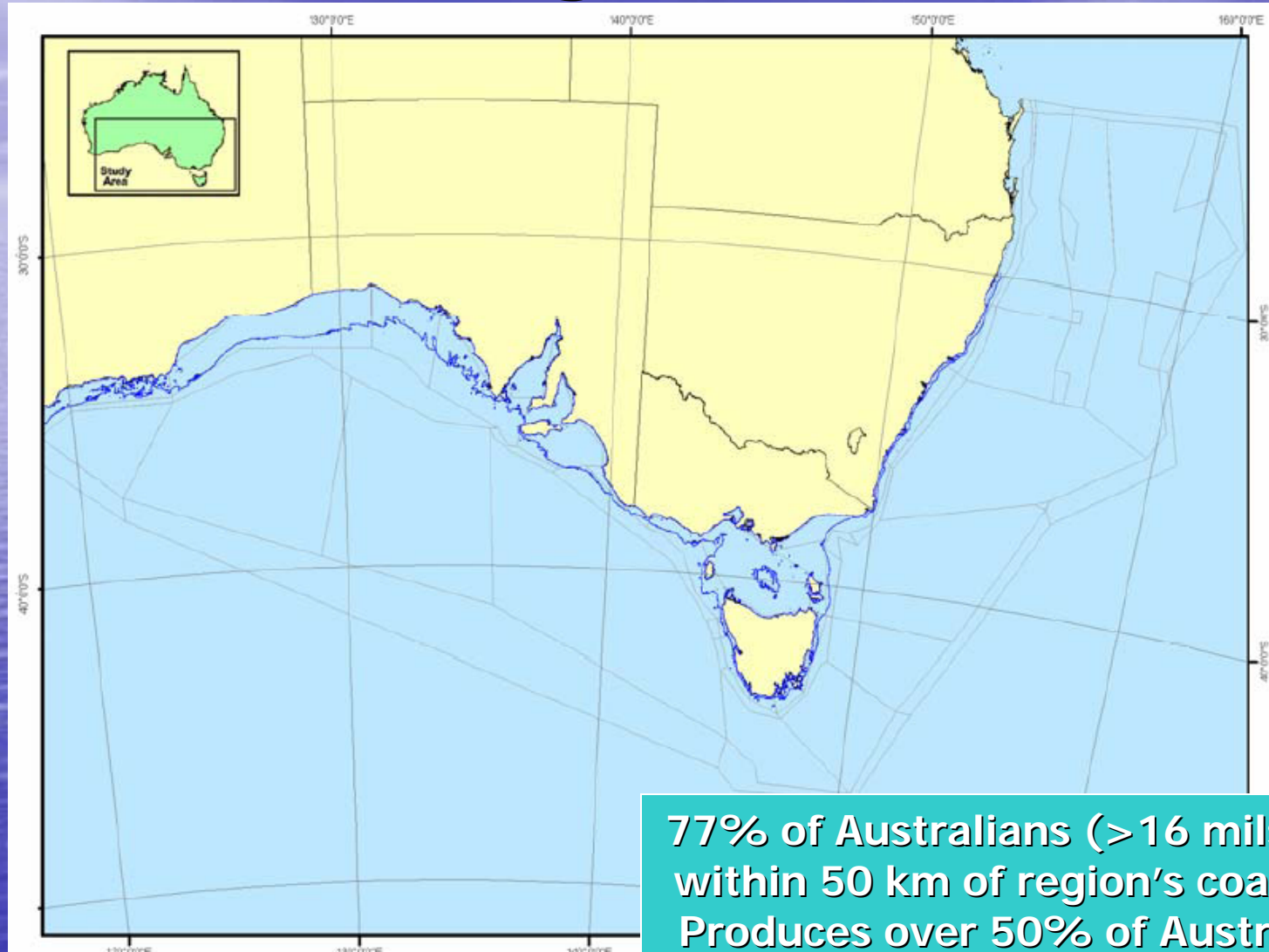


**Australian  
Southern and Eastern  
Scalefish and Shark  
Fishery  
(SESSF)**

Bob O'Boyle, Andy Rosenberg & Tony Smith

# South East Region



77% of Australians (> 16 mils) live within 50 km of region's coastline  
Produces over 50% of Australia's fisheries gross value

