



Impacts and Achievements of the MTSRF

Copy of abstract and presentation given at the
2010 Annual Conference of the
Marine and Tropical Sciences Research Facility (MTSRF)
http://www.rrrc.org.au/news/2010_conference.html

Showcasing the Australian Government's investment
in the MTSRF for improved sustainability of the
North Queensland region, and Australia

18-20 May 2010
Pullman Reef Hotel & Casino
Cairns, North Queensland



Abstract

[MTSRF Project Number 1.4.2c](#)

Robust and cost effective indicators of the status of the dugong in the Great Barrier Reef World Heritage Area

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It is the responsibility of the Great Barrier Reef Marine Park Authority (GBRMPA) to protect the dugong as one of the outstanding natural values of the Great Barrier Reef World Heritage Area (GBRWHA). In light of this, the GBRMPA and Queensland Government have introduced substantial management initiatives to reduce dugong mortality in the GBRWHA and to protect their seagrass habitats. There are multiple tools that monitor the performance of management initiatives in the GBRWHA. However, the relative power of each of the performance indicators to provide information on the status of dugongs and to inform their management is unknown.

We evaluated the potential and cost-effectiveness of multiple performance indicators for their ability to inform the GBRMPA and Queensland Government on the status of the dugong and their seagrass habitats in the GBRWHA, including: (1) dugong aerial surveys; (2) spatial models of dugong distribution and abundance; (3) risk assessments informed by expert opinion (James Cook University); (4) the carcass monitoring programme (Department of Environment and Resource Management); and (5) Seagrass Watch data (Fisheries Queensland). The costs and benefits of each performance indicator were further explored during a workshop with GBRMPA and Queensland Government agency staff in May 2010. In our presentation, we discuss the outputs of the assessment and workshop and we identify a series of robust and cost effective indicators of the status of the dugong in the GBRWHA.



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Marine and Tropical Sciences Research Facility

Robust and cost effective indicators of the status of dugongs

Alana Grech and Helene Marsh

Sustainable use of marine species of conservation concern (1.4.2)

School of Earth and Environmental Sciences



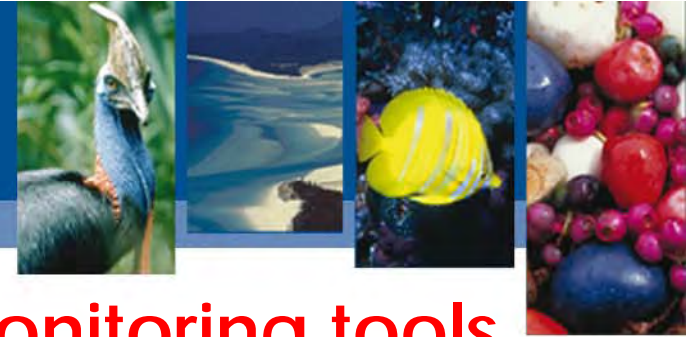


Monitoring marine species

- Detect status and trends in species and their habitats (increasing, decreasing or stable)
- Provide information on the performance of management actions (*performance indicators*)



