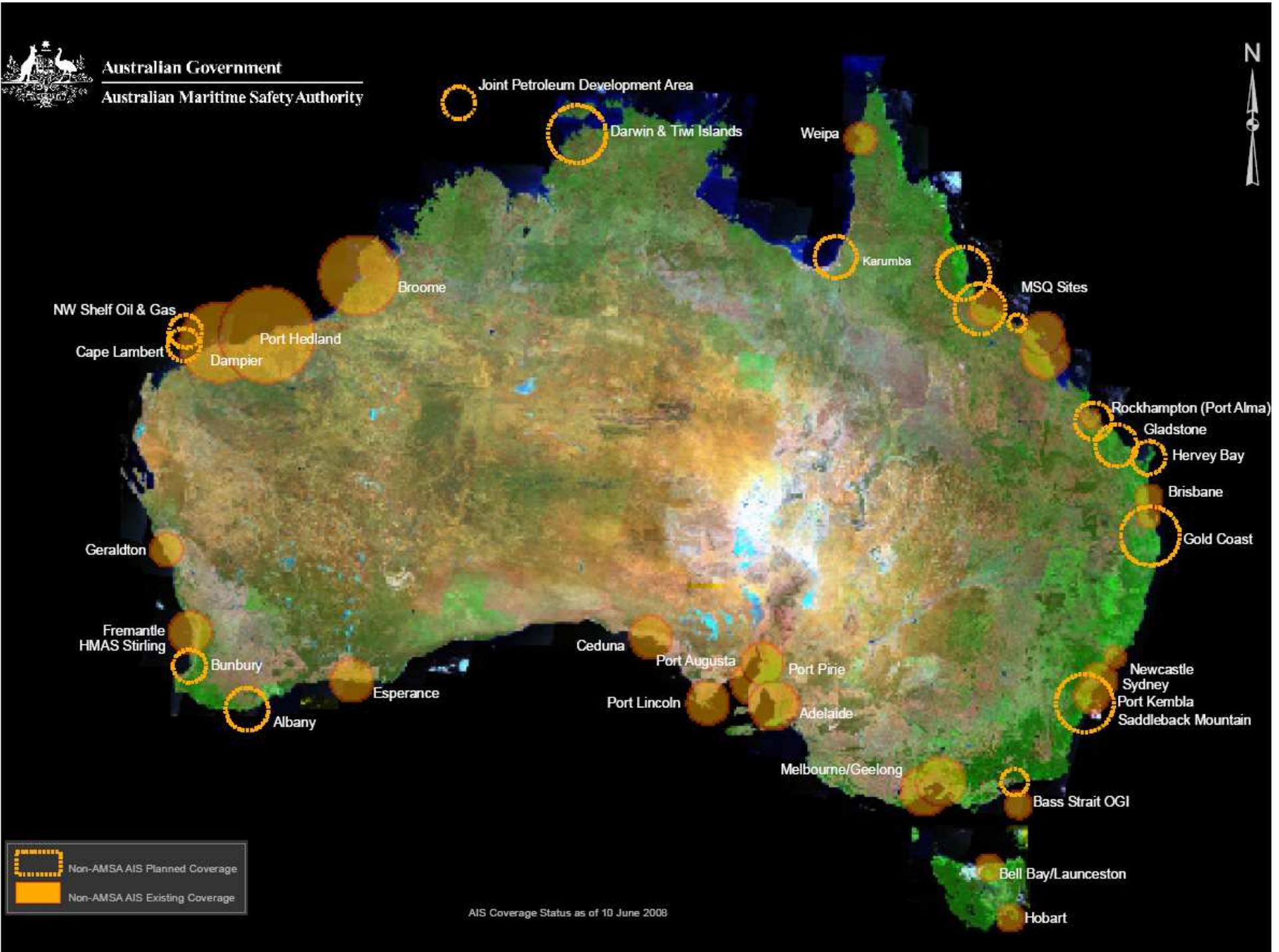
Legend:

- Light Blue Box: AMSAAIS Planned Coverage
- Dark Blue Box: AMSAAIS Existing Coverage