# Fishery ('multi-everything')

- Commonwealth Trawl Sector (CTS) & East Coast Deepwater Trawl Sector (ECDWTS)
  - 30 scalefish species
- Great Australian Bight Trawl Sector (GABTS)
  - Deepwater flathead & bight redfish
- Gillnet Hook & Trap Sector (GHATS)
  - Ling, blue eye & sharks



Trawl sectors

Gillnet, Hook and Line sectors



Tuna fisheries

Jig and Dredge fisheries



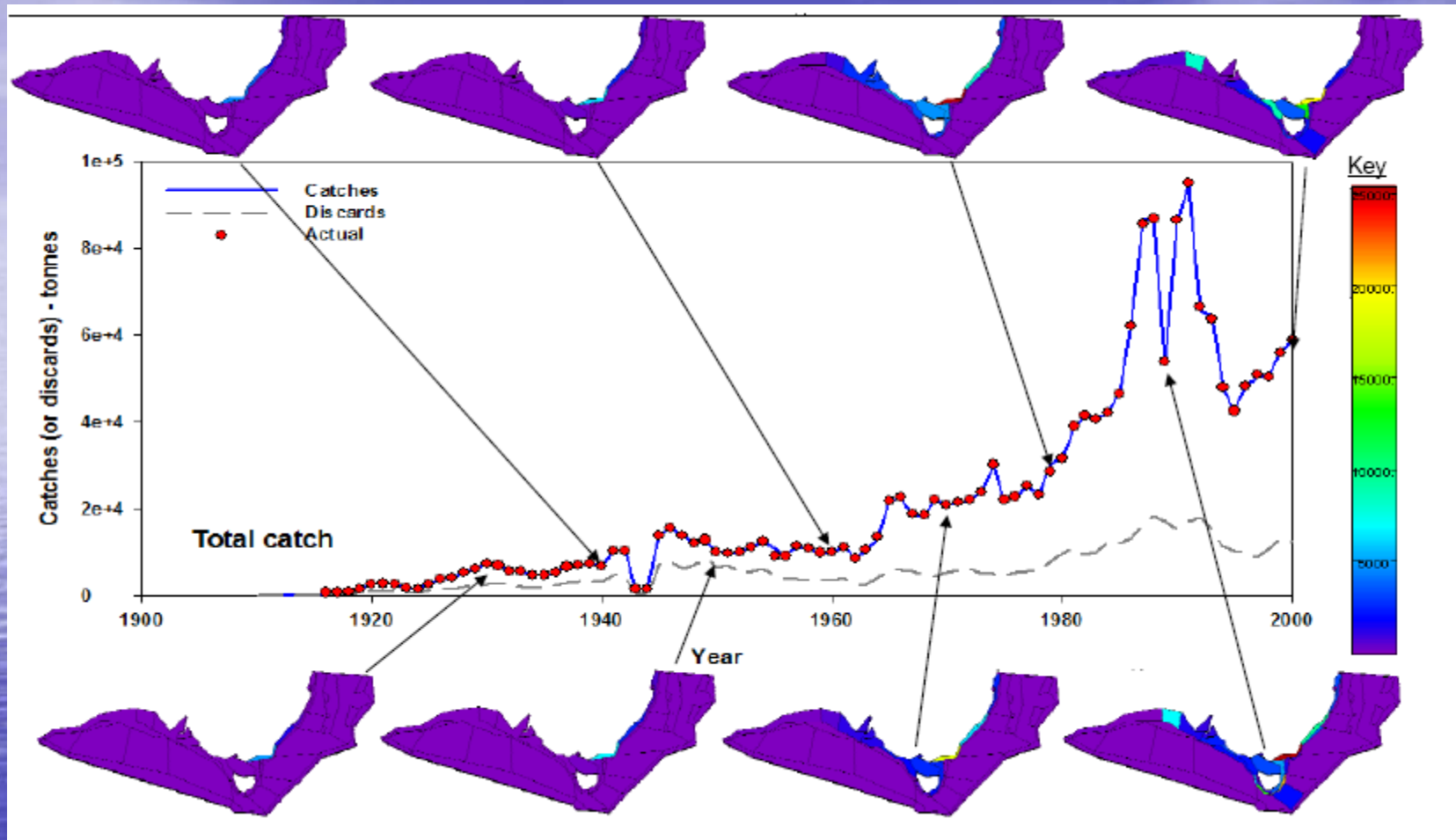
- Commonwealth Trawl Sector
- Commonwealth GAB Sector
- East Coast Deepwater Trawl
- Trawl Exclusion Zone
- Gillnet and Hook Sector
- Scalefish Hook Sector
- Small Pelagic Fishery
- Bass Strait Scallop Fishery
- Southern Squid Jig Fishery
- Eastern Tuna and Billfish
- Southern Tuna and Billfish

