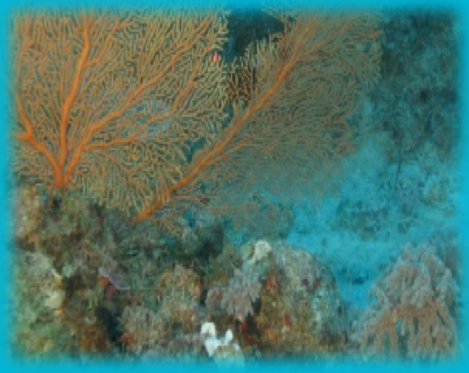


The Australian experience with EBFM

