MARINE BIODIVERSITY RESEARCH

Prediction and Management of Australia's Marine Biodiversity

Marine Biodiversity Hub & Future Research

MBI Workshop

Thursday 4th November 2010

Nic Bax University of Tasmania/CSIRO

Main Questions

CERF 2008-10

- How can we describe and predict marine biodiversity?
- What are the options for management?

NERP Bid 2011-14

- How do we monitor national ecosystem health?
- Integrated management of marine biodiversity
- How can we improve management of listed species?
- Biodiversity discovery in support of marine bioregional planning

tafi Tasmanian Aquaculture and Fisheries Institute

Australian Government Geoscience Australia

National Research FLAGSHIPS Wealth from Oceans

CSIRO

Australian Government Australian Institute of Marine Science

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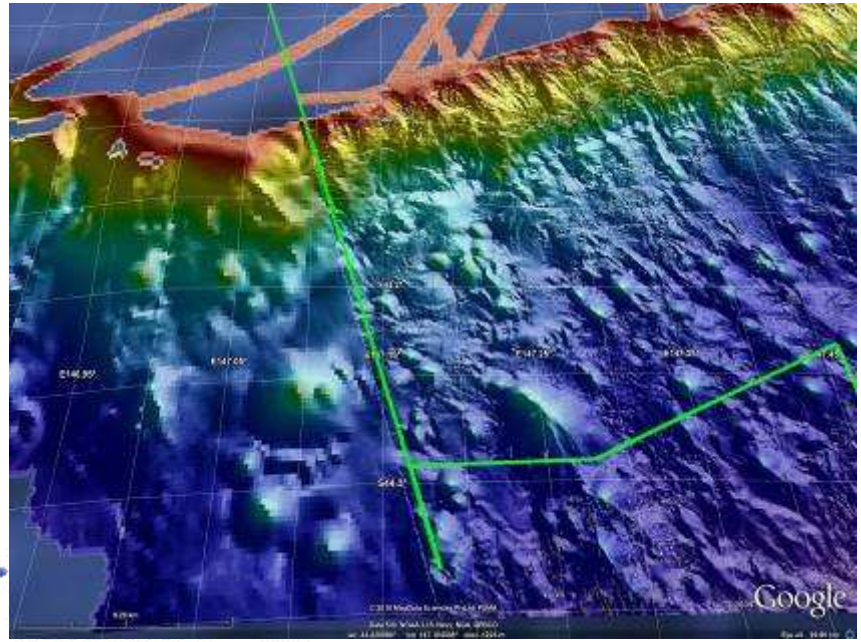
Stakeholders & Collaborators

