The value of coastal monitoring in responding to the challenges of sea level rise and coastal management.

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City of MANDURAH

Department of Transport

City of MANDURAH

Coastal Infrastructure

Mandurah Northern Beaches Coastal Monitoring Program

Technical Report - February 2013

inable... A city excited about its future!

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uments on the importance of coastal monitoring
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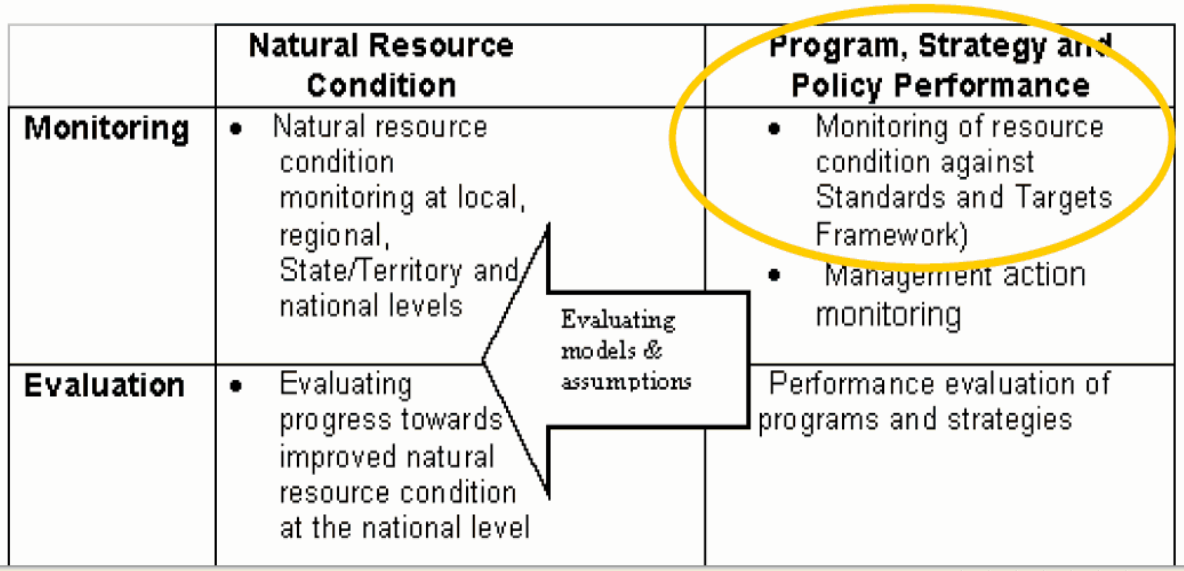
Why is the natural resource condition of estuarine, coastal and marine ecosystems to be monitored?

Two major components of the National Monitoring and Evaluation Framework require the monitoring of natural resource condition, but for different reporting needs.

The purpose of monitoring the indicators identified in this document is to assess the performance of programs, strategies and policies in terms of their achievements towards improved natural resource condition (see right hand side of Figure 1.1). Specifically, these indicators will: "be used to monitor changes in resource condition associated with each program, strategy or policy" (*National Natural Resource Management Monitoring and Evaluation Framework, 2003)*



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Normal v Not Normal

- The power of observation
- Understand natural history and response to drivers of coastal change
- Understand temporal cycles – hours, days, weeks, months, seasons, years and decades and centuries
- Understand as much about natural coastal zone dynamics as possible
- Understand as much about other systems in other places

Use your eyes to make personal observations

How were our dunes formed?

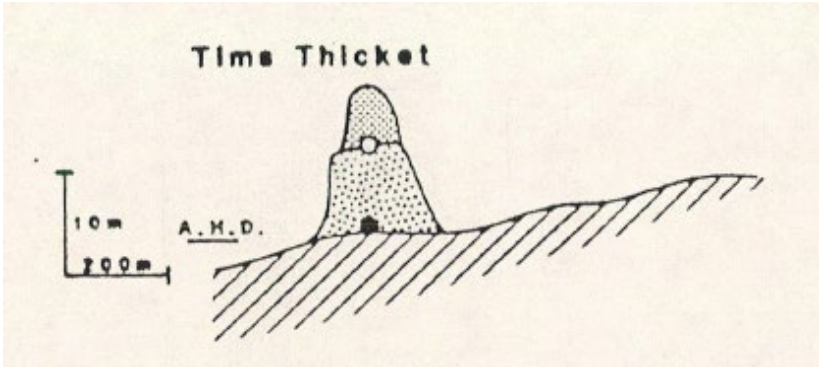
The data on beach rock indicate that the former shoreline portion was at least 500 m offshore in the vicinity of "The Cut" at Koombana Bay and approximately 100 m offshore near Binningup Beach. This provides a triangular zone of eroded sediment which, extrapolated to a mean dune height of 15 m, gives an overall volume of 154 x 10^6 m^3 (Fig. 9). This eroded material has been exported since at the most 2,800 years or at the least 1,000 years ago.

The Holocene sediment sinks between Leschenault and Becher Point are:

- The Leschenault Barrier between Leschenault and Myalup.
- The Preston Barrier, 20 km of coast centred on Preston Beach.
- The perched dunes, Tims Thicket area.
- The Dawesville coastal area.
- The Falcon Head-Halls Head area.
- The tidal delta complex at Mandurah.
- The San Remo-Singleton Beach coastal strip.
- Becher Point.
- Eroded fossil sinks.

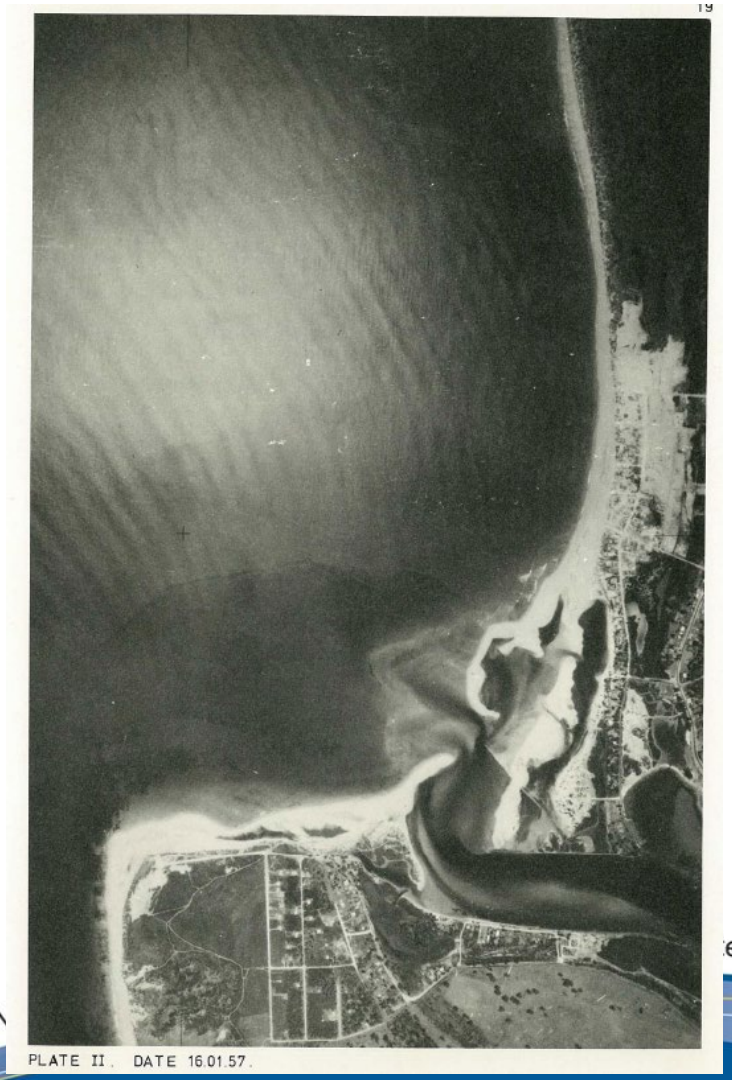
5.2.3 Tims Thicket

The perched shoestring of aeolian sand in the Tims Thicket area rests on Pleistocene Limestone and is currently undergoing erosion. The shoestring of sand extends from White Hill Road to north of Tims Thicket Road, a distance of 5 km. The aeolian sand was emplaced in two stages: at approximately 5,500 yrs BP and post 1,600 yrs BP. The former is not considered further here. The aeolian sand emplaced at 1,600 yrs BP and younger amount to 2.5 x 10^6m.



Dawesville Channel Coastal Engineering Studies Appendices C & D Volume 2
Riedel & Byrne Consulting Engineers
LeProvost, Seminiuk & Chalmer
Unisearch Limited

Natural Evolution of Our Coast



ed about its future!

Source: An investigation into the causes of the beach erosion at Silver Sands, Mandurah, WA. CG Ruck 1974