Small pelagic fisheries

# Fisheries in SE Region

- Pre-1970
  - Steam trawlers & Danish seiners
  - Open access with separate State regulations
  - Ad-hoc research & monitoring
  - No stock assessment
- 1970s – 80s
  - Diesel trawlers & start of non-trawl fishery
  - Federal jurisdiction
  - Major new programs
  - Several quantitative assessments
- 1990s
  - Vessel reduction but effort up
  - Non-trawl fishery under federal jurisdiction; ITQs for 16 species; FMPs
  - Fishery – wide sampling
  - Many quantitative assessments & HCRs

# Fishery History



1910  
Fishery  
started off  
NSW

1940s  
Spread down  
East coast &  
Tasmania

1980s-90s  
Spread to  
deep  
water

2000  
Even effort  
distribution

# Emerging Issues in early 2000s

- Conservation
  - Overfishing & depleted stocks
  - Bycatch
  - Threatened & endangered species
  - Habitat impacts
- Economic
  - Declining profitability
- Social & Cultural
  - Resource access issues
  - Perception of deteriorating ecosystems
- Institutional
  - Increasing management costs

**After 10 years,  
ITQs had not  
resolved capacity  
problems**

**General agreement amongst  
managers, industry, scientists &  
NGOs that interactions amongst  
sectors needed direct  
consideration**

**2004**

**Rethink of management direction  
& strategies**

**Likely most comprehensive of  
any EBFM globally**

**Also changing legislative environment**





- 1984 Wildlife Protection Act amended
  - Fisheries now require federal approval to export fish
  - 'MSC like' certification of stock status, fishery sustainability & ecosystem impacts (bycatch, habitat & food chains)
- 1999 Environmental Protection & Biodiversity Conservation Act (EPBCP)
  - Brings together environmental legislation including endangered species
  - Environmental certification & plan audits
- Australian Ocean Policy
  - 8 Regional Marine Plans (RMPs)
  - 1<sup>st</sup> RMP in SE coincident with SESSF (2004)
  - Ecologically Sustainable Development (ESD)
  - National MPA network with first proposed in SESSF area

# High Level Objectives Articulated

- Cease overfishing & recover overfished stocks to levels that will ensure long-term sustainability & productivity
- Avoid further species from becoming overfished in short & long-term
- Manage broader environmental impacts of fishery, including threatened species & those protected under EPBCA

# Alternative Management Strategies Project

- Established in 2004
  - Objectives-based
  - Developed performance measures (indicators & RPs) for each objective
  - Identified management scenarios
  - Predicted consequences of each scenario
  - Evaluated trade-offs
- Most comprehensive Management Strategy Evaluation (MSE) of multi-species / multi-issue ecosystem globally

Scenario = Strategy

# AMS (cont'd)

- Predicting consequences step occurred in two stages
- Stage 1: qualitative – expert knowledge
  - 4 scenarios
  - Status quo (pessimistic), Status quo (optimistic), enhanced quota mgt, mixed controls (best in long-term)
- Stage 2: quantitative using ATLANTIS model
  - 3 scenarios from Stage 1 + pragmatic scenario & NGO scenario

# AMS Stakeholder Engagement

- Project worked through AFMA consultative bodies
  - Management Advisory Committees
    - South East Trawl
    - Gillnet, Hook & Trap
    - Great Australian Bight
  - Resource Assessment Groups
    - Slope
    - Shelf
    - Deepwater
    - Shark
    - Great Australian Bight
- Large team of scientists, industry, managers & NGOs involved over three years

# Qualitative evaluation

- Analyses completed within few months
- Expert group predicted trends in key indicators across range of 'whole of fishery' management scenarios
- Key finding
  - "integrated management" had superior performance across most PIs in medium to long term but severe short term economic impacts
- Vigorous debate among stakeholders
  - led to many more scenarios developed by fishers, NGOs & managers
- Supported major restructure package for fishery (to overcome short term economic impacts)
- Major "agent for change" in fishery