AIS Coverage Status as of 10 June 2008



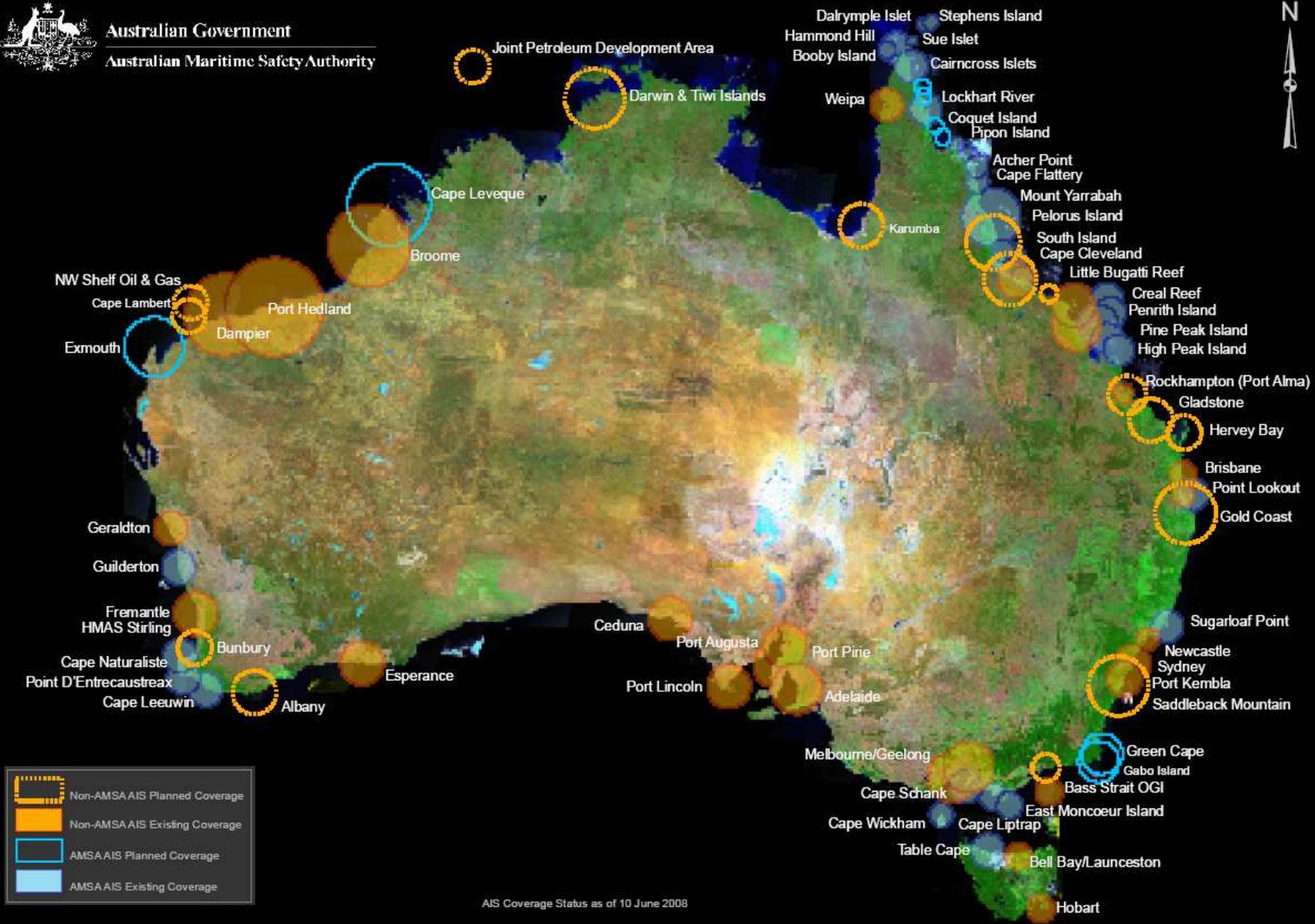
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AIS Coverage Status as of 10 June 2008