1969
Training Walls

Understand Natural History

Mandurah

Source: MP Rogers Watersun Beach Erosion Investigations

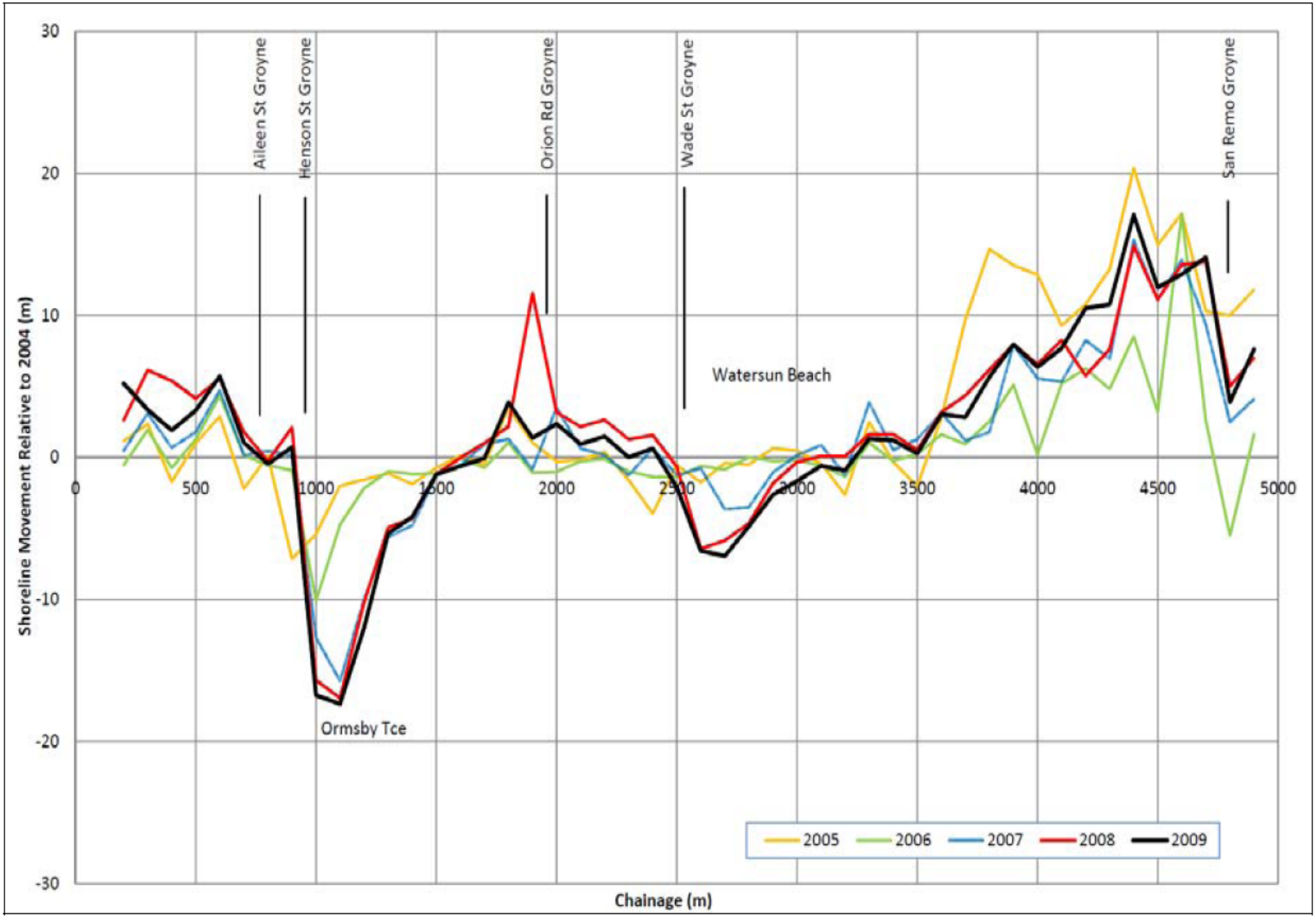
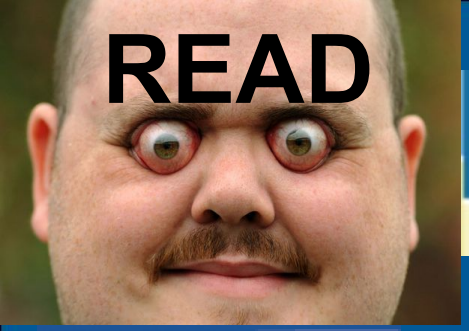
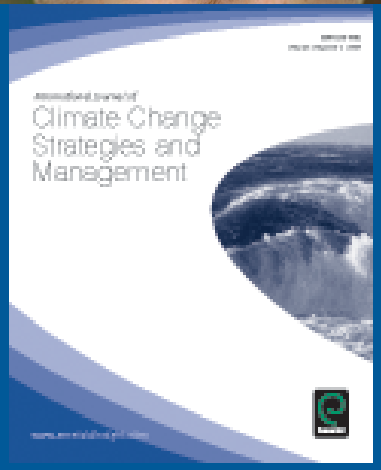
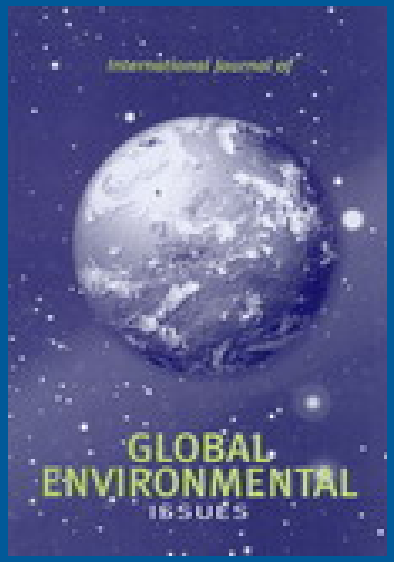


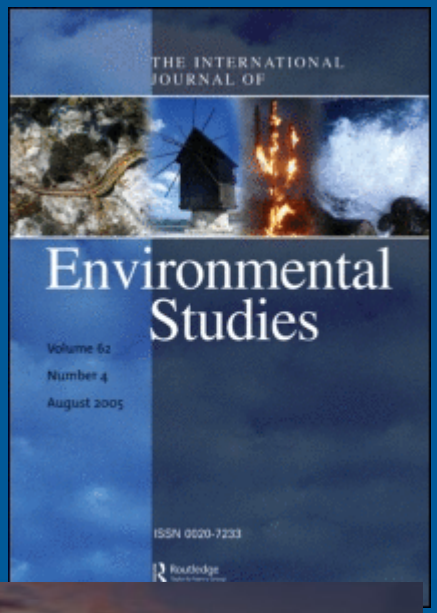
Figure 4.1 – Relative Shoreline Movement 2004-2009

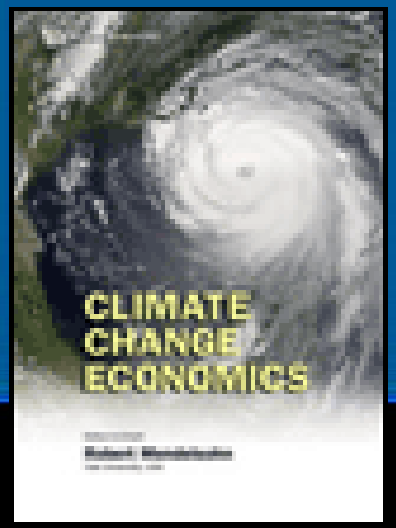


THE INTERNATIONAL JOURNAL of CLIMATE CHANGE
Impacts and Responses





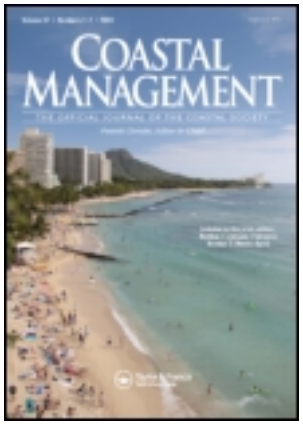


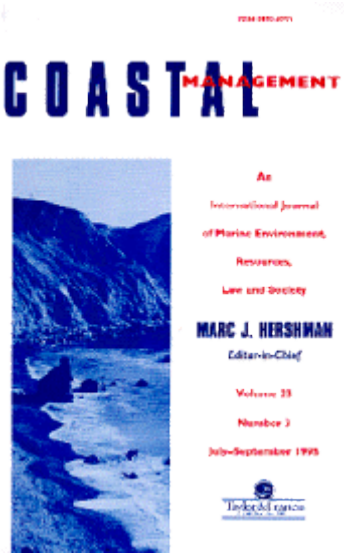


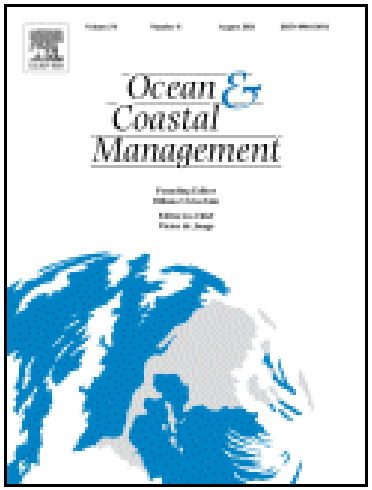
National Research FLAGSHIPS Wealth from Oceans | CSIRO | ace CRC | CRC | City of MANDURAH

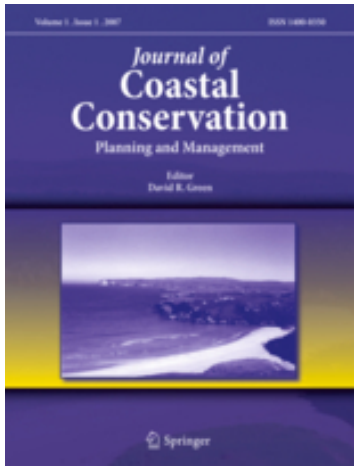
SEA LEVEL RISE

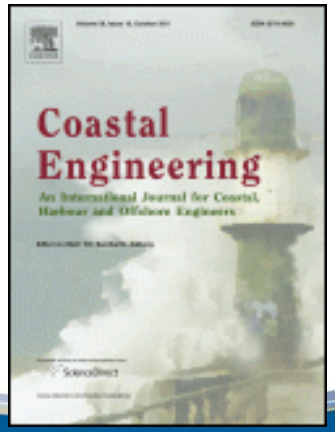
Understanding the past – Improving projections for the future