- DEWHA
- AFMA
- NGOs
- Fishing Industry
- Oil & Gas Industry
- Tourism Industry



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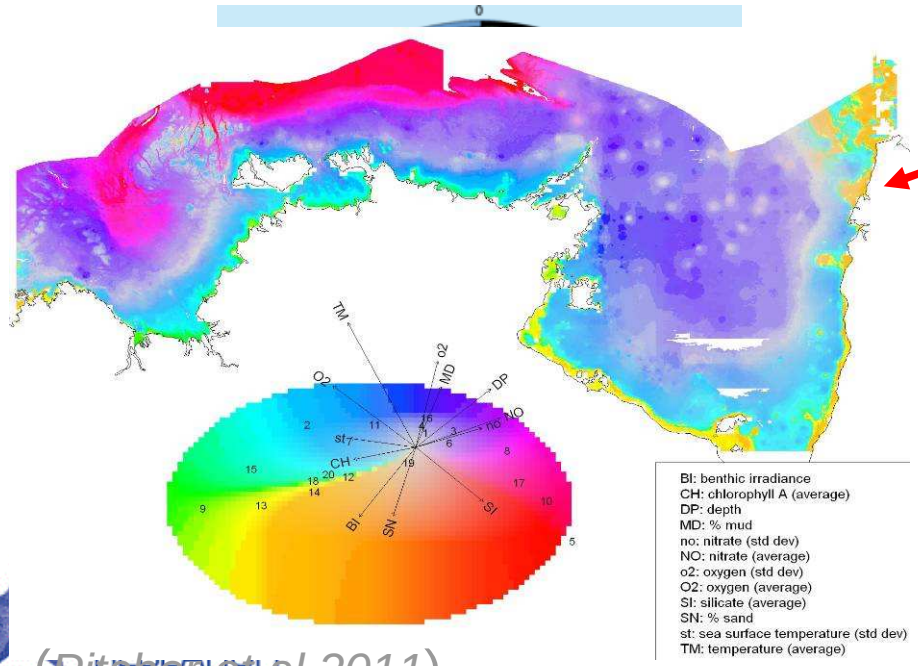
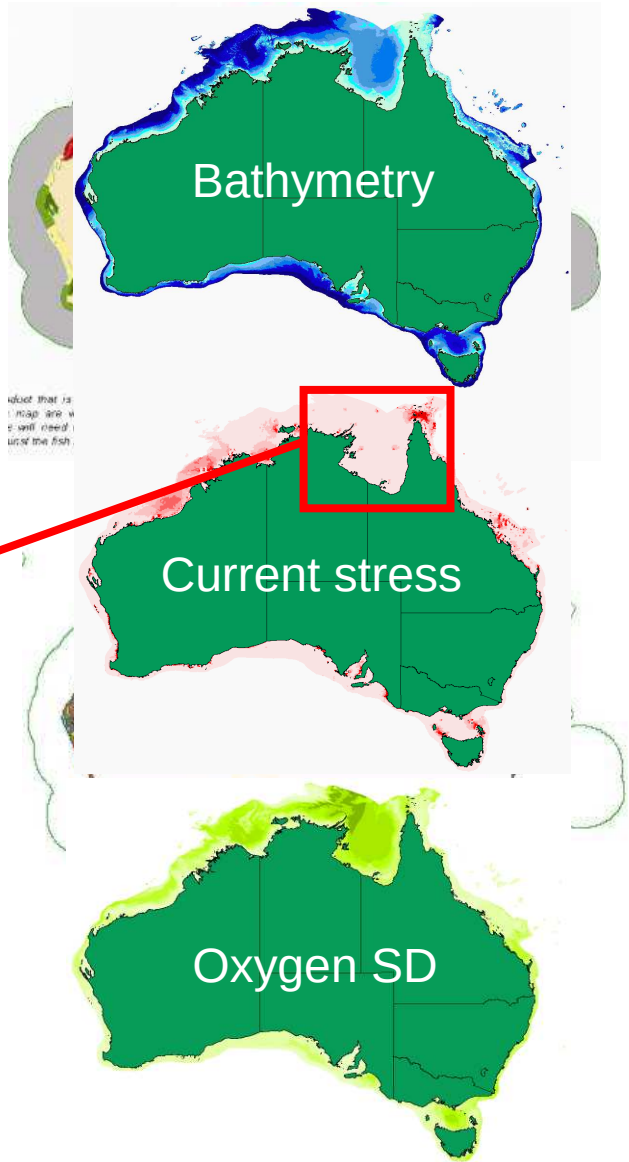
- NSW DECCW
- SA Marine Parks
- NT
- DSTO
- Hydographic Office
- Integrated Marine Observing System (IMOS)
- MACC R&D Committee
- MACC Marine Biodiversity Working Group
- National Marine Protected Area Working Group
- Census of Marine Life
- Global Ocean Biodiversity Initiative

Describing and Predicting Biodiversity

"Limited information about Australia's marine biodiversity, especially for the species and ecosystems of the more remote and deeper areas, has been a barrier to developing a strategic approach to the sustainable management of our oceans."