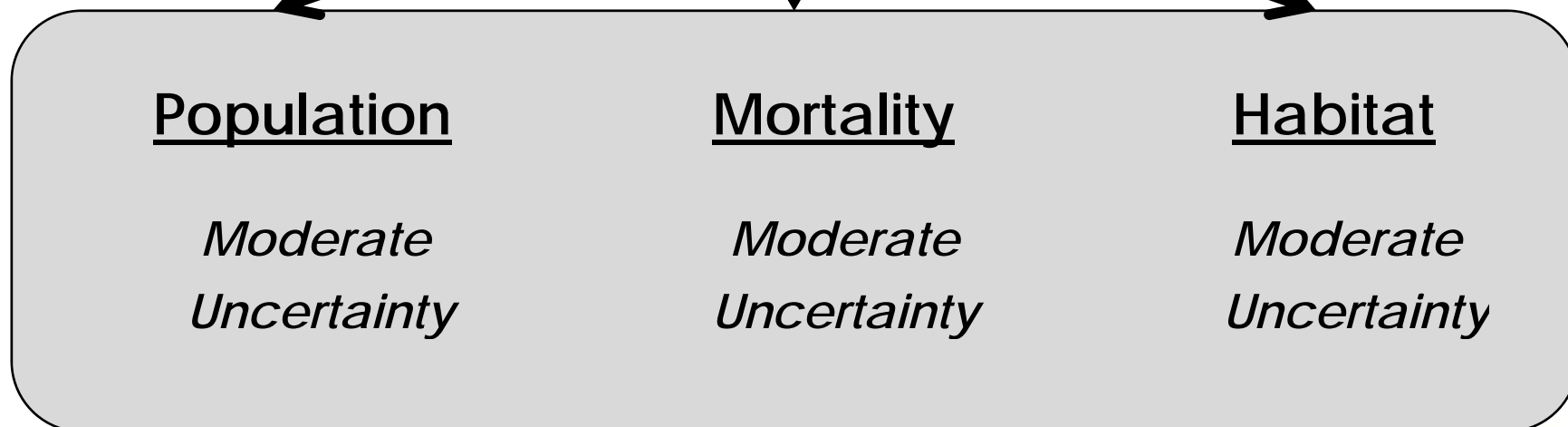
Thanks Howard Wilson



What happens when all the monitoring tools
have equal uncertainties in their estimates?



*We need to look at things that go beyond
statistical power*



Thanks Howard Wilson





Monitoring dugongs and their seagrass habitats in the Great Barrier Reef World Heritage Area

Population

Aerial
surveys
(JCU)

Mortality

Queensland
Marine
Strandings
Programme
(DERM)

Habitat

Broad-scale
seagrass surveys
Seagrass-Watch
(Fisheries
Queensland)

All the monitoring tools have *strengths and weaknesses*





Research Objectives

- Critically evaluate the **strengths** and **weaknesses** associated with dugong and seagrass monitoring programmes
- Identify **robust** and **cost effective** performance indicators for dugong management
- Make recommendations to DERM, DEWHA, DEEDI and the GBRMPA



Workshop: Dugong monitoring and performance indicators in the GBRWHA

May 12th 2010



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1. Identify the strengths and weaknesses of dugong monitoring tools
2. Identify dugong performance indicators in the GBRWHA
3. Discuss reports cards for dugongs in the GBRWHA