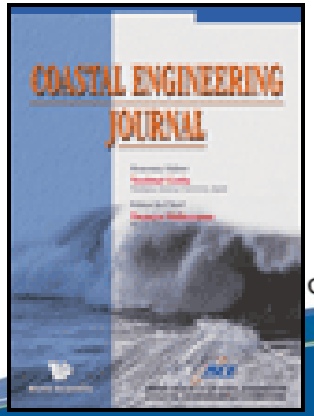










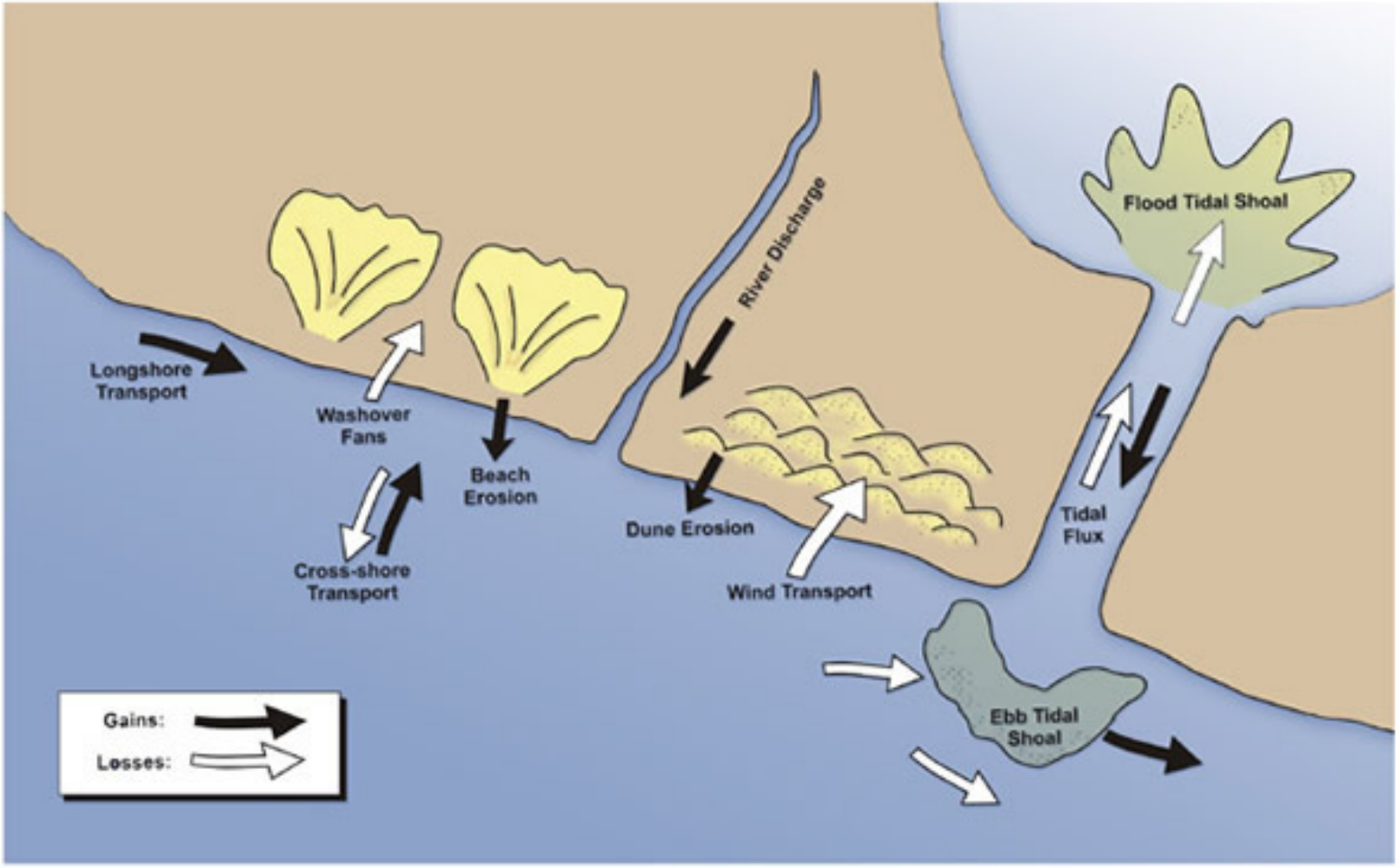


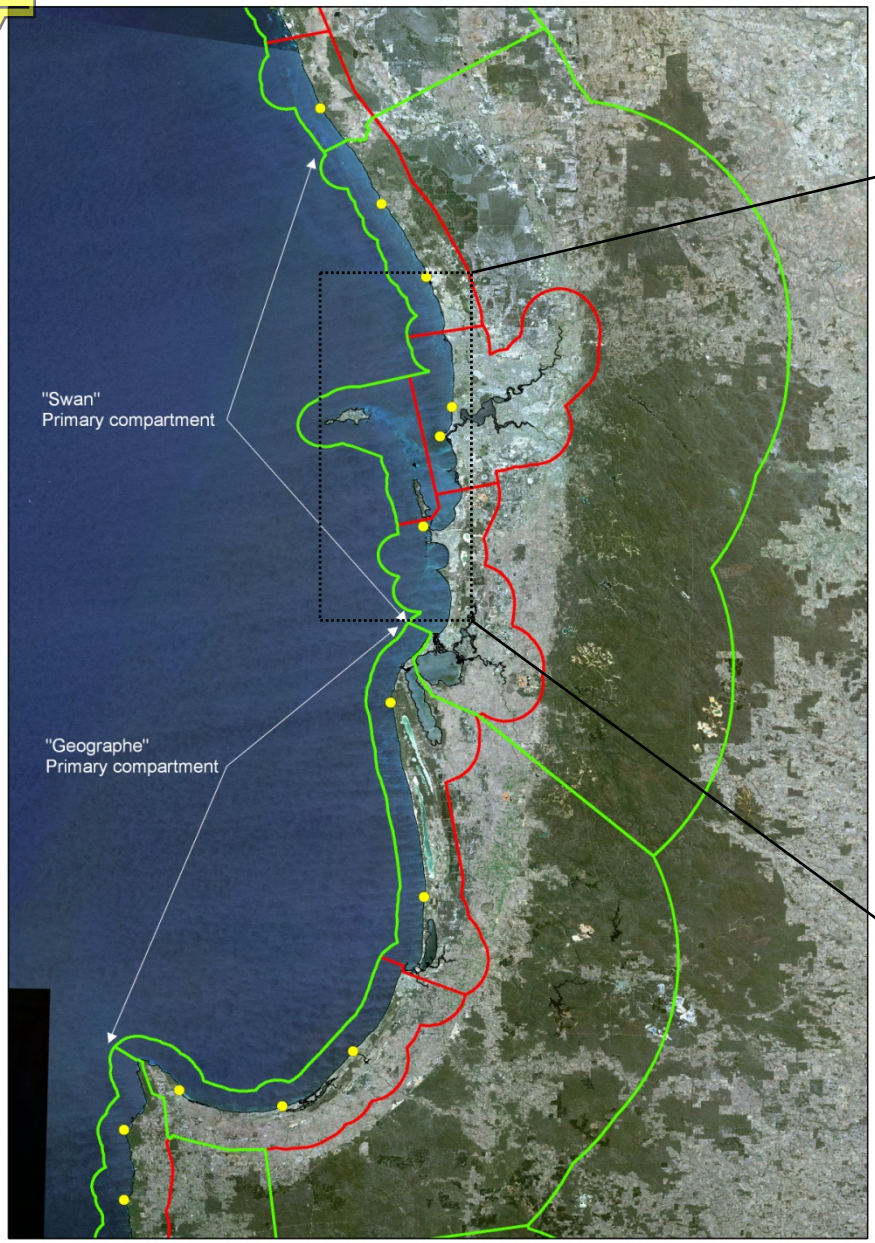
connected, sust

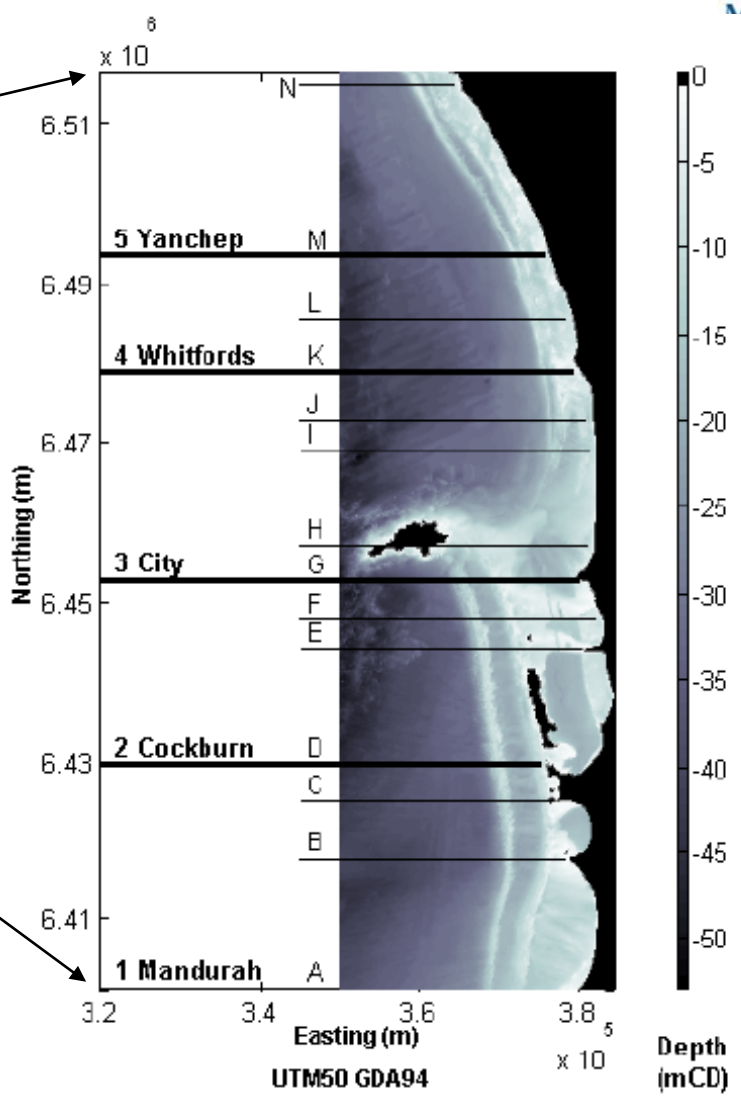
out its future!

Understand coastal processes in general

Sediment Budgets



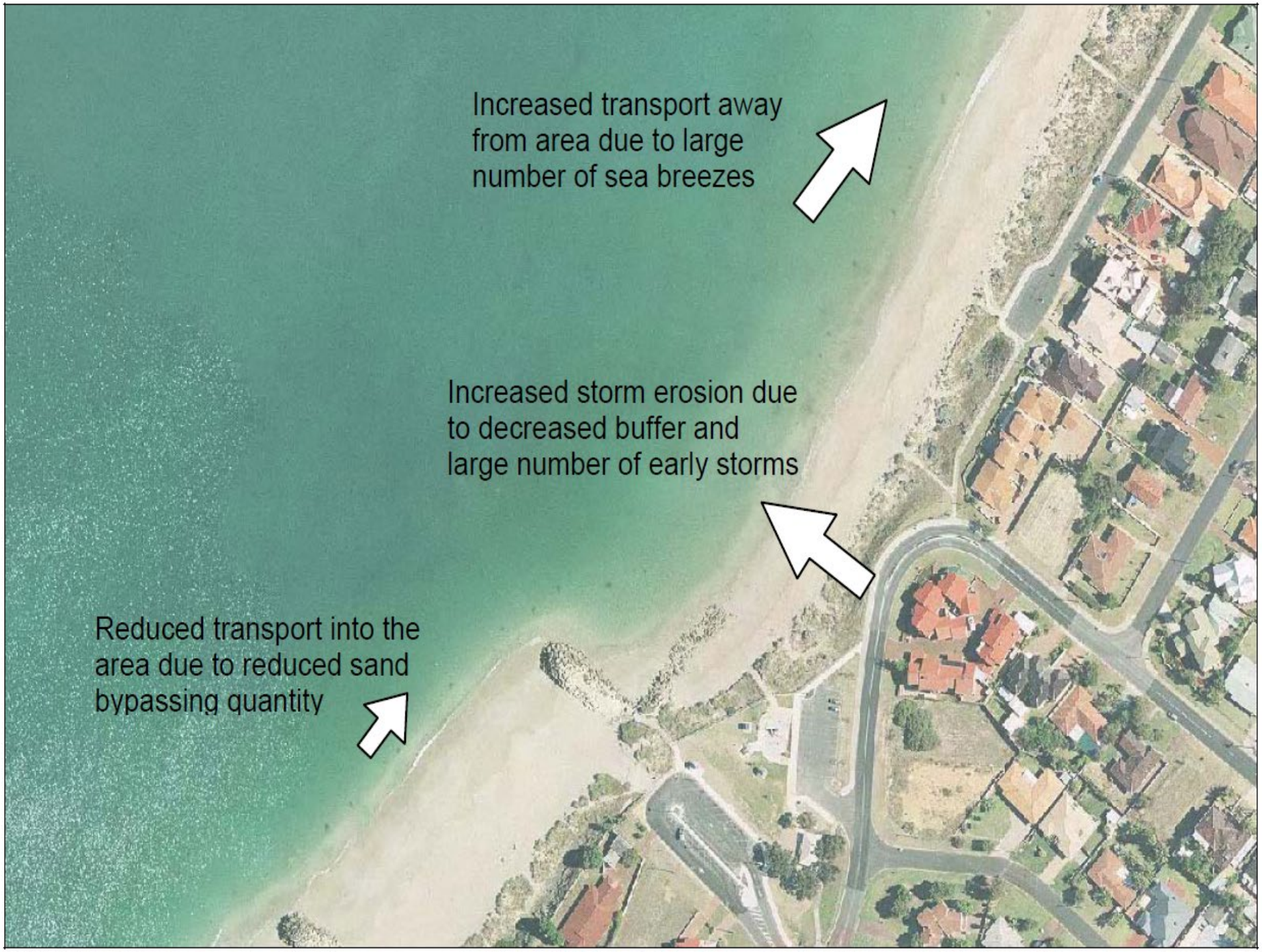




Primary and secondary sediment cells of the Perth Metropolitan Coast

From Stul et al (2007)

THE LOCAL SCALE: SEDIMENT CELLS & SEDIMENT BUDGETS


Increased transport away from area due to large number of sea breezes
Increased storm erosion due to decreased buffer and large number of early storms
Reduced transport into the area due to reduced sand bypassing quantity

Systematic photographic monitoring

Town Beach

out its future!