- Environment Minister Peter Garrett 2009

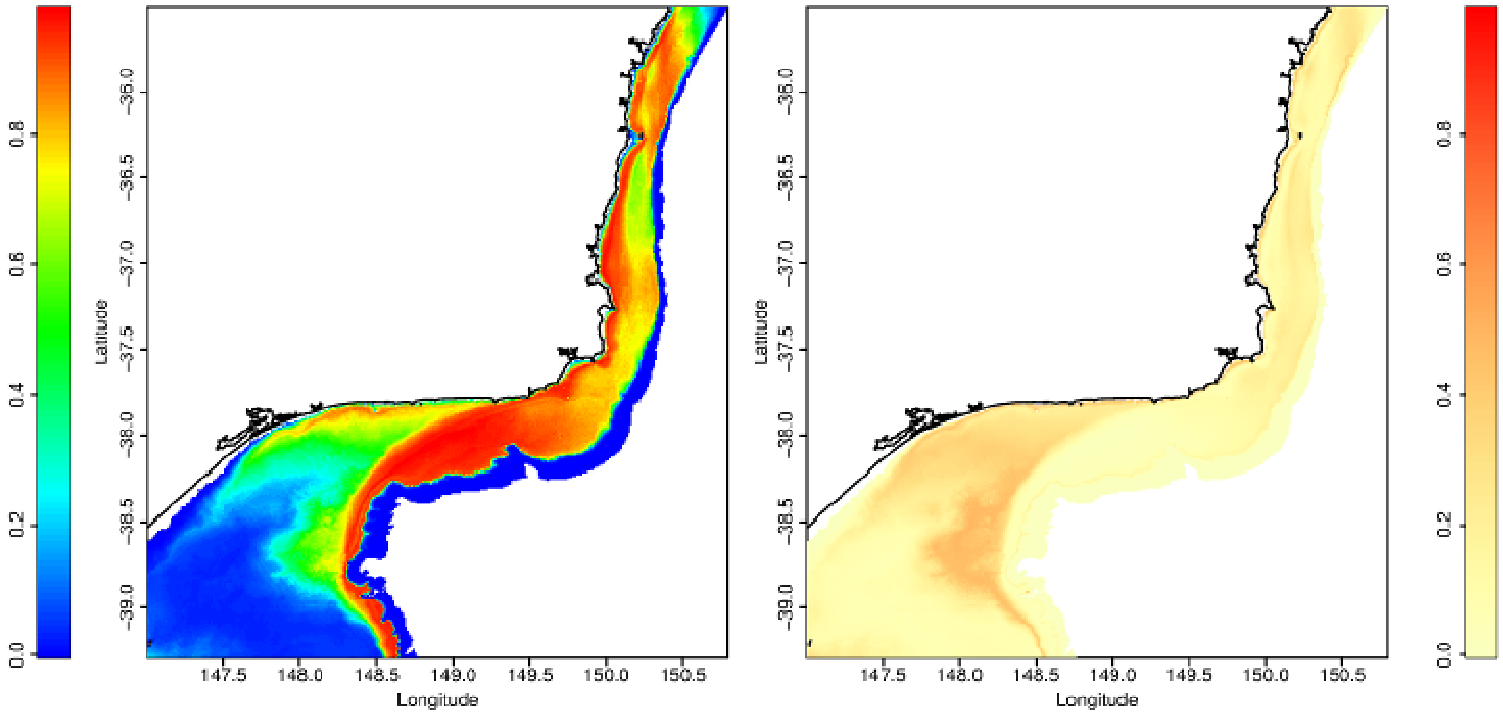




(Pitcher et al 2011)

Describing Biodiversity – one key point

Predictions are probabilistic and include uncertainty



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Group 4 – mid-shelf species include Southern Eagle ray, longspine flathead, eastern school whiting