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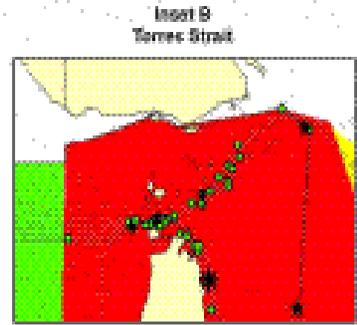
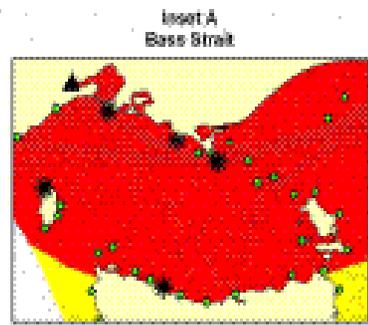
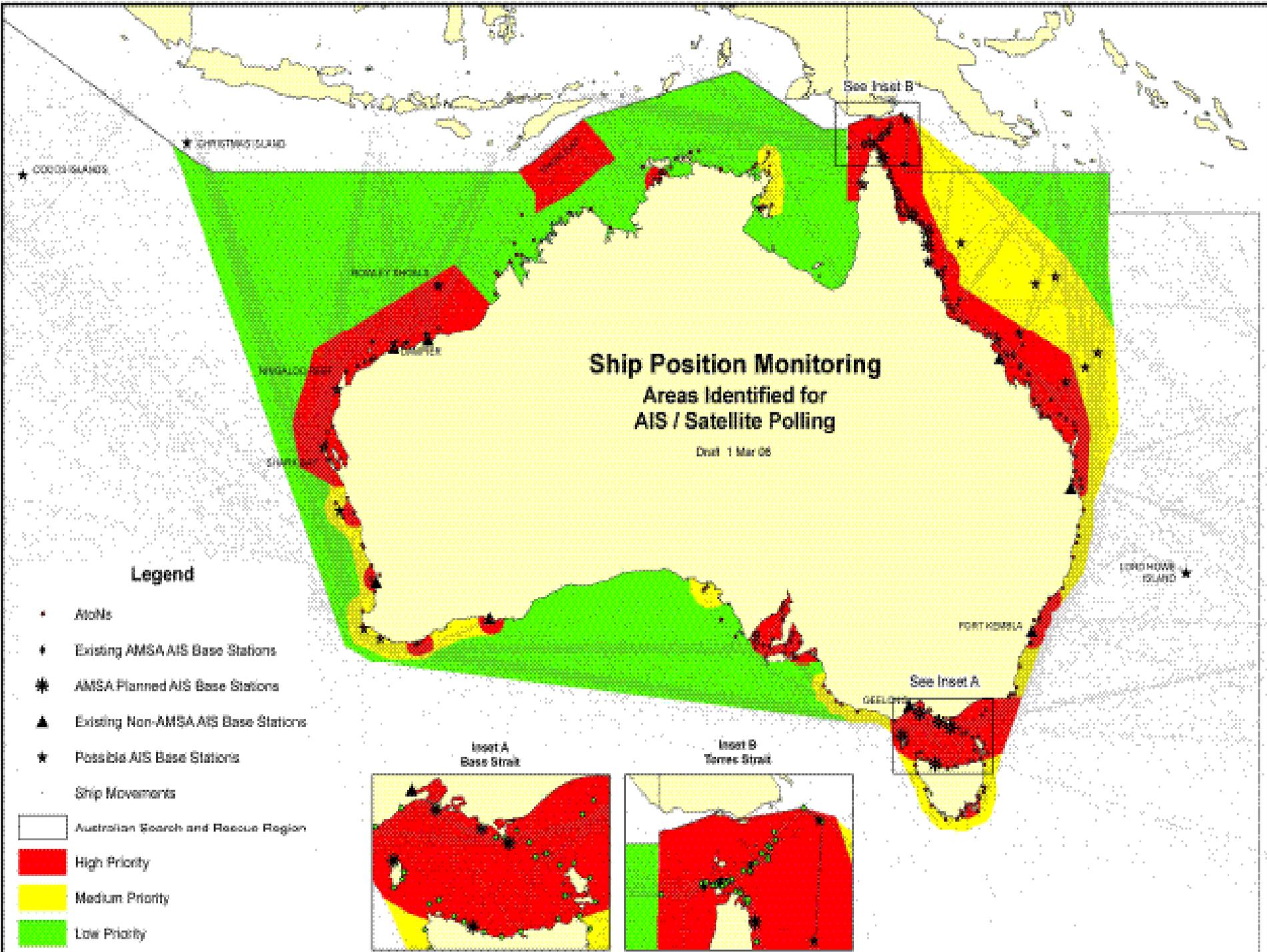
AIS Coverage Status as of 10 June 2008