Falcon Bay


13:07 2/OCT/2013
S 32°34'48.46
E 115°39'7.85

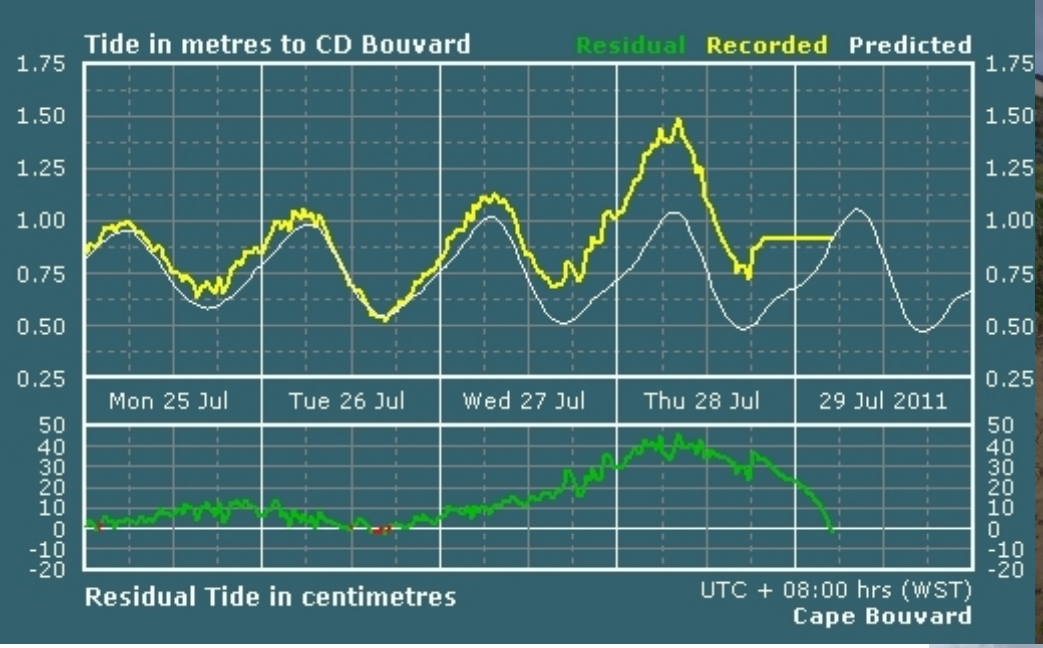

13:06 2/OCT/2013
S 32°34'47.52
E 115°39'11.37


13:09 3/DEC/2013
S 32°34'48.35
E 115°39'7.81


12:59 25/NOV/2013
S 32°34'49.08
E 115°39'7.24

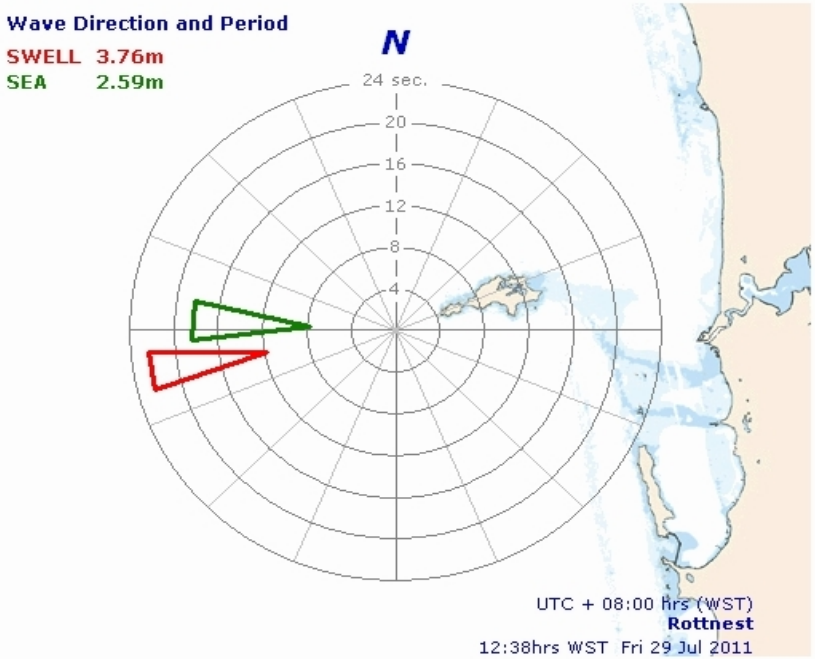
Henson Street

d about its future!



Directional graph

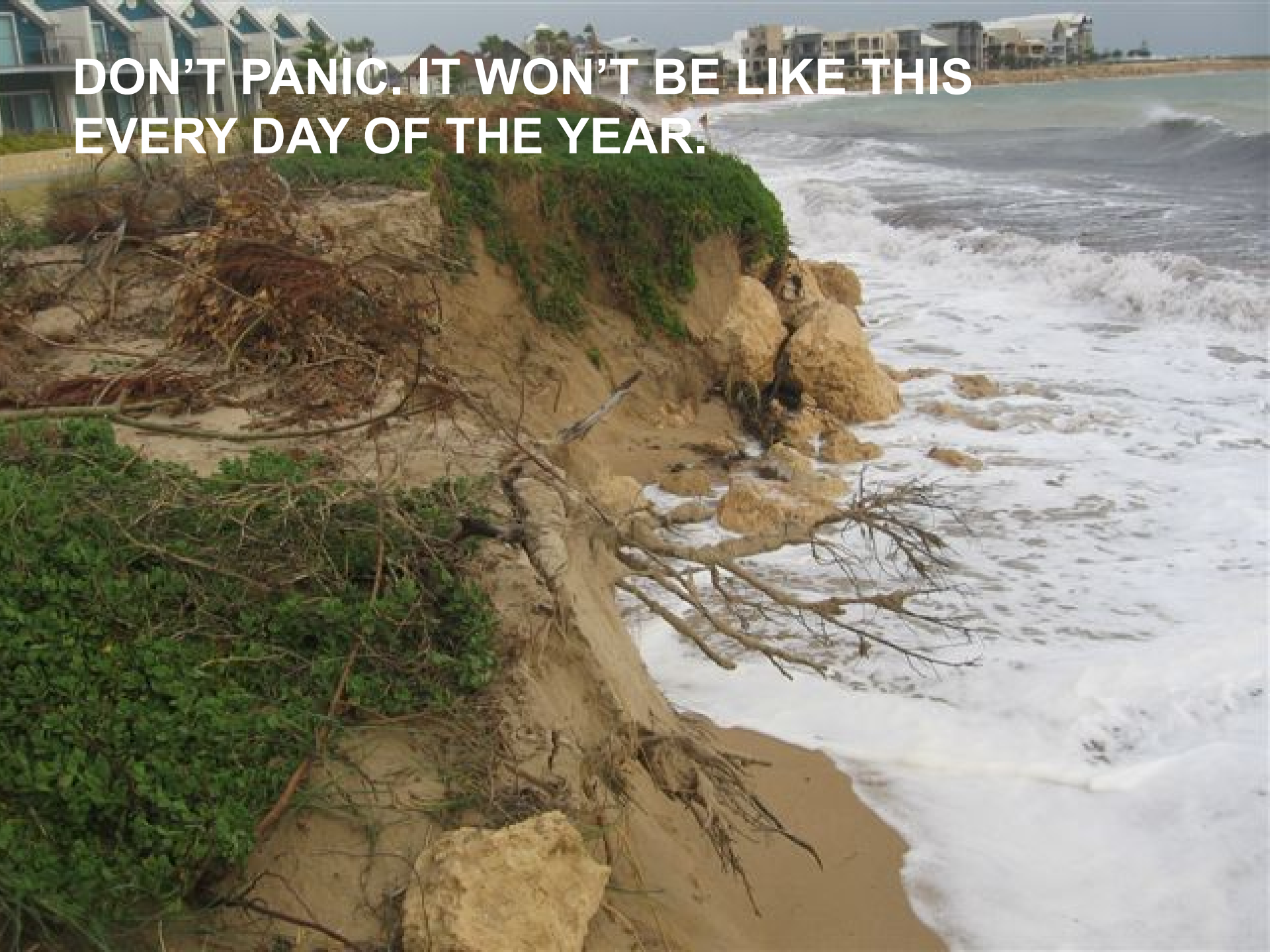
The bearing of the arrow indicates the direction of the sea and swell. The point of the arrow indicates the sea and swell.



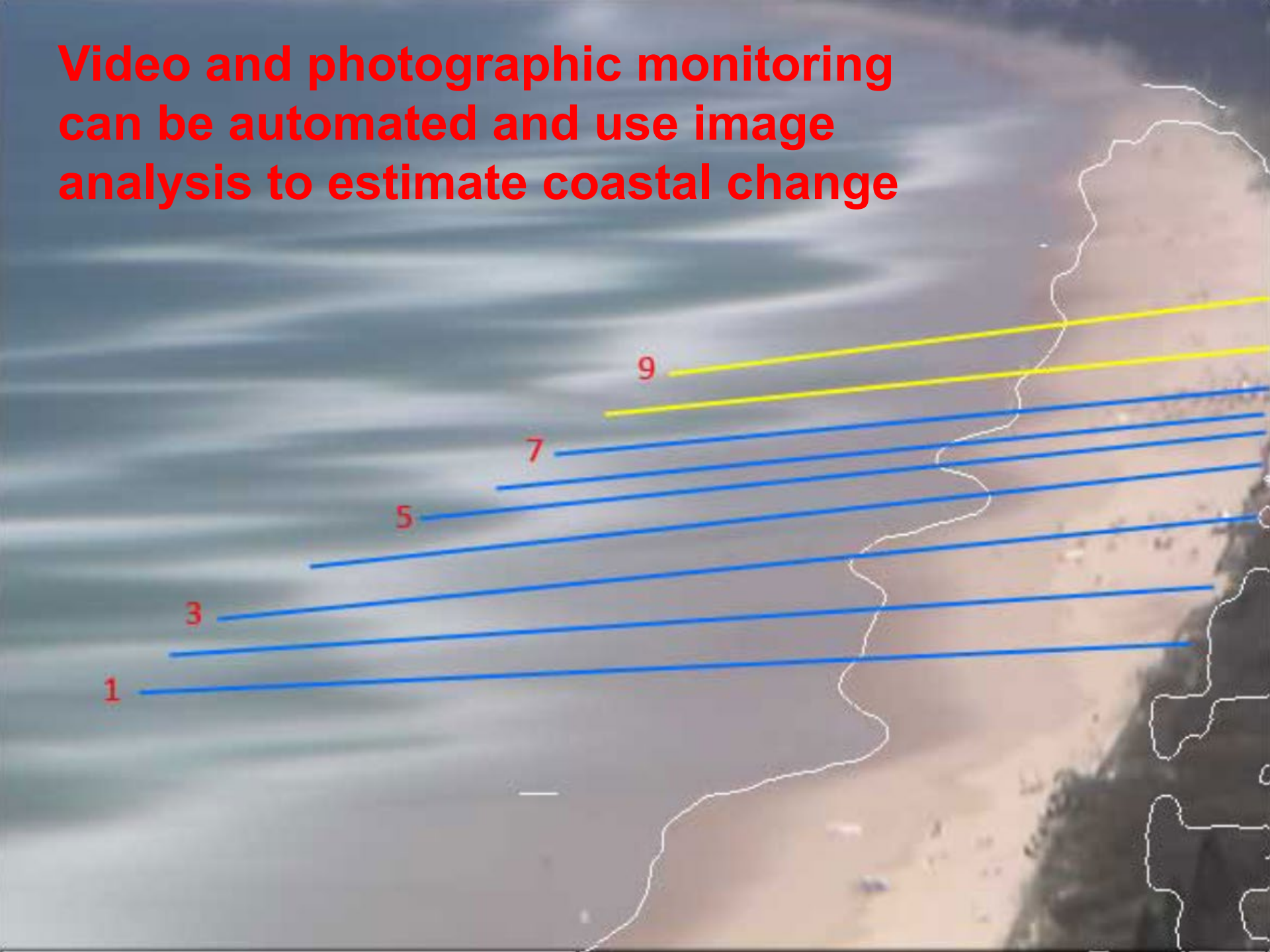

Understand the magnitude
and recurrence interval of
storm events
05/04/2007 11:26


01/05/2007 10:11


BE REALISTIC. LOOKS
CAN BE DECEIVING


DON’T PANIC. IT WON’T BE LIKE THIS
EVERY DAY OF THE YEAR.