Off-Reserve Management

- Expert elicitation
- Stakeholder consultation
- Offsets
- Incentives

Ghost Net – QLD NRM

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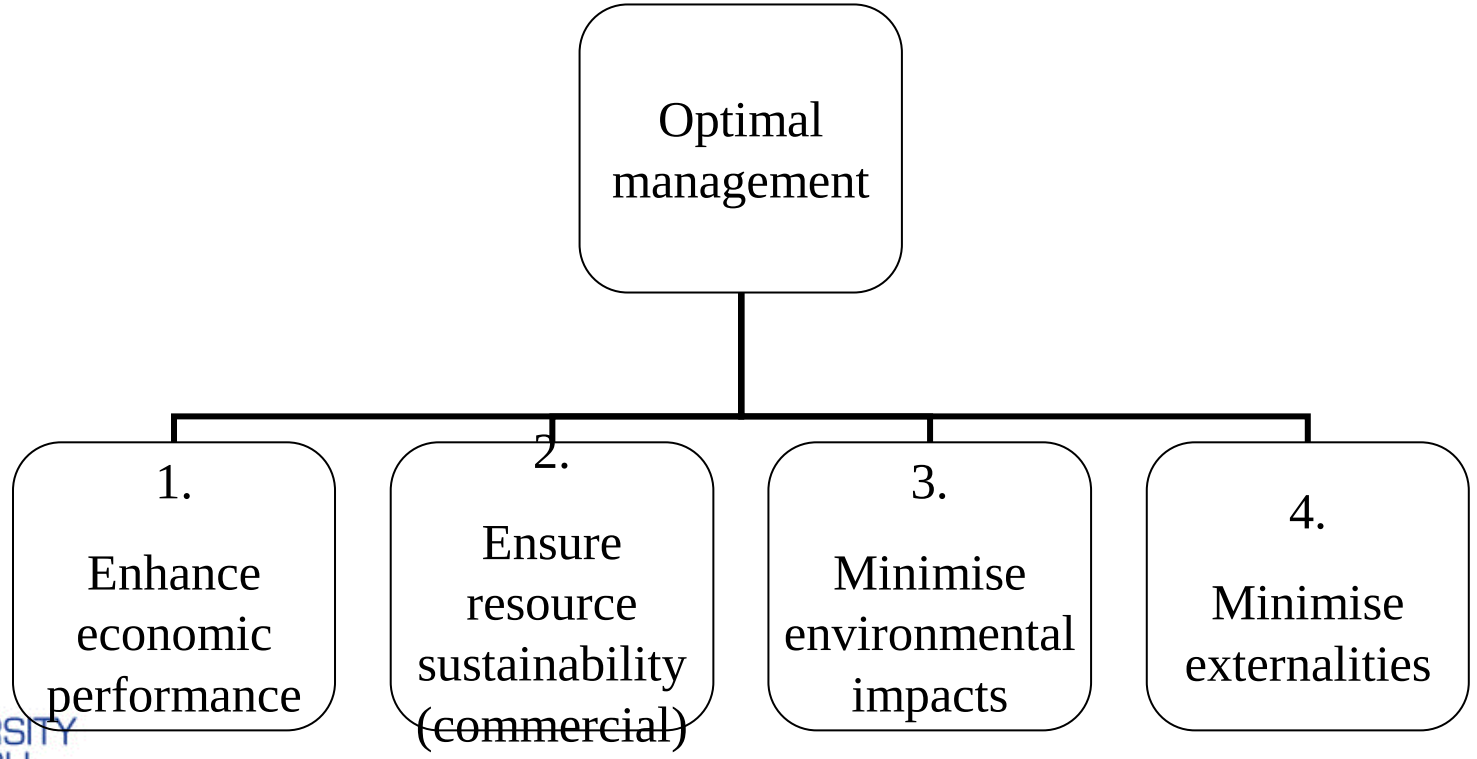
Formal Elicitation Process – Marine Turtles

- Web-based survey – 244 responses
- Major hazards – fishery bycatch and coastal development, then nest predation and direct take
- Major conservation expenditure biased towards land-based activities
- Expert surveys can assist in targeting resources
- Expert bias
  - Respondents with no specific experience for a species, tended to rank hazards higher for that species
  - The greater the respondent's experience with a hazard, the higher the threat ranking.

Stakeholder preferences and triple bottom line management

- Fishery and environmental managers, commercial and recreational fishers, biophysical and social scientists, conservation advocates and economists (74 responses)
- First-stage results used to compare alternative management strategies in ETBF



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Key Findings

- Main preference followed group membership
- Considerable variability within groups
- Each group recognised importance of other's objectives, especially at higher levels
- Disagreed at lower levels eg. importance of protecting habitat or bycatch species
- After MCDA strong incentives performed best (1.66 hook decrement

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Application of offsets to off-reserve management

- develop several case studies for the application of offsets in marine management,
- compare economic cost and biological benefit of offsets and other management actions
- identify the potential complexities in applying offsets
- propose at least one potential implementation of offsets in marine environmental management.

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Key Findings

- Offsets can be a cost-effective option
- Can be controversial
- Potential as interim management tool to promote improved fishing methods
- Biological data not limiting
- Monitoring a key component
- Potential applications include turtles and longline fisheries (Oil and Gas industries?)

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Spatial management with incentives

- Eastern Tuna and Billfish Fishery interactions with seabirds and turtles (AFMA, DEWHA, NGOs, Industry)
- Contrasted hook penalties with area closures
- Models of fishing fleet, target species and bycatch
- Later modifications to support reserve design