# Management Strategy Evaluation Cycle

ATLANTIS MODEL

## MSE DESIGN AND ANALYSIS

DEFINE OBJECTIVES →

← PERFORMANCE MEASURES

↓  
JUDGING OUTCOMES

### BIOPHYSICAL

- environment (currents, bathymetry & climate)
- resources (flora & fauna)
- impacts

### IMPLEMENTATION

- economic pressures (costs, markets, trading)
- effort allocation & gear choice
- investment
- social pressures
- public perception
- ports

### INDUSTRY

- development
- exploitation
- multiple fleets (behaviour & gears)

### MANAGEMENT

- decision rules (harvest strategy)
- all levers (input & output)
- management costs

## SIMULATION CYCLE

### MONITORING

- observers
- surveys
- reporting

### ASSESSMENT

- estimation
- classification
- RBC

# **ATLANTIS Model**

**Synthesis of knowledge of  
ecosystem & human system**

**Platform used to evaluate  
management strategies**

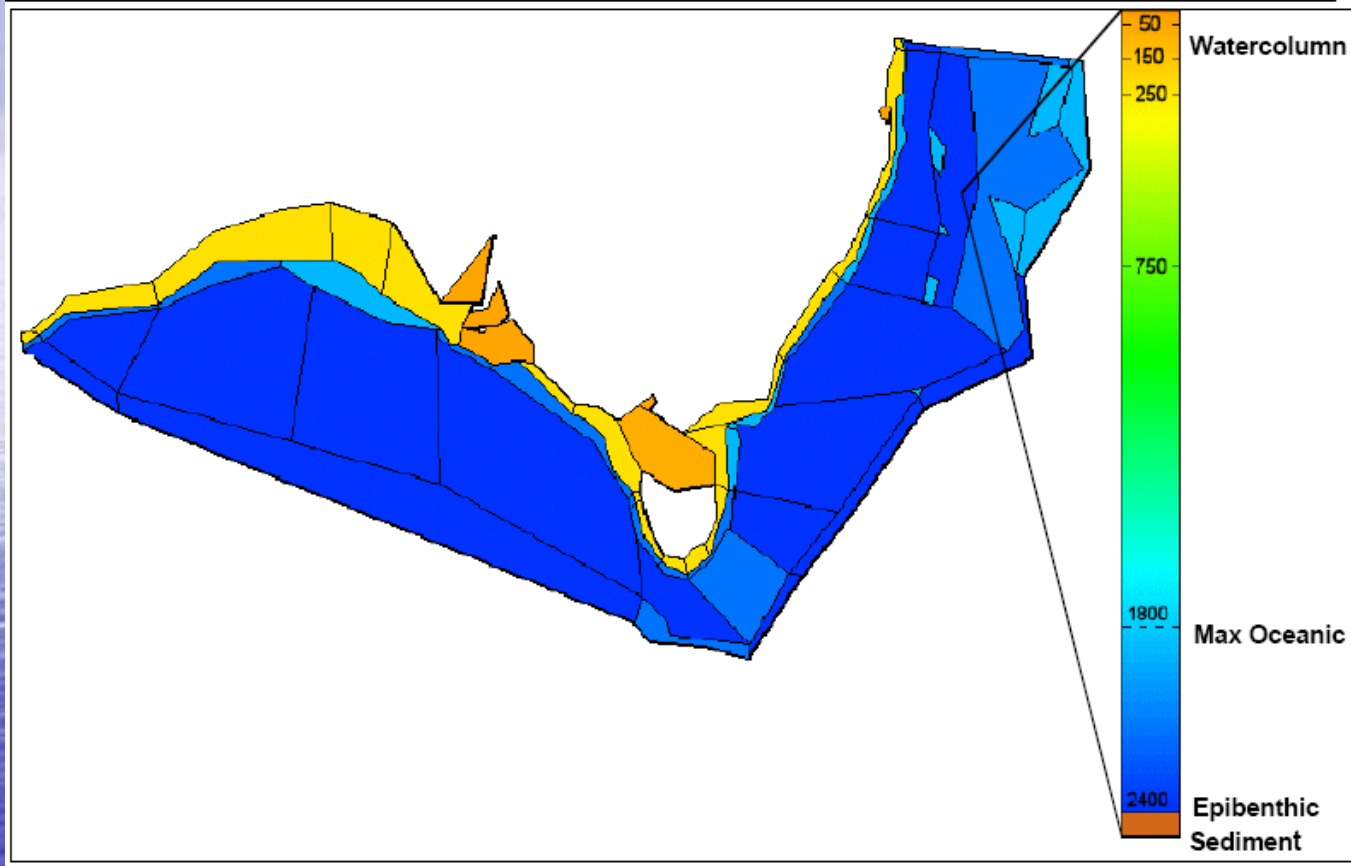


# ATLANTIS Model Components

- Biophysical
  - Physical (currents, eddies, temp & sal, sediments)
  - Ecological (Functional groups, stocks, trophic connections, habitat dependencies)
- Fishing Fleets & Components
- Socio-economics
  - Economic indicators
  - Fleet & Port status
  - Effort allocation
  - Quota trading
  - Compliance
  - Stakeholder perceptions
- Assessment
  - Sampling
  - Surveys
  - Models (Surplus Production, VPA, SCAA)
- Management
  - Harvest Strategies and Recommended Biological Catch (=ABC); 4 tiers – advanced to catch based
  - Regional, Companion & Basket (combined) TACs
  - Spatial Management

**Comprehensive sub-model  
for each component of  
management system**

# ATLANTIS Model – Spatial Structure



71 polygons  
Based on  
biological &  
physical  
properties

Up to 5 depth  
layers in each  
polygon

# Management Scenarios

- Five scenarios based on combinations of TAC management, Spatial management, Gear controls & Input Controls
  - Scenario 1: 2003 management system
  - Scenario 3: greater emphasis on quota mgt