Video and photographic monitoring can be automated and use image analysis to estimate coastal change



January

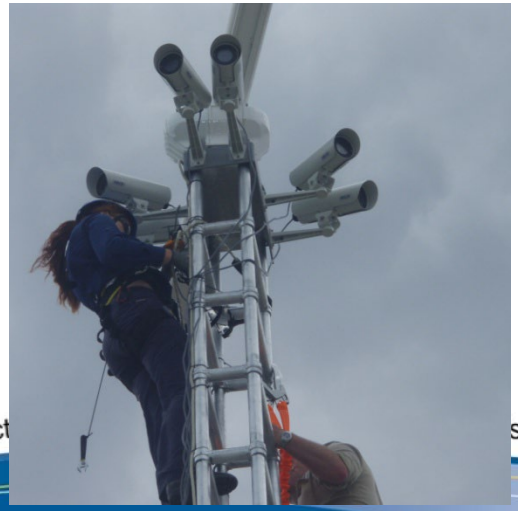
February

March

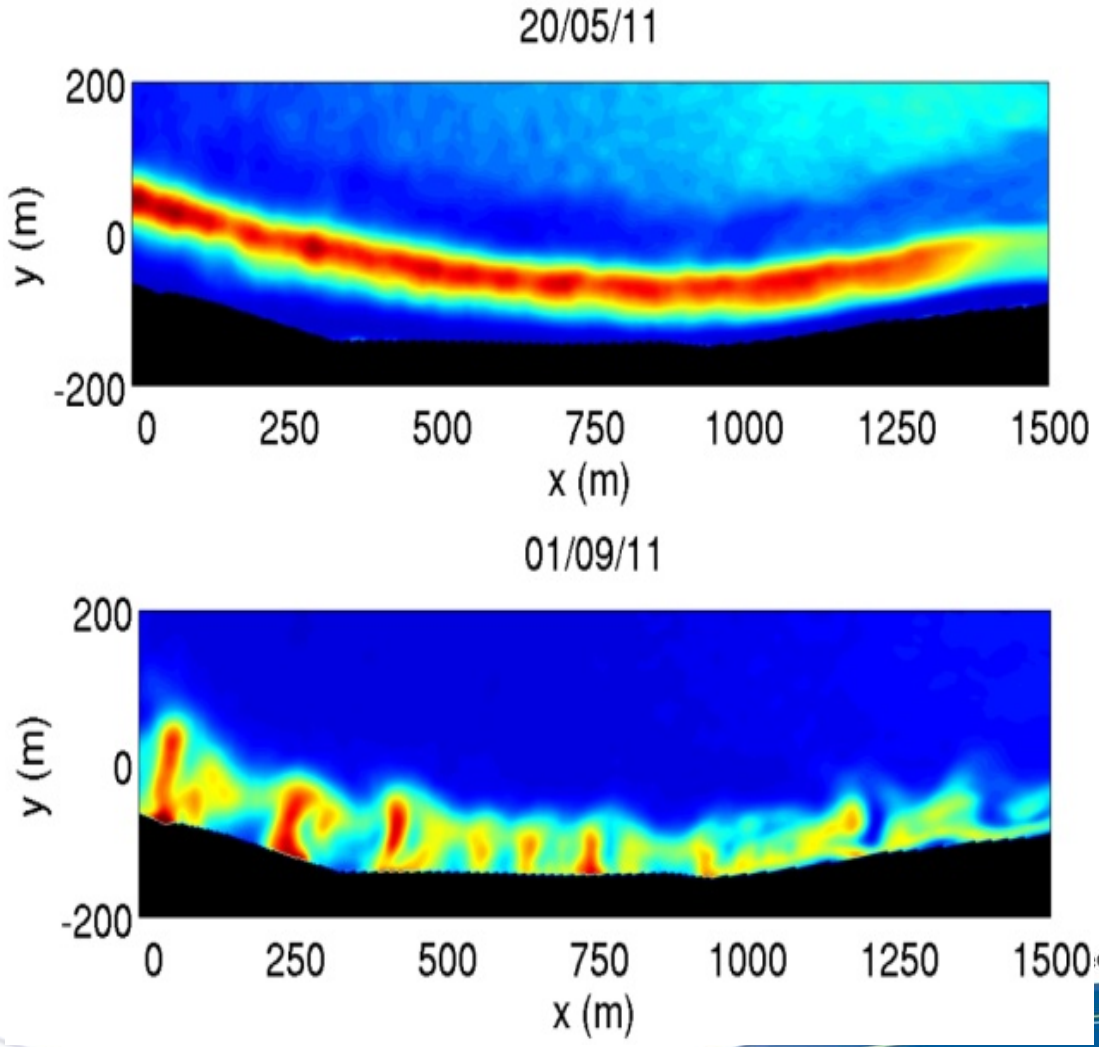
Figure 2 – The Mandurah shoreline position has accreted from January to March 2013. Black line is the A-line, red is the shoreline position for January, yellow is for February and Blue is the shoreline position for March.

Tap into other skill sets and form partnerships and collaborations

NRF installation



Radar time exposures

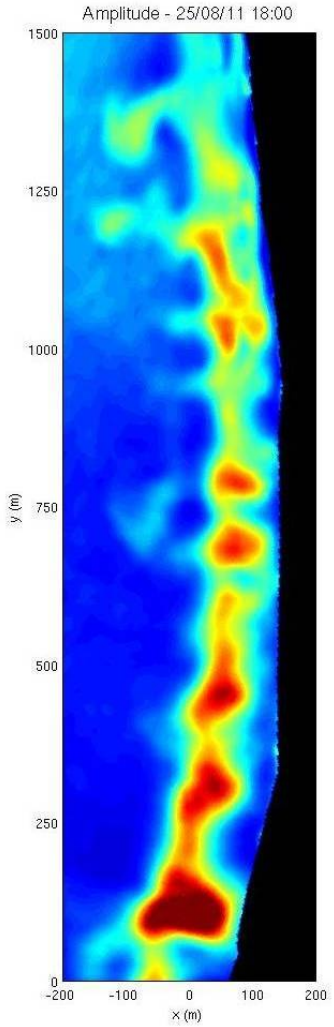


Beach State
Wright and Short (1984)