Tuna Fishing Activity

Current

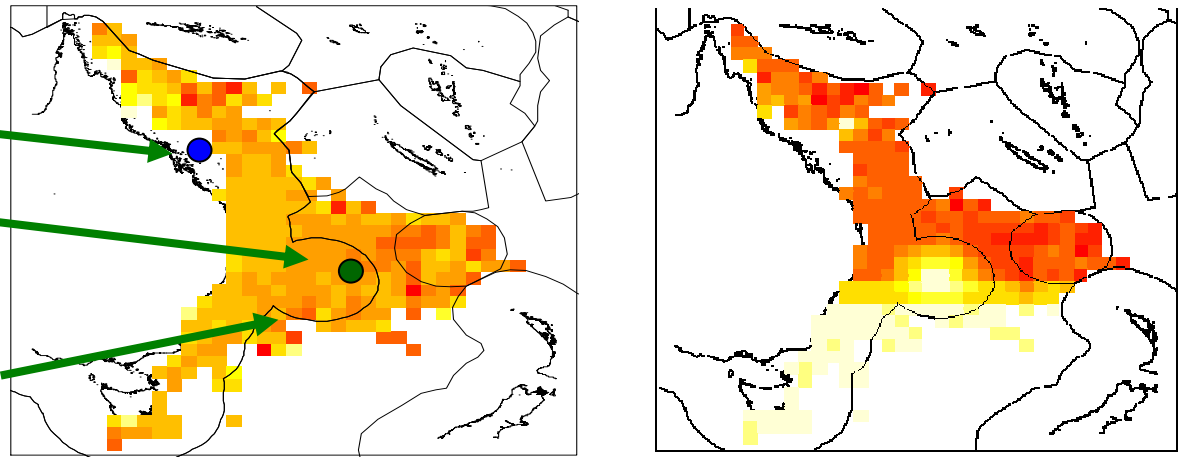
With Incentives

Avoid Protected Species

like marine turtles

And nesting seabirds

Modified by fishery management concerns – e.g. catch of southern bluefin tuna



High Low

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Key Findings – ETBF Incentives

- Hook penalty reduced fishing effort
- No consistent economic or conservation superiority of incentives or closures. Depended on area, port and year
- Variability likely due to variability in availability of resource and variability in costs between ports
- Cases need to be examined individually
- Understanding fishers likely response to closures could produce savings of 20% in predicted lost revenue
- One advantage of hook decrements is their flexibility so they can be fine-tuned as knowledge or management objectives change.

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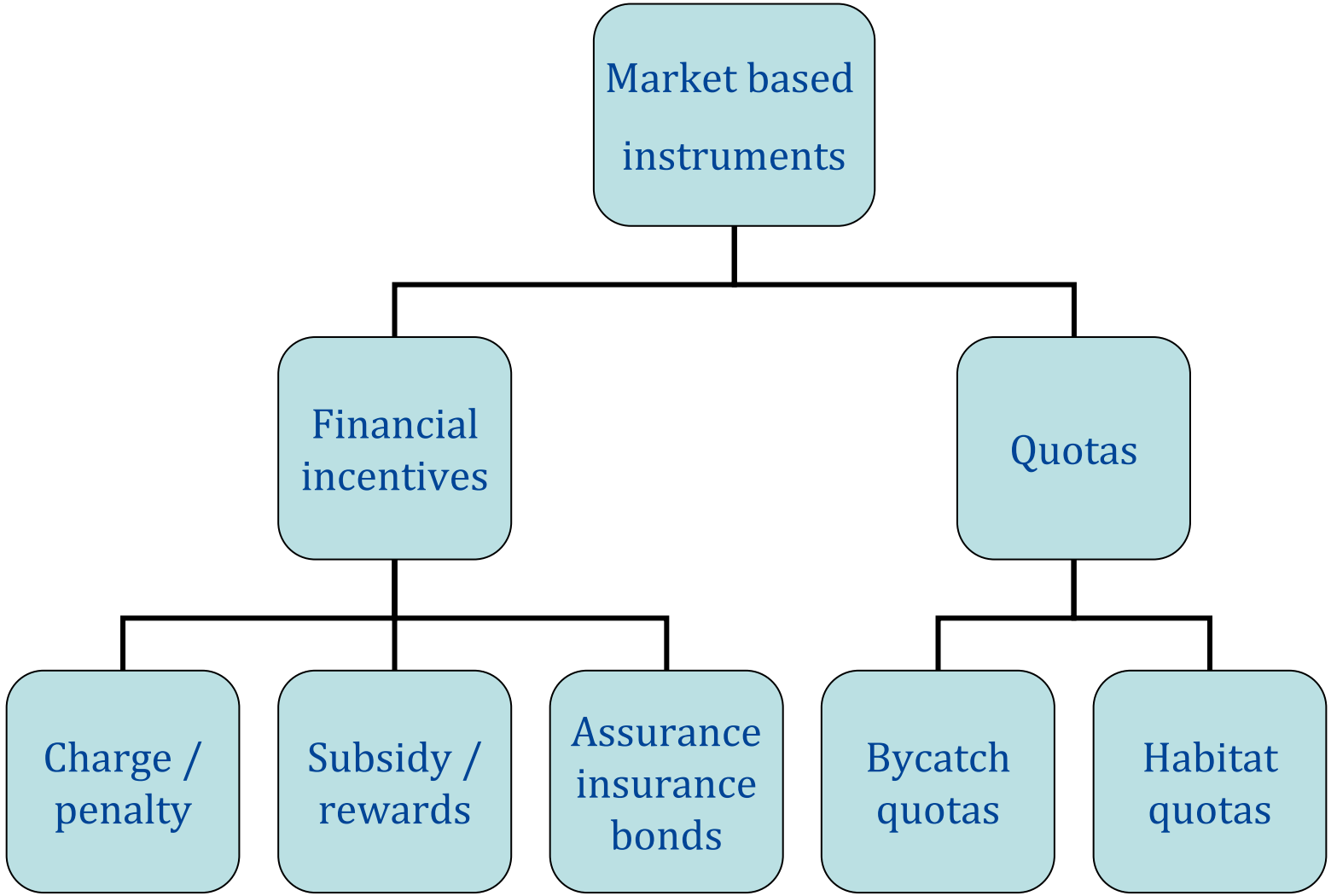
Review of Market Based Instruments