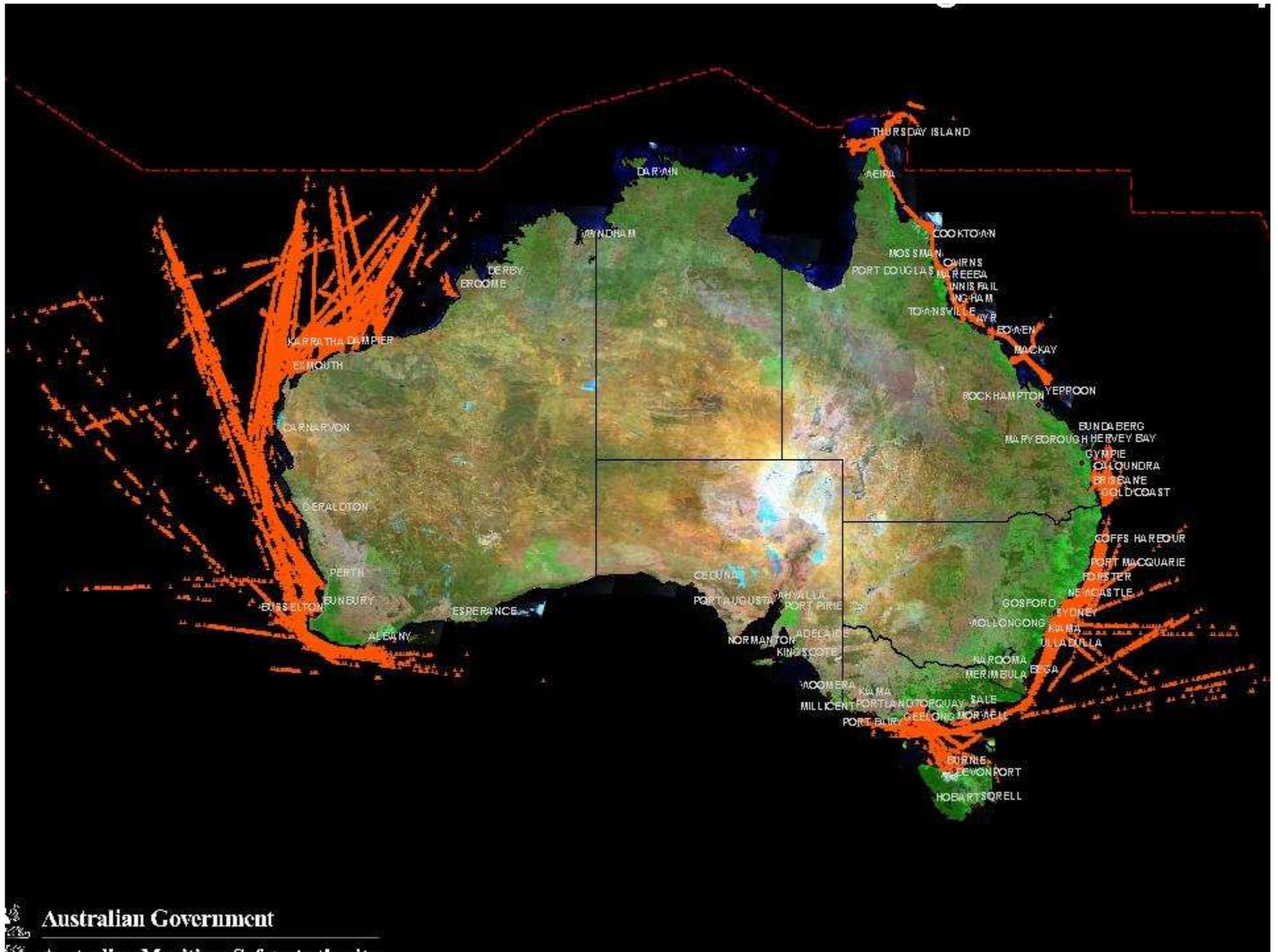
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Australian Government



## DSTO Study

What impact will varying AIS A / AIS B traffic densities have on:

- ▶ Reception of AIS B by AIS A?
- ▶ Reception of AIS A / AIS B by base stations?