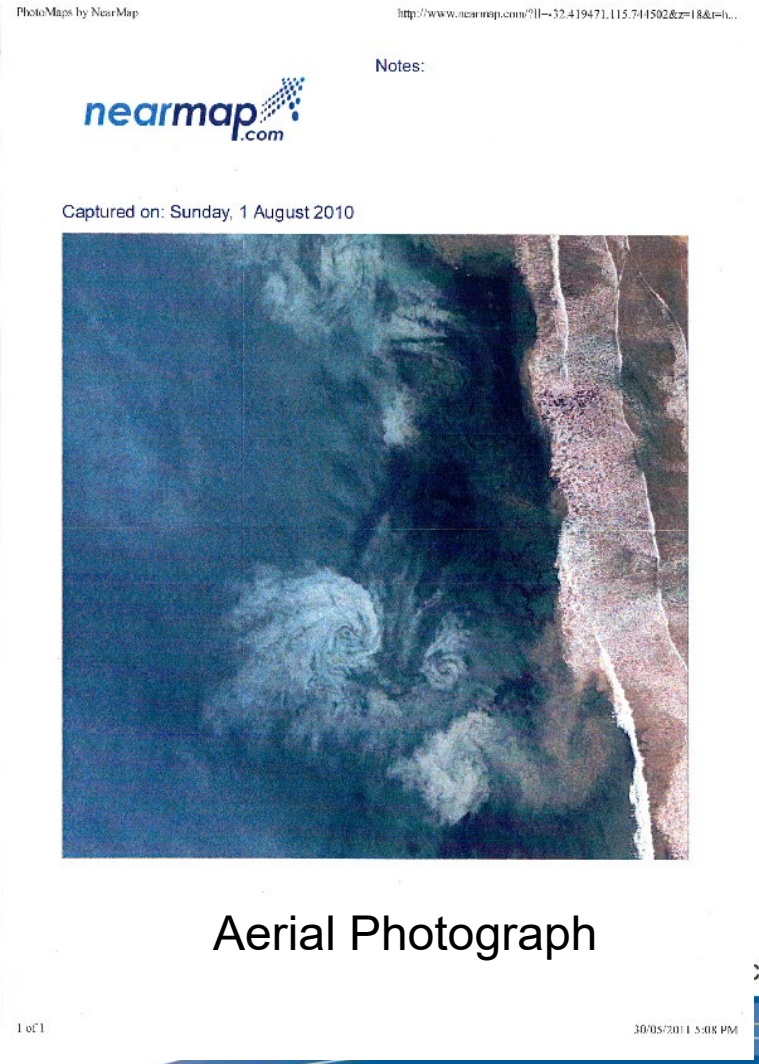
Linear Bar and Trough

Transverse Bar and Rip

Surf zone eddies

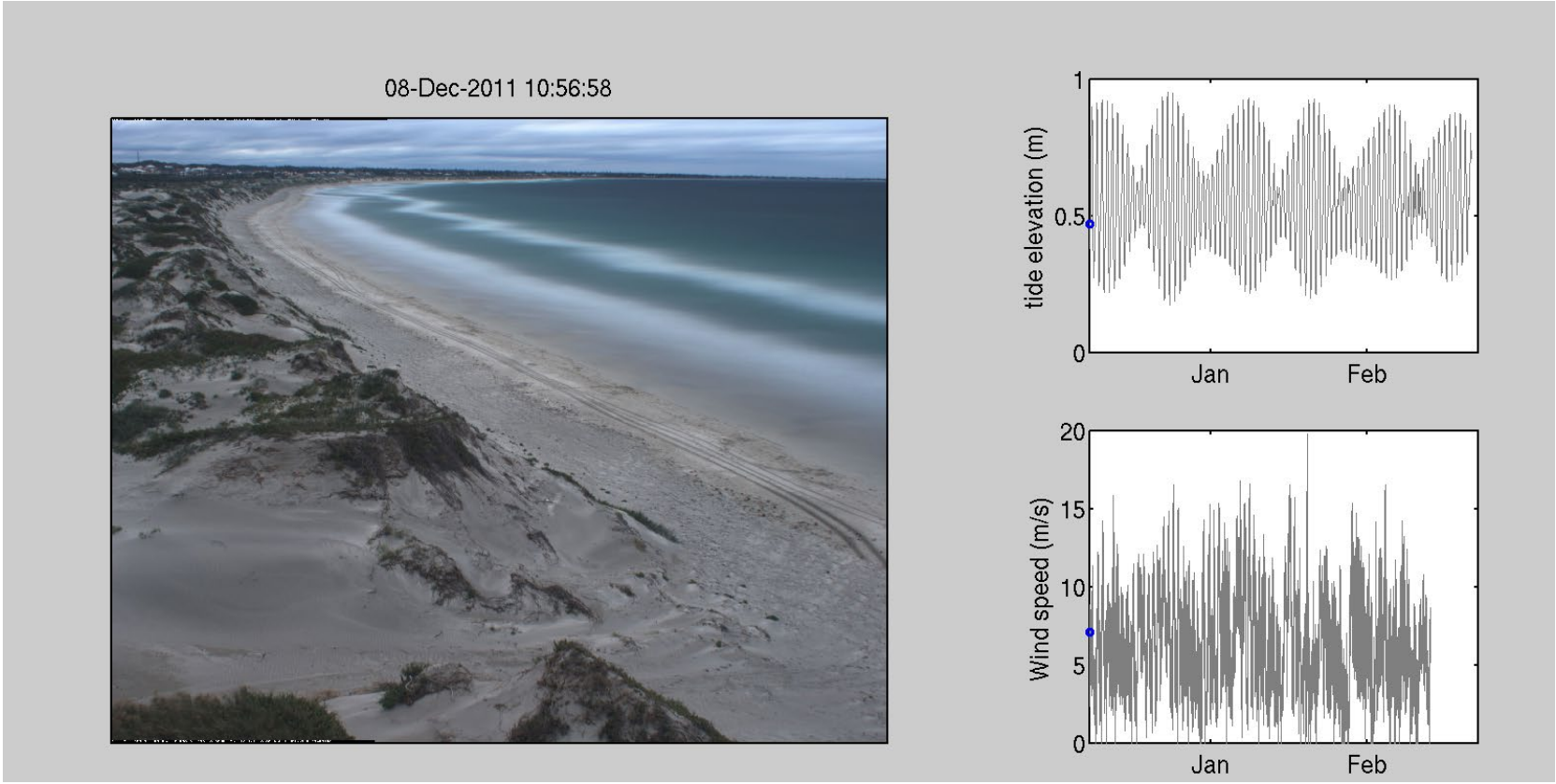


Radar

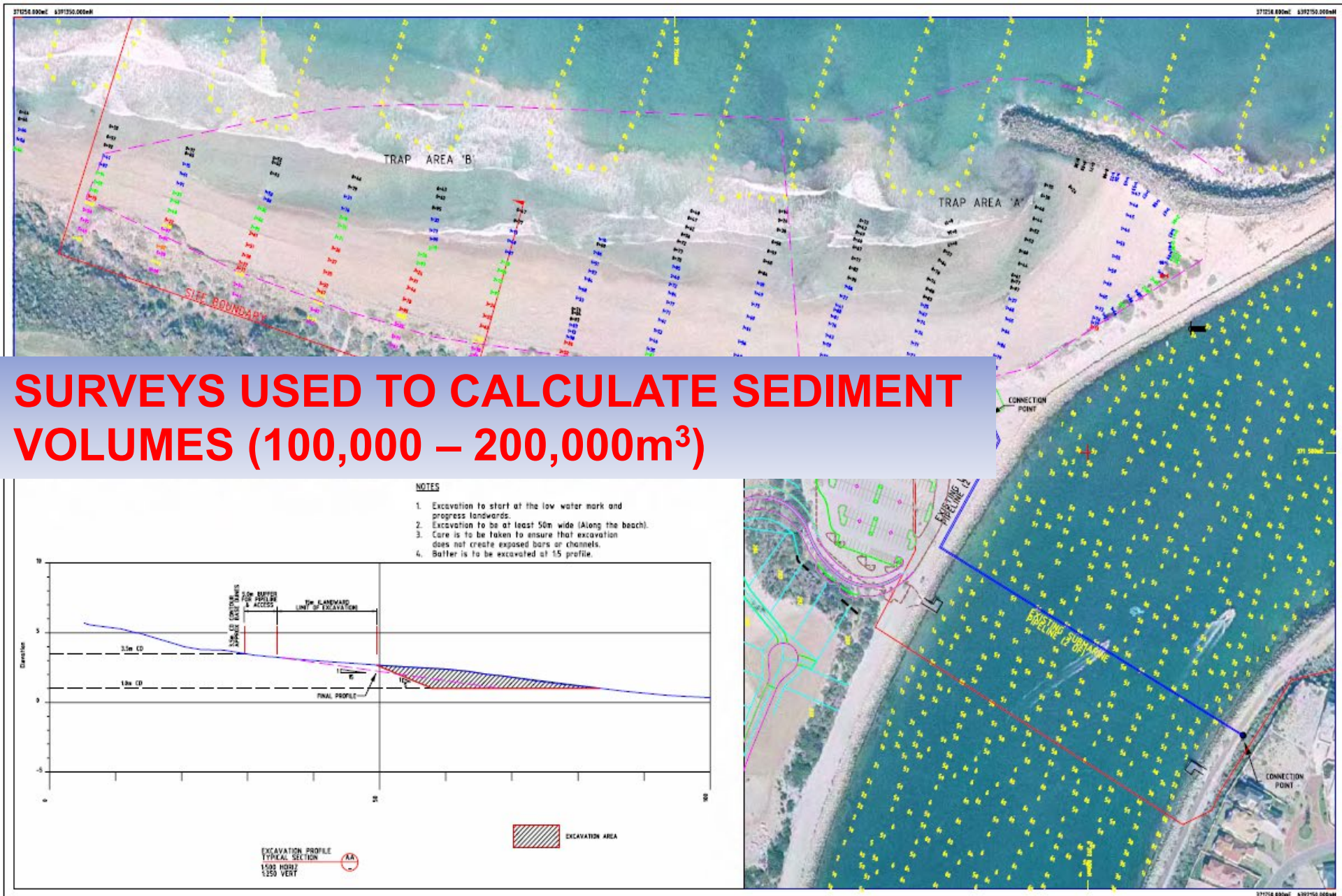


Aerial Photograph

Video time exposures



SURVEYS USED TO CALCULATE SEDIMENT VOLUMES (100,000 – 200,000m³)



NOTES

1. Excavation to start at the low water mark and progress landwards.
2. Excavation to be at least 50m wide (Along the beach).
3. Care is to be taken to ensure that excavation does not create exposed bars or channels.
4. Batter is to be excavated at 1:5 profile.

EXCAVATION PROFILE
TYPICAL SECTION
1:500 HORIZ
1:250 VERT

NOTES
TOPOGRAPHIC DETAIL SUPPLIED BY DPI
LEVELS AND SOUNDING DPI SURVEY MARCH/APRIL 2006.
REFER DPI PLANS 974-29-3 & 4.
AERIAL PHOTOGRAPHY METRO SW DEC 2004

SCALE 1 : 1000
METRES
DATUM
VERTICAL DAWESVILLE CHANNEL - BOUVARD - CHART DATUM WHICH IS 3.415m BELOW AHD DPHI 102
HORIZONTAL MAP GRID OF AUSTRALIA, BASED ON GDA94

ACTION	NAME	SIGNATURE	DATE
ENGINEER	R.Jones		25/05/2006
DRAWN	G.Bebbington		25/05/2006
ENGINEER CHECK	T. Green		
CARTOGRAPHY CHECK	R.Talbot-Smith		
APPROVED FOR RELEASE	C.Flattmann		

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BERSCART CARTOGRAPHY Pty Ltd
10 GEORGIA DRIVE, JINDIVICK
PHONE (03) 5629 0203
FAX (03) 5629 0206
MOB (0417) 597 203
EMAIL bellcart@bigpond.au

jfa consultants pty ltd.
port and harbour engineers
ABN 74 109 191 754
Arnelia House PO Box 219
9 Rockingham Rd Hamilton Hill
Hamilton Hill WA 6163 WA 6963
Ph (08) 9535 9555 Fax (08) 9535 9599
Email jfa@jfaconsultants.com.au

Department for Planning and Infrastructure
Spatial Information
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DAWESVILLE - OCEAN ENTRANCE
3RD PARTY BEACH EXCAVATION
BEACH PROFILE

DRAWING NUMBER DPI 789 - 08- 02 REV B

A1

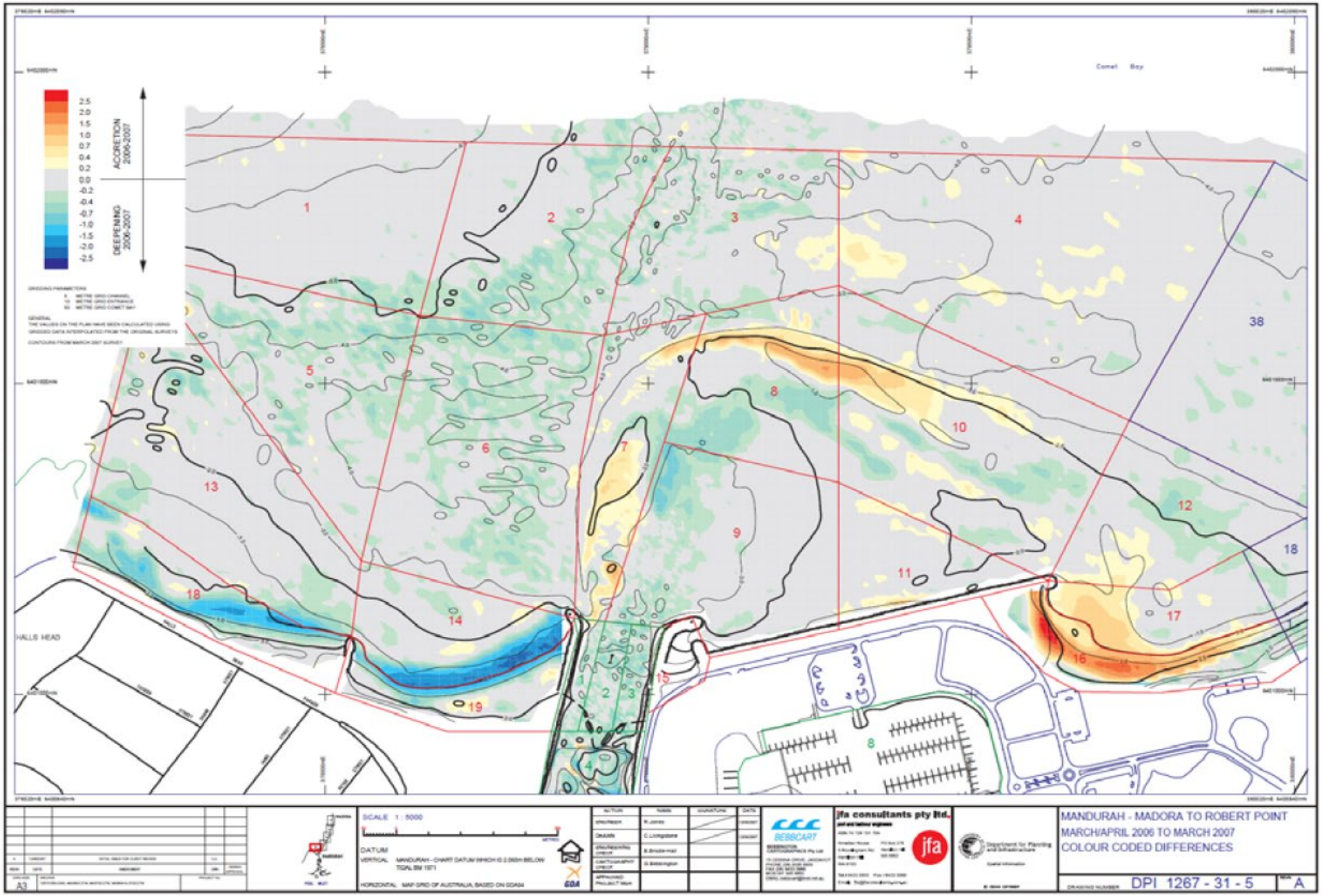
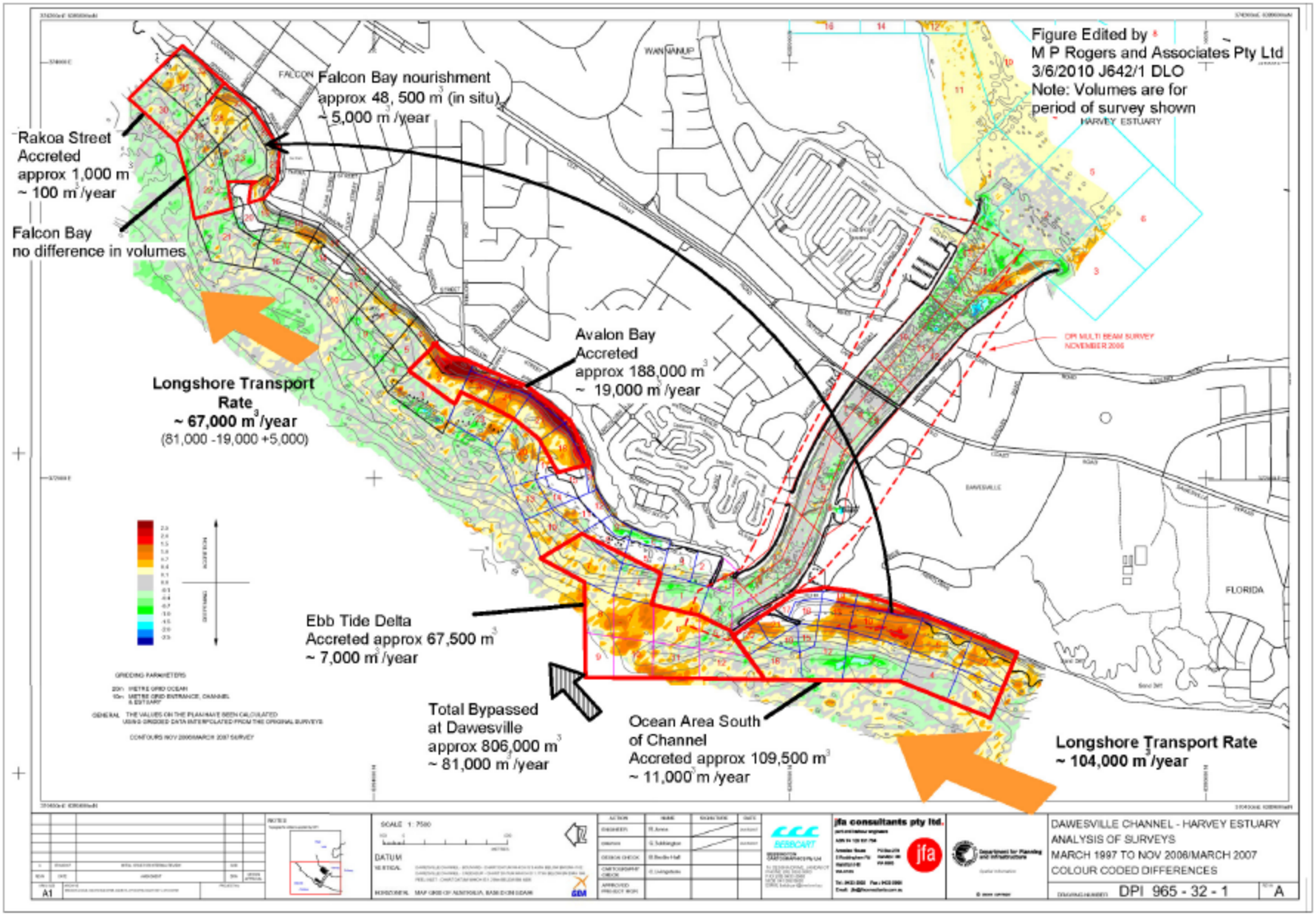
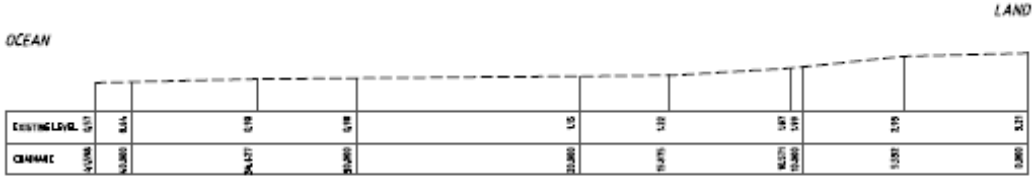


Figure 4.7 – March 2006 to March 2007 Difference Plot Near Mandurah Ocean Entrance

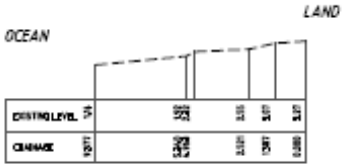
Figure 2.1 Survey Differences 1997 – 2007



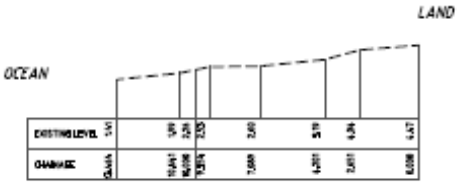
F1 DUNE LONGITUDINAL SECTION



F2 DUNE LONGITUDINAL SECTION



F3 DUNE LONGITUDINAL SECTION

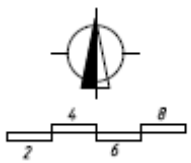


Project:

FALCON BAY DUNES
LONGITUDINAL SECTIONS

City of MANDURAH

DRAWN :	P.W.
CHECKED:	P.B.
DATE:	04-09-13
SCALE:	1:200 @ A3
S13-106	F-1,2,3



L:\Survey Data\Mandurah South West\AutoCAD\S13-106\Falcon Bay.dwg

- S:\Works & Services\Mandurah Ocean Marina\Asset Management\Waterways\Coastal\Coastal Erosion\Falcon Bay\Beach Profile Monitoring.xls

Take account of active beach management

SLURRY IS PUMPED ALONG BEACH IN LARGE PLASTIC PIPES TO MORE POWERFUL PUMPING STATIONS

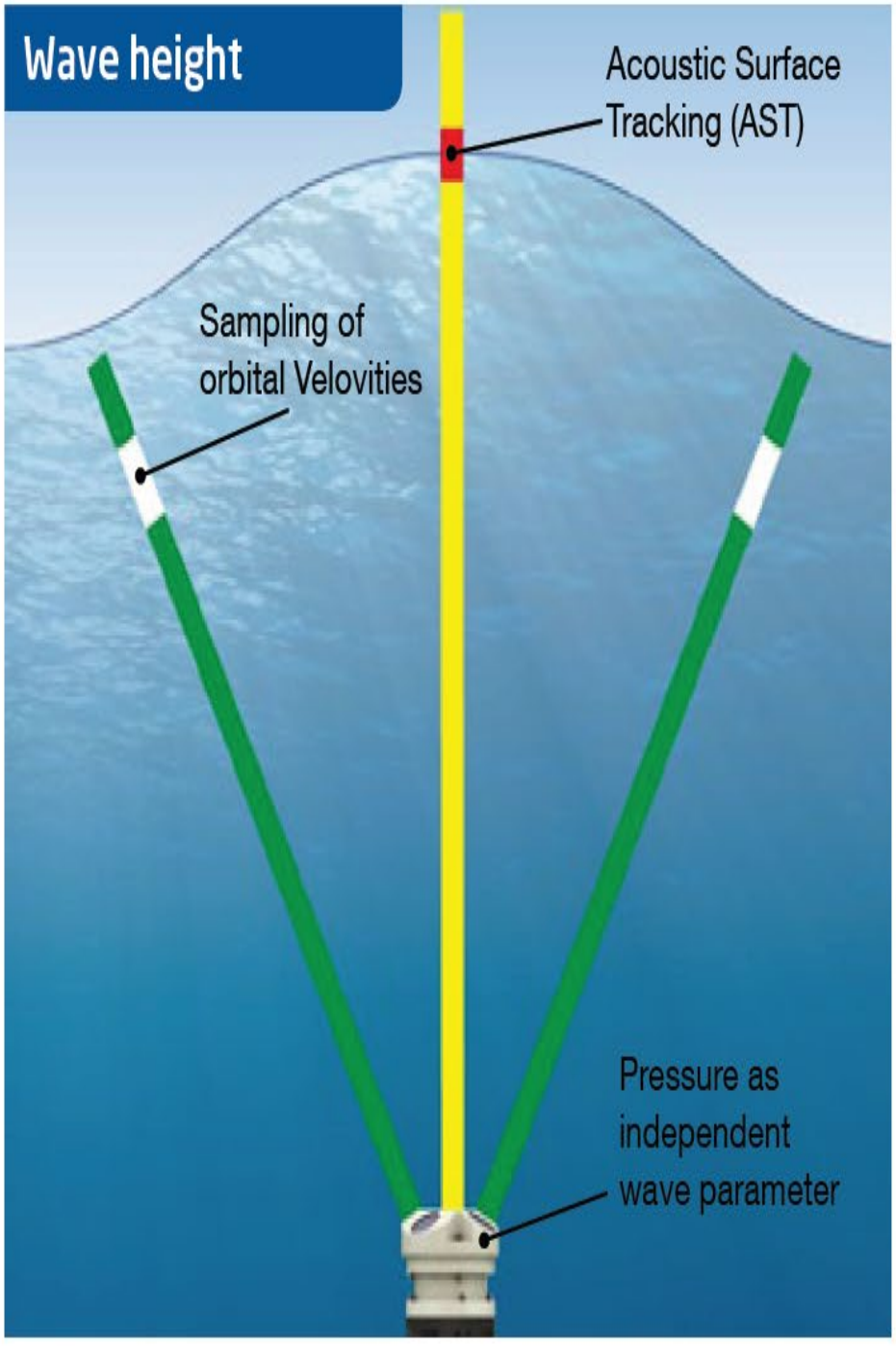

DISCHARGE SITE
19/04/2007 11:52

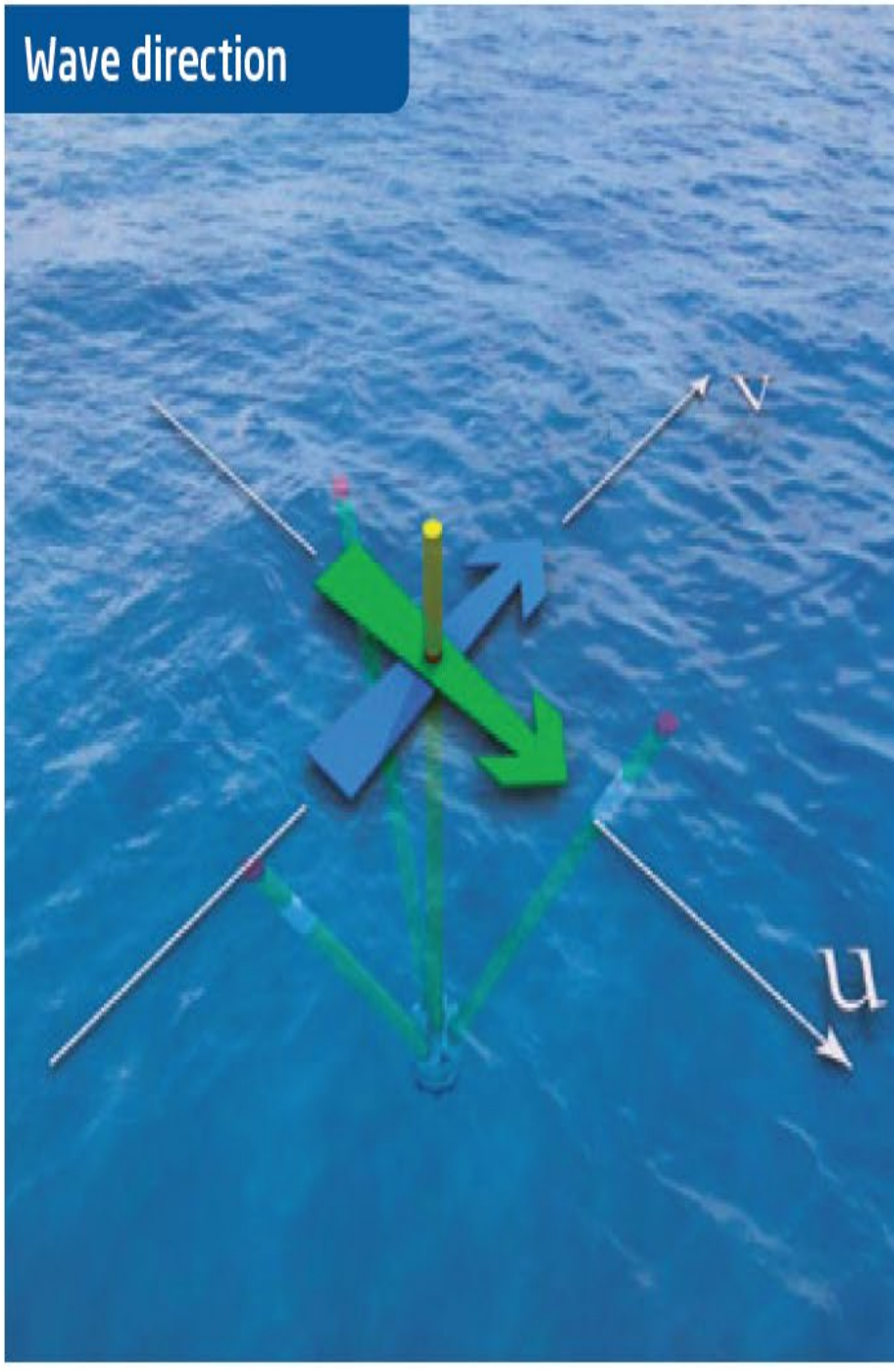

2014-02-03 12:20:56


FOR SOUTHERN BEACHES THIS USUALLY MEANS TRANSPORTING SAND VIA TRUCK FROM SAND TRAP AT PYRAMIDS BEACH


WE NEGOTIATE WITH COMMUNITY
STAKEHOLDERS ABOUT OUTCOMES.
THERE MAY BE OPPORTUNITIES
NO
VEHICLES

Understand what data will help you and invest in data acquisition


Wave height
Acoustic Surface Tracking (AST)
Sampling of orbital Velocities
Pressure as independent wave parameter


Wave direction
v
u

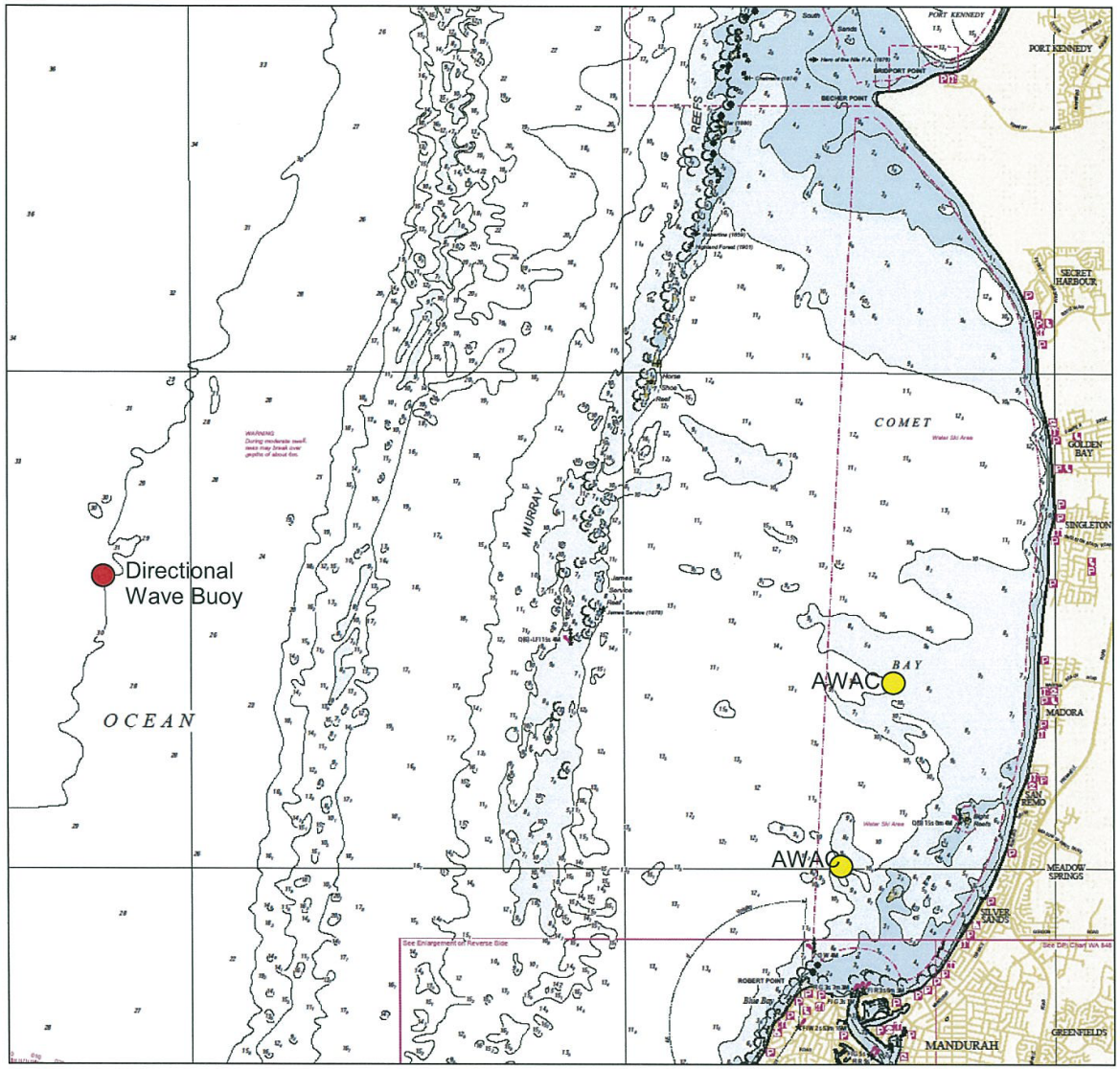
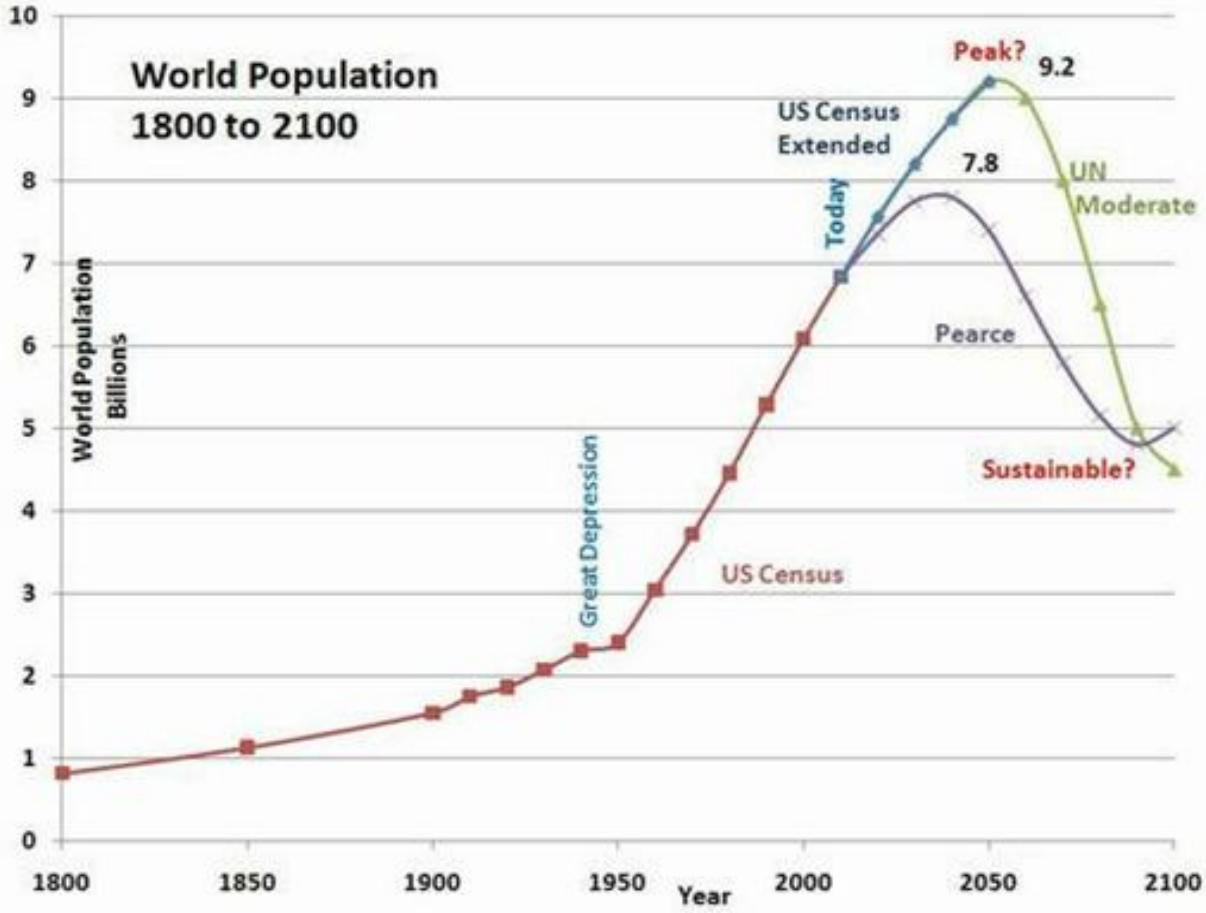
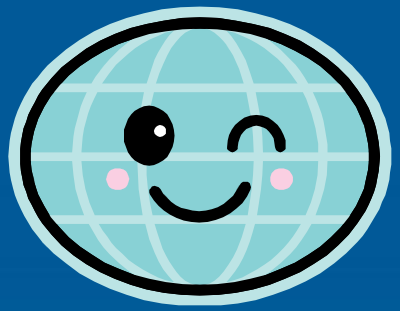


Figure 11: Directional wave buoy and acoustic wave and current recorder (AWAC) deployment locations. Overlaid on Department of Transport Cape Peron to Dawesville nautical chart.

Today's data is tomorrows history



Thanks for listening



City of MANDURAH