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Additional work for SEWPaC

- MBI alternatives to structural adjustment
- A more realistic measure of displaced effort
- Predicted distributions of listed species

Conservation Values/ Fishing method	Seals & sealions	Whales	Dolphins	Seabirds	Turtles	Spatially predictable pelagic features	Sharks (regional priority)	Demersal fish species	Seagrass	Benthic habitats
Demersal/ bottom trawl	P	P	BQ	P/BQ	P	P/HQ	BQ	BQ	HQ/B	HQ/B
Longline demersal	√*	√*	√*	√*	n.a.	n.a	BQ/P	BQ/P	n.a.	HQ
Longline – pelagic	√	√	√	BQ/HQ	√	√	BQ/HQ	√	√	√
Gillnet - demersal	P/BQ*	√*	√*	√*	√*	n.a.	P/BQ	√*	n.a.	HQ

Key:

√ Acceptable (some conditions may be required)

√* Acceptable with mitigation measures and conditions

P Charge/penalty based system

BQ Bycatch quota

HQ Habitat (effort)/spatial quota

B Bond/insurance

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Where are we now?

CERF

NERP

Probabilistic prediction of biodiversity

Increased management options

Integrated Management

Cross-sectoral

Cross-jurisdictional

Whole of Government

On- and off-reserve

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Integrated management of marine biodiversity

- How do we value biodiversity?
- What are the key threats facing biodiversity (including cumulative impacts)
- Strategic assessment and spatial management
  - Compare assets and threats
  - Evaluate collective effects of management regulations
  - Develop and communicate management options
  - Facilitate development of quantifiable objectives, targets and indicators for biodiversity management





Partners

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Australian Government
Geoscience Australia

Australian Government
Department of the Environment, Water, Heritage and the Arts

Australian Government
Australian Institute of Marine Science

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9 PhD students

10 Postdoctoral students

70 Research scientists

NERP Marine Biodiversity Hub Plan

Integrated Management

Marine Environmental Reporting Framework

Threats, Cumulative Impacts, Management Goals

National Monitoring Evaluation and Reporting

Monitoring Options Reporting

Improved Management of Listed Species

Validation of KEFs and MPAs

Hotspots for Biodiversity

Regional Biodiversity

Surrogacy Key Processes

Ecosystems Knowledge

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National Monitoring Evaluation and Reporting

- A validated national marine monitoring system for ecosystem health (MERF)
- A framework to monitor management performance of the NRSMPA
- Capability to deliver to NPEI and SOE reporting

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Integrated Management of Marine Biodiversity

- A framework to estimate socioeconomic value of marine biodiversity and costs of management actions
- National threat maps and their cumulative impacts
- A system to evaluate alternative management approaches in a multi-jurisdictional, multi-sectoral environment

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National Ecosystems' Knowledge

- Identification, classification and ranking of key physical features and processes recognised as important to marine biodiversity
- National connectivity maps
- Scientific basis for a new Integrated Marine Classification and Regionalisation of Australia (IMCRA 5)

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Regional Biodiversity Discovery to Support Marine Bioregional Plans

- Validation of KEFs and baseline surveys of MPAs off Northern Australia
- Provide knowledge base for monitoring and management consistent with other 3 marine bioregions
- Develop a program of national marine mapping using recent marine infrastructure investment

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Improved Management Options for Listed Species and Communities

- Improved predictions of listed species ranges
- A framework for the cost-effective and efficient monitoring and managing of listed marine species
- Improved engagement of Indigenous rangers in monitoring

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