What impact with AIS B have on AIS effectiveness in areas of good signal propagation (i.e. west coast of Australia)?

What is the prevalence of AIS B and what are the trends?

How is the VDL changing with time as AIS B becomes more accepted?

What is the most accurate method for identifying range of AIS base stations?



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## Class A reception of Class B

AIS B 'stationary' on Nobby's Head  
Questionnaires to Class A vessels  
through cooperation of Newcastle  
Port Corporation and Vessel Agents  
Significant number of  
questionnaires returned over three  
months of trial  
Shows Class A receiving Class B





## VDL loading

1. Average VDL usage is **less than 3%** in all locations, and while a **peak of just below 9%** was seen in the Sydney area, this is likely due to good radio signal propagation conditions.
2. Average VDL usage by AIS-B is 0.02% or less, with a peak of 0.3%
3. When **repeaters** come into view due to good radio propagation conditions, repeated messages **can account for more than 50% of the total VDL load.**



## Base Station Range

IALA Formula:  $Range = 2.5(\sqrt{H} + \sqrt{h})$

$H$  = height of receiving antenna in metres

$h$  = height of transmitting antenna in metres

Range is measured in nautical miles

*Anecdotal evidence that AIS provides greater range,  
i.e. 1.5X IALA formula range.*

Range Extension Claim:  $Range = 3.75(\sqrt{H} + \sqrt{h})$

# Distance Based Reliability Estimates

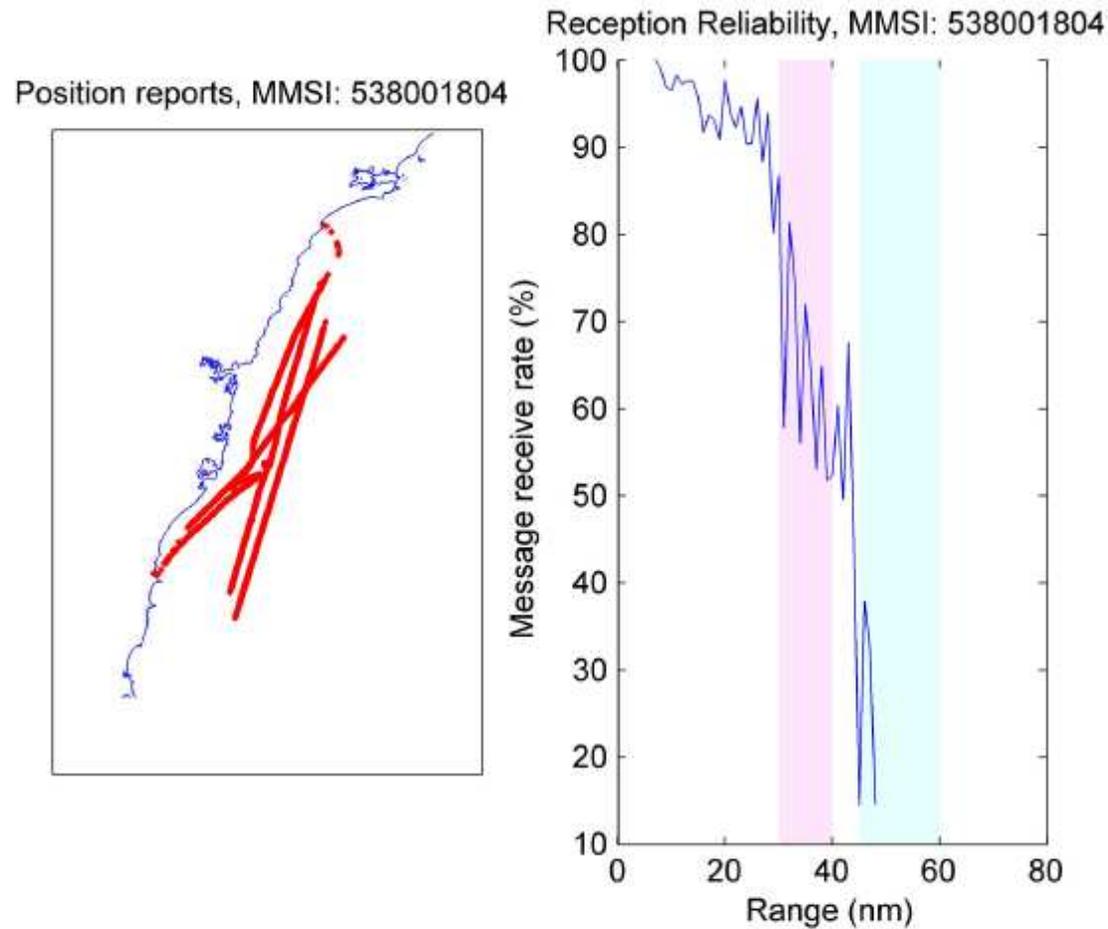


Figure 29 Path and AIS reliability profile for MMSI 538001804, which reports as Cape Darnley, a 189m long cargo ship – type 79 – and is identified on vesseltracker.com as a multipurpose dry cargo ship. The magenta band represents the IALA Range and the cyan band represents 1.5 x IALA range.