  - Scenario 4: Greater integration of Mgt actions
  - Scenario 9: emphasis on recovery of overfished & threatened resources (NGO proposed)
  - Scenario 10: 2007 management system
- Scenarios 1, 3 & 4 from Stage 1
- Scenarios 9 & 10 new to Stage 2

# Performance Measures (PM)

- Derived from model components
  - Indicator compared to Reference Point
  - Used to evaluate how well scenarios achieve objectives
- Objectives broadly follow dimensions of Sustainable Development & linked to AFMA legislative objectives
  - Conservation
  - Economic
  - Social & cultural
  - Institutional

- Conservation PMs
  - Biomass of bycatch groups & target species, habitat cover, pelagic : demersal biomass ratio, piscivore : planktivore biomass ratio, change in BSS-slope, biomass of TEP groups, microfauna biomass, elasmobranch biomass
  - Discards & habitat-impacts
- Economics PMs
  - Value of landed catch, revenue per ton, revenue per effort, costs, profits
  - total effort, CPUE, total catch, catch average size & composition
- Social & cultural PMs
  - Public image, gear conflict, port activity
  - Access, stability & quota trading
- Institutional PMs
  - Costs of management, research, enforcement, monitoring & assessment

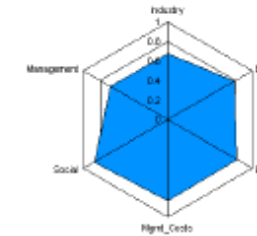
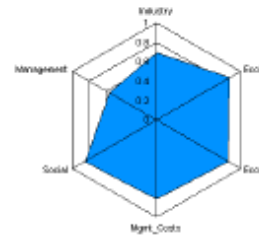
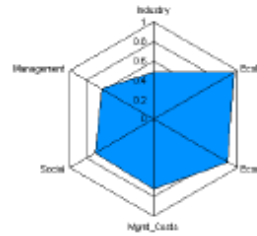
**Scenario**  
**Scenario 1**



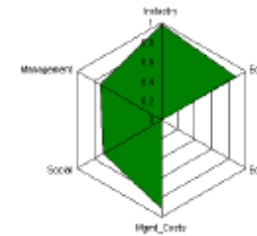
**Scenario 3**



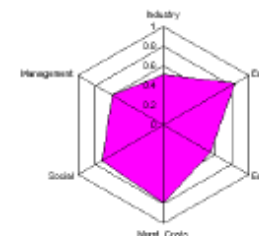
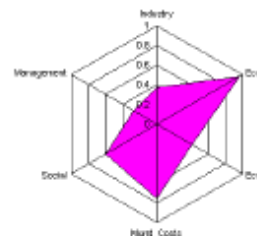
**Scenario 4**



**Scenario 9**



**Scenario 10**



# Evaluation of Scenarios by Performance Measure

# Conclusions

- No scenario exhibited strong performance across all objectives
- Scenarios (1, 3 & 9) which focused on one mgt action met with limited overall success
- Scenarios 4 & 10 were more balanced approach & were more generally successful
- Results generally similar to Stage 1 qualitative evaluation