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Marine Park Authority





Monitoring dugongs with aerial surveys

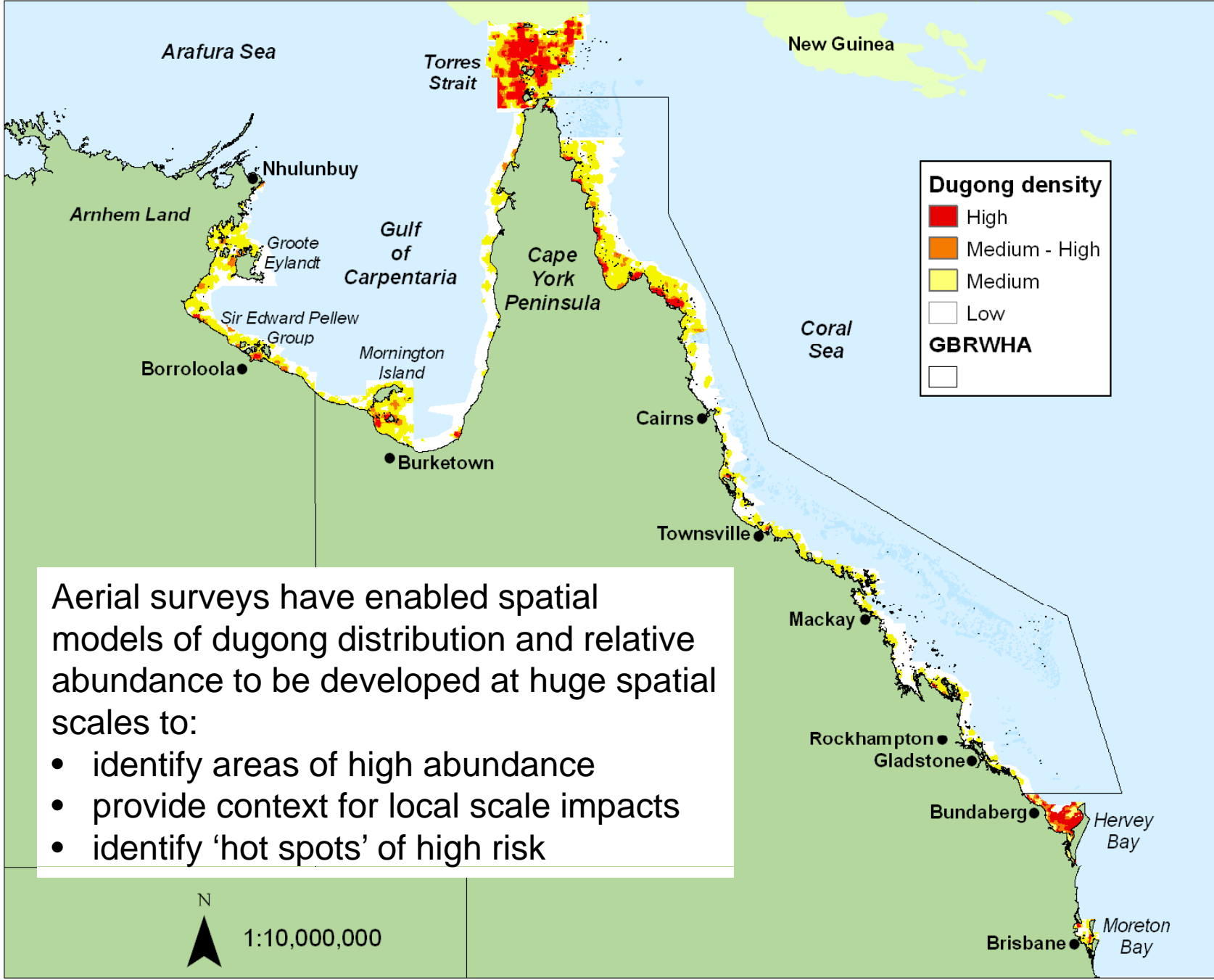
Objective: To determine patterns of dugong distribution, abundance and trends for marine planning and management

- Conducted as funding available since mid 1980s
- **Limited capacity to detect trends over 20 year timeframe despite (too) good precision** (generally every 5 years based on Power Analysis)
- Uses standardised systematic transect technique and two aircrafts per survey
- Movements between and within survey regions
- Population estimates account for perception and availability bias
- Inability to survey entire area in single season