## General Trends...

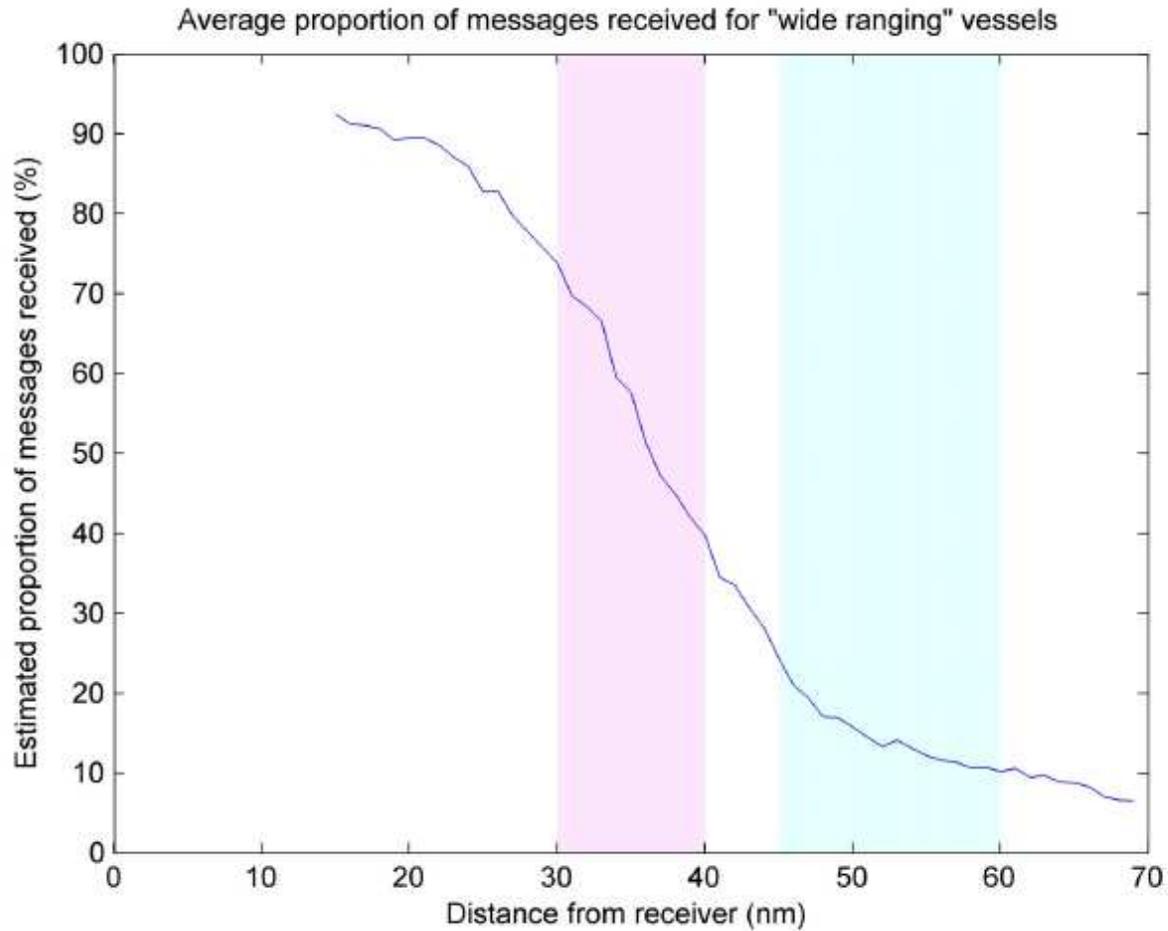


Figure 35 Average proportion of messages received. This is the average of reliability estimates for all "wide ranging" vessels, that is vessels which were seen throughout the range 15-28nm and so deemed to have been at distances 28-70nm. The IALA Range is coloured magenta and the 1.5 x IALA is coloured cyan.



# AIS spectrum issues

- ▶ **AMSA's experience so far has been problematic;**
  - Third party authorisation procedures are lengthy;
  - Site co-ordination (i.e. the frequency assigning process) by the *Australian Communications and Media Authority (ACMA)* is treated on a site-by-site basis;
  - Each new site is added (if successful), as a new spectrum access to AMSA's AIS 1 and AIS 2 licences;
  - AMSA currently has 31 AIS base stations in operation and there are 9 non-AMSA licenced base stations.



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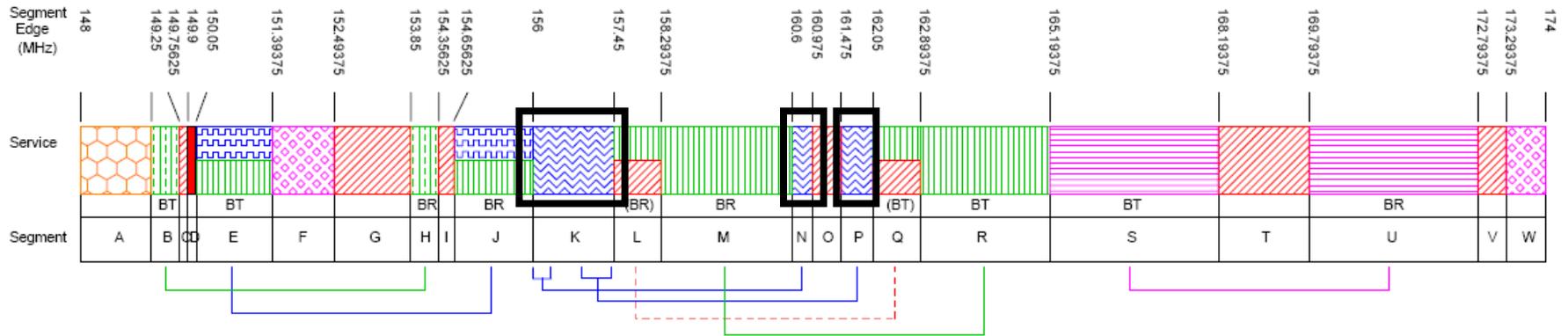
# AIS Spectrum

World-wide implementation does not guarantee a base station will be permitted in Australia – virtually impossible to ensure license in central business district areas.

Technical basis for frequency co-ordination based on analogue land mobile technology.

Licensing is on a non-interference basis, with no protection from interference

Cavity filters are being identified as required prior to licensing.



## VHF HIGH BAND PLAN DIAGRAM

<b>SERVICES</b>					
Land mobile (two frequency)		12.5 kHz channelling	Land mobile (trunked)		12.5 kHz channelling
Land mobile (two frequency)		6.25 kHz channelling	Land mobile (paging and fixed (paging))		25 kHz channelling
Land mobile (single frequency)		12.5 kHz channelling	Miscellaneous		12.5 kHz channelling
Land mobile (either two frequency or single frequency)		12.5 kHz channelling	<b>Maritime mobile</b>		<b>25 kHz channelling</b>
Fixed (two frequency, rural areas only) and land mobile (two frequency)		12.5 kHz channelling	Radionavigation satellite		

BT = Base transmit  
BR = Base receive  
┌ ┐ = Paired segments

(BT),(BR) and ┌ ┐ have the same meaning as above, if the segment is used for a land mobile service operating in a two frequency mode. These symbols are not applicable if the segment is used for a land mobile service operating in a single frequency mode.