# Management System Response

- Significant changes in fishery after stage 1 completed
  - Adoption of elements of scenario 4
  - Several groups (fisher & NGO) came forward with own scenario
  - Stage 1 significant catalyst of change
- Stage 2 completed in 2007
  - Results being incorporated into SESSF management

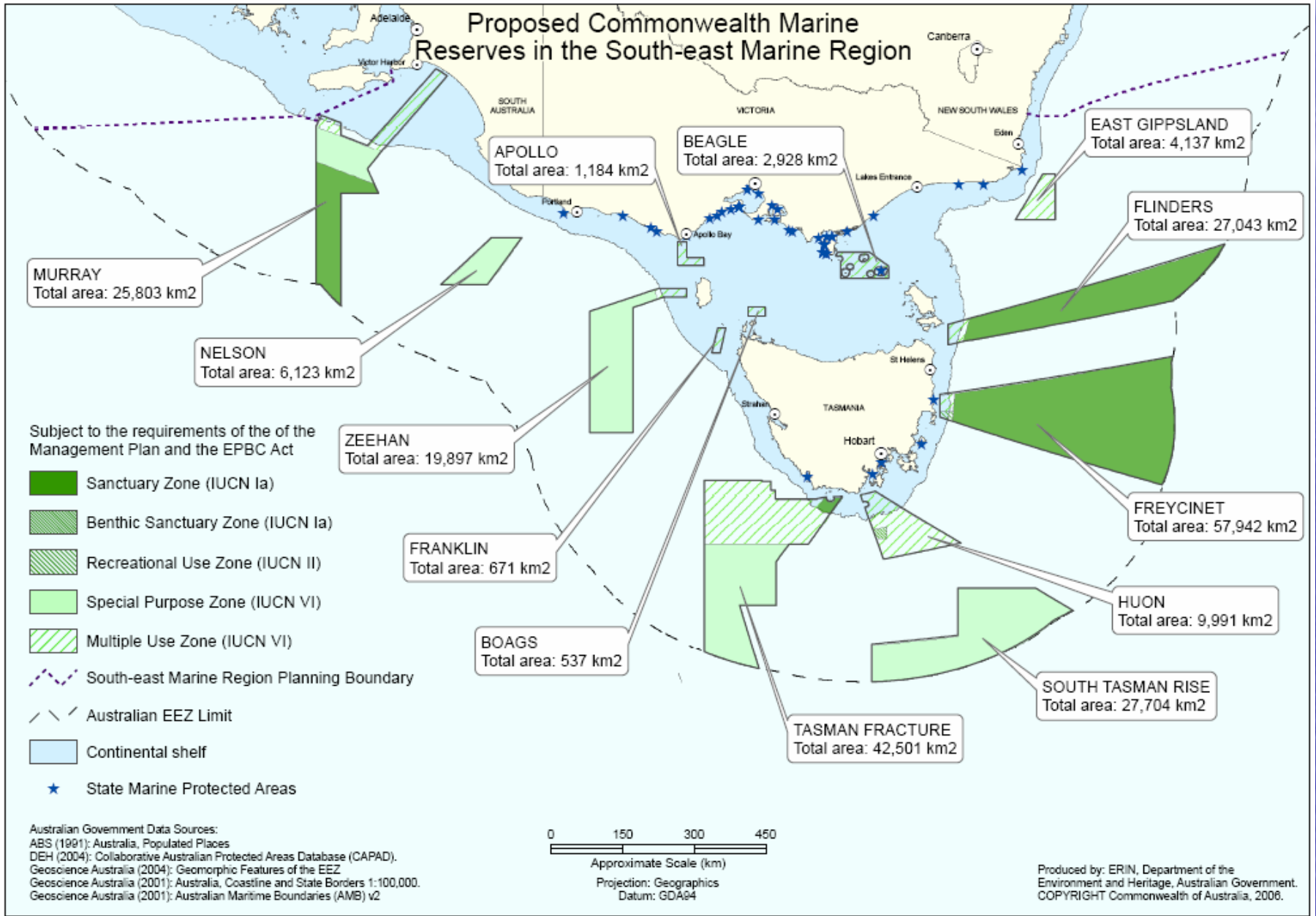


# Management System Response (cont'd)

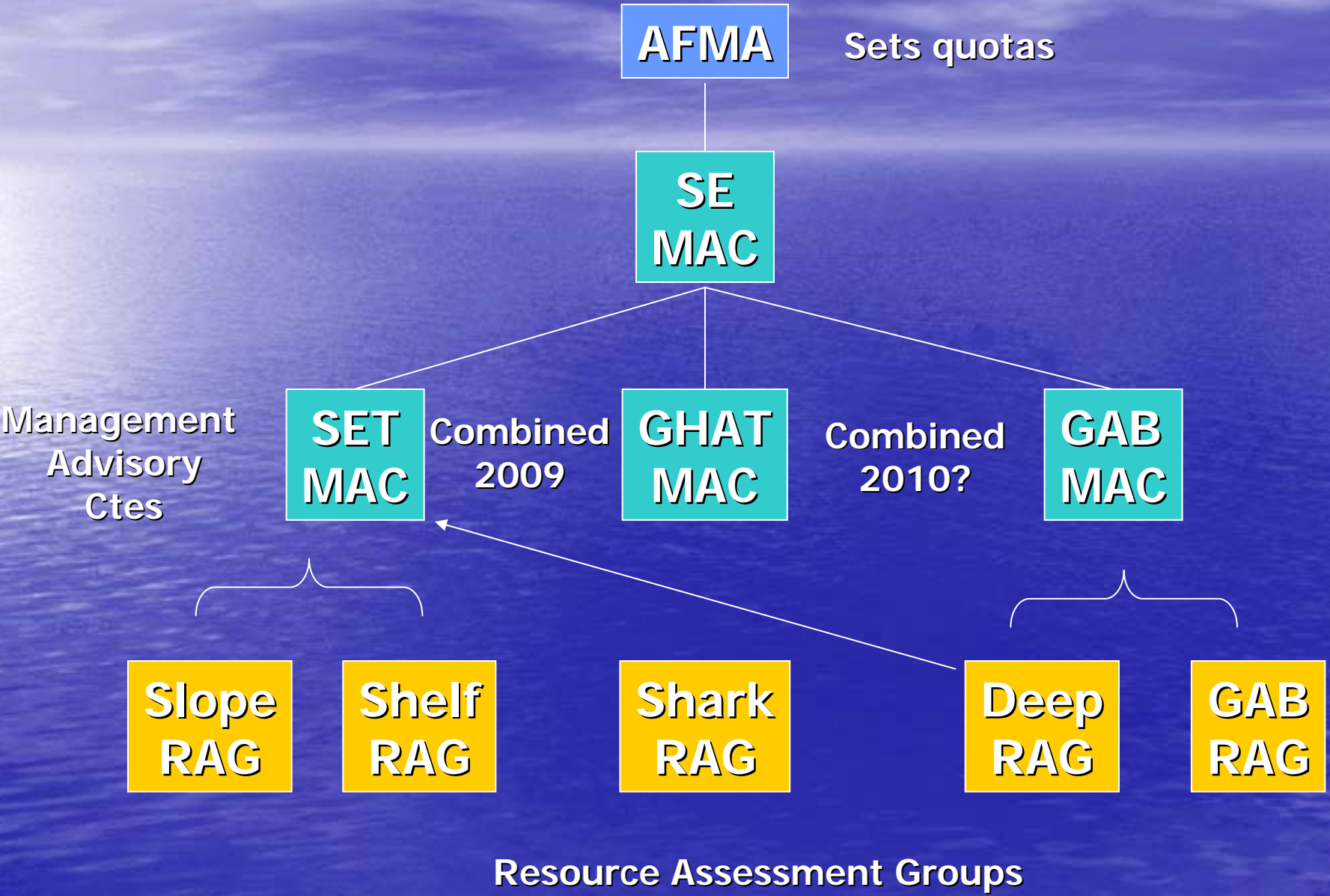
- To legislation
  - environmental certification
  - Industry code of conduct
- To EBFM
  - Extensive set of spatial closures (additional to MPAs)
  - Larger mesh in trawl fishery
  - Improved observer coverage (gears & sectors added)
  - Formal harvest strategies
- New Research Agenda
  - Gear impacts
  - Habitat mapping

Little food  
chain work  
thus far

# Proposed Reserves in SE



# Changes in Consultative Arrangements



A blue sky with light clouds over a blue ocean with a sun reflection.

**THANK YOU!**