Aerial survey years

Northern GBR	Southern GBR
	1986
1990	1987
1985	1992
2000	1994
2006	1999
	2005

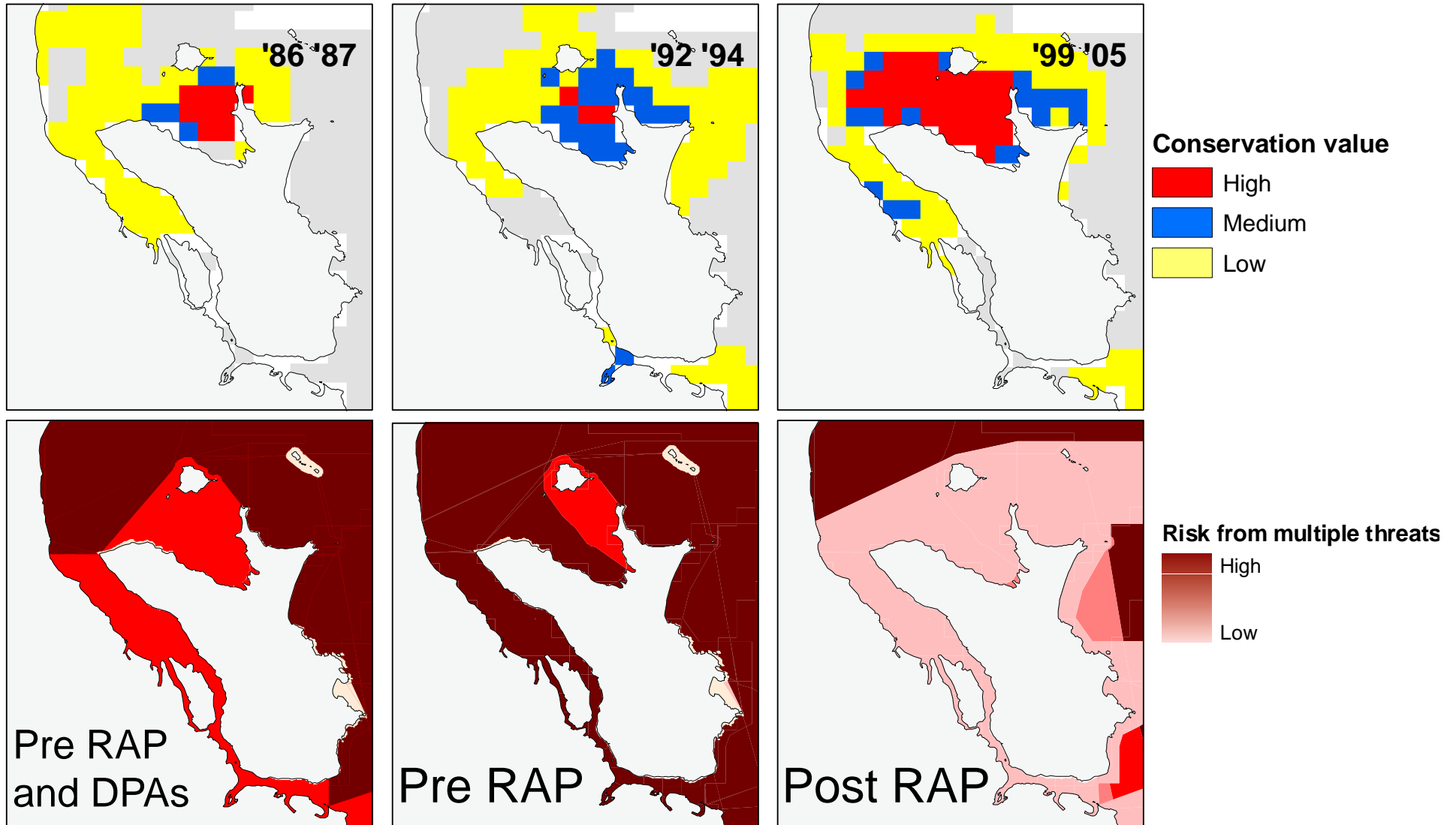
An increase in investment will not improve the power of the surveys to detect trends



Aerial surveys have enabled spatial models of dugong distribution and relative abundance to be developed at huge spatial scales to:

- identify areas of high abundance
- provide context for local scale impacts
- identify 'hot spots' of high risk

Monitoring change in the spatial distribution of dugongs and their threats





Performance indicator

Change in risk over time to areas with high and medium dugong relative density

Strengths

Rapid approach
Cheap desktop study
Allows for the evaluation of the cumulative impact of multiple threats
Linkages with the e-Atlas

Weaknesses

Requires technical expertise
Insufficient quantitative data on relative impact of multiple threats
Expert weightings need to be re-evaluated
Requires expensive aerial survey data