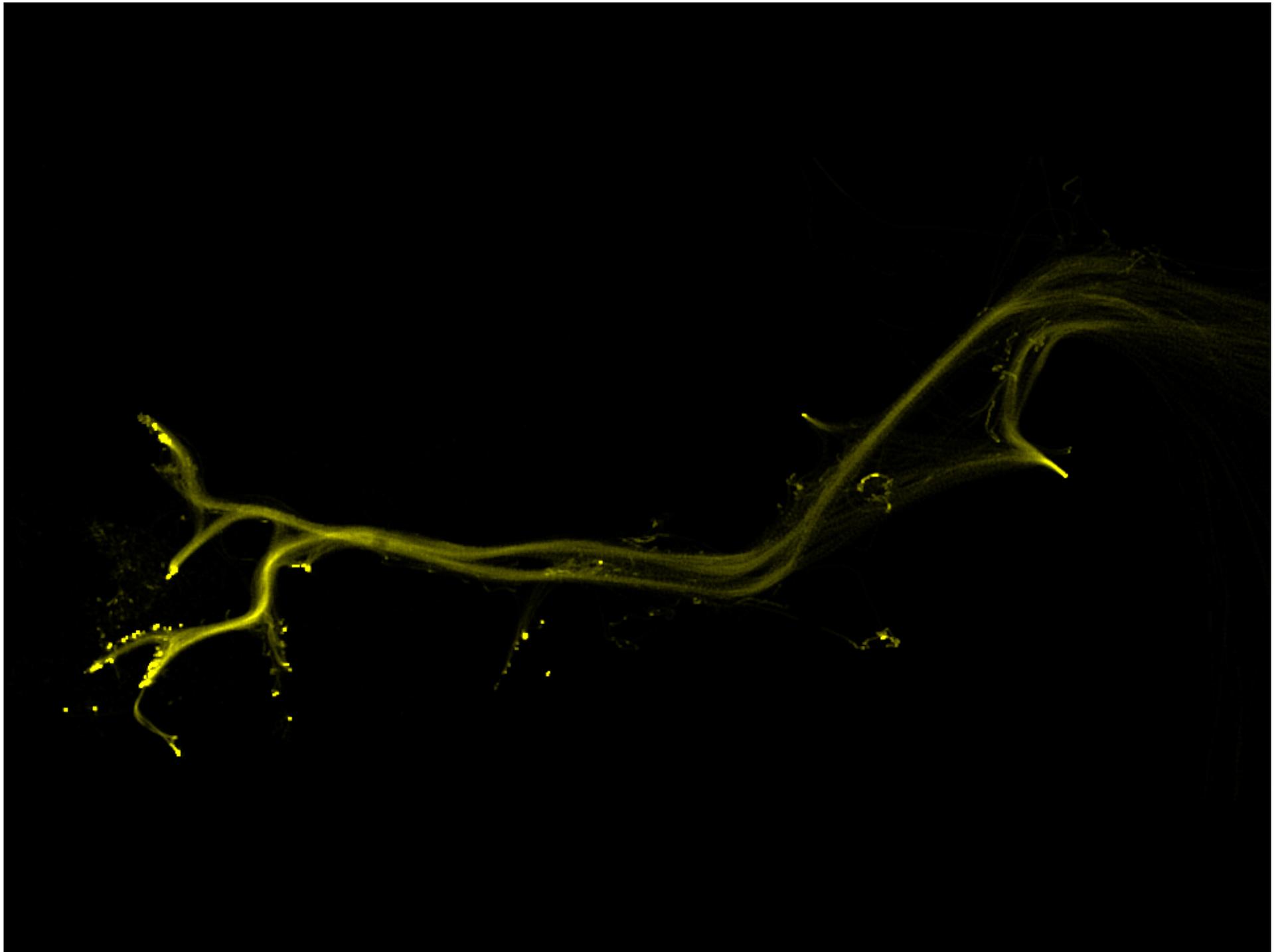
Note : This diagram should be read with reference to Tables 2 and 3 of the Band Plan.



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## AMSA – ACMA – next steps

- ▶ Study into band sharing with maritime mobile and land mobile bands.
- ▶ Confirm application of land mobile licensing regime for AIS / options
- ▶ Higher level of inclusion and protection for the maritime mobile band – AIS aspects.





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