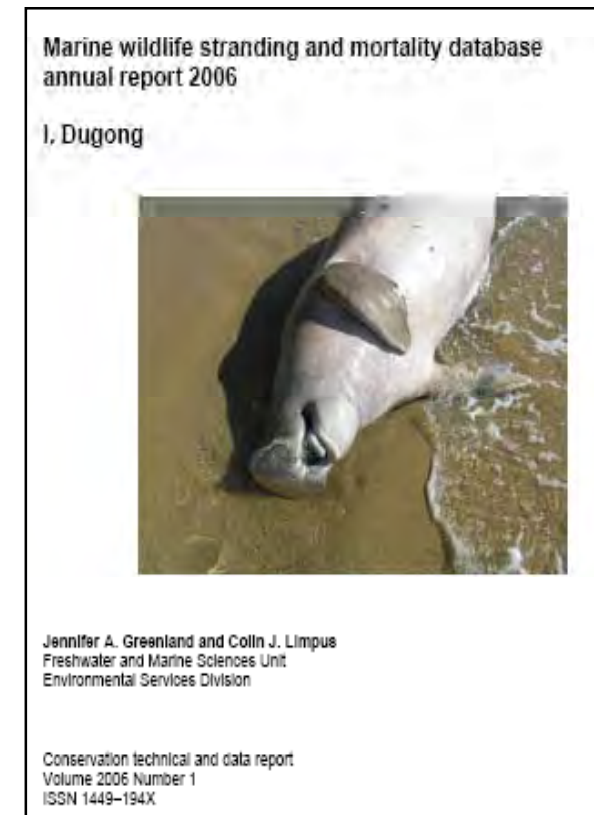
Queensland's Marine Strandings Program

Main source of knowledge about human-related mortality factors affecting dugongs

Cause of death cannot be ascertained in 70% of cases

Low proportion of dead dugongs necropsied

No information north of Cooktown



Thanks Ilze Brieze, Mark Read and Col Limpus





Catch per unit effort monitoring of Indigenous take

Strengths

Reliable information on CPUE could provide important insights into population trends

Reliable information on demographics of the catch could provide important insights into ecological and cultural sustainability of catch

Enables hunters to collect data for themselves

Information relevant to other species that are also hunted can be collected

Weaknesses

Does not provide information on other impacts on dugongs

Trends in catch numbers and demographics of the catch may be confounded by external natural and anthropogenic factors

Biases in the demographics of the catch

Requires significant training of hunters

Very difficult to obtain reliable demographic information

Very difficult to obtain effort information

Requires significant effort of local catch-monitors/coordinators/rangers

Thanks Jillian Grayson





Monitoring dugong's seagrass habitats

Strengths

Long-term seagrass datasets extend over most of the GBR

Some sites that are important to dugongs are monitored regularly via Seagrass-Watch

Seagrass risk modelling approach is cost effective

Good trend data GBR wide for intertidal seagrasses

Seagrass-Watch has a dedicated network of volunteers along the coastline

State management agencies closely linked to research team

Weaknesses

Seagrass monitoring data is a snap-shot

Some sites are surveyed more than others, especially ports

Maps and models built on above ground presence data

Few measurements of plant nutritional health and below ground biomass measurements

Spatially limited shallow subtidal monitoring

Expensive and dangerous to conduct seagrass surveys north of Cooktown





Dugong Performance Indicators

Aerial surveys	Long-term direction of trend in population size (increasing, decreasing or stable) at broad spatial scales
Aerial surveys	Long-term and short-term changes in habitat use and dugong distribution
Aerial surveys	Change in risk over time to areas with high and medium dugong relative abundance
Marine Wildlife Stranding and Mortality Database	Long-term direction of trend in number of carcasses dying from various causes
CPUE monitoring	Long-term trends in Catch Per Unit Effort in major hunting communities and demographics of catch
Seagrass surveys and Seagrass-Watch	Long-term and short-term changes in the condition of some dugong seagrass habitats





Robust and Cost Effective Performance Indicators?

- Elements of each monitoring tool and performance indicator have applicability and validity
- There is not a *'one size fits all'* solution – a combination of multiple monitoring tools and performance indicators are required
- Choose performance indicators that value-add with other species (e.g. stranding data)
- Management performance indicators
- Need to consider:
 - Monitoring more than just species abundance and trends
 - Strengths and weaknesses that go beyond statistical power





Working Towards a Report Card for Dugongs

<i>Performance Indicator</i>	<i>Very good</i>	<i>Good</i>	<i>Moderate</i>	<i>Poor</i>	<i>Very poor</i>
Long-term direction of trend in population size			X		
Change in risk over time to areas with high and medium dugong relative abundance				X	
Long-term direction of trend in number of carcasses dying from various causes					X





Thank you



Alicia Hill

Jillian Grayson

Amanda Hodgson

Kirstin Dobbs

Col Limpus

Lee Butcher

Darren Cameron

Marissa Land

David Blair

Mark Read

David Souter

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Don Whap

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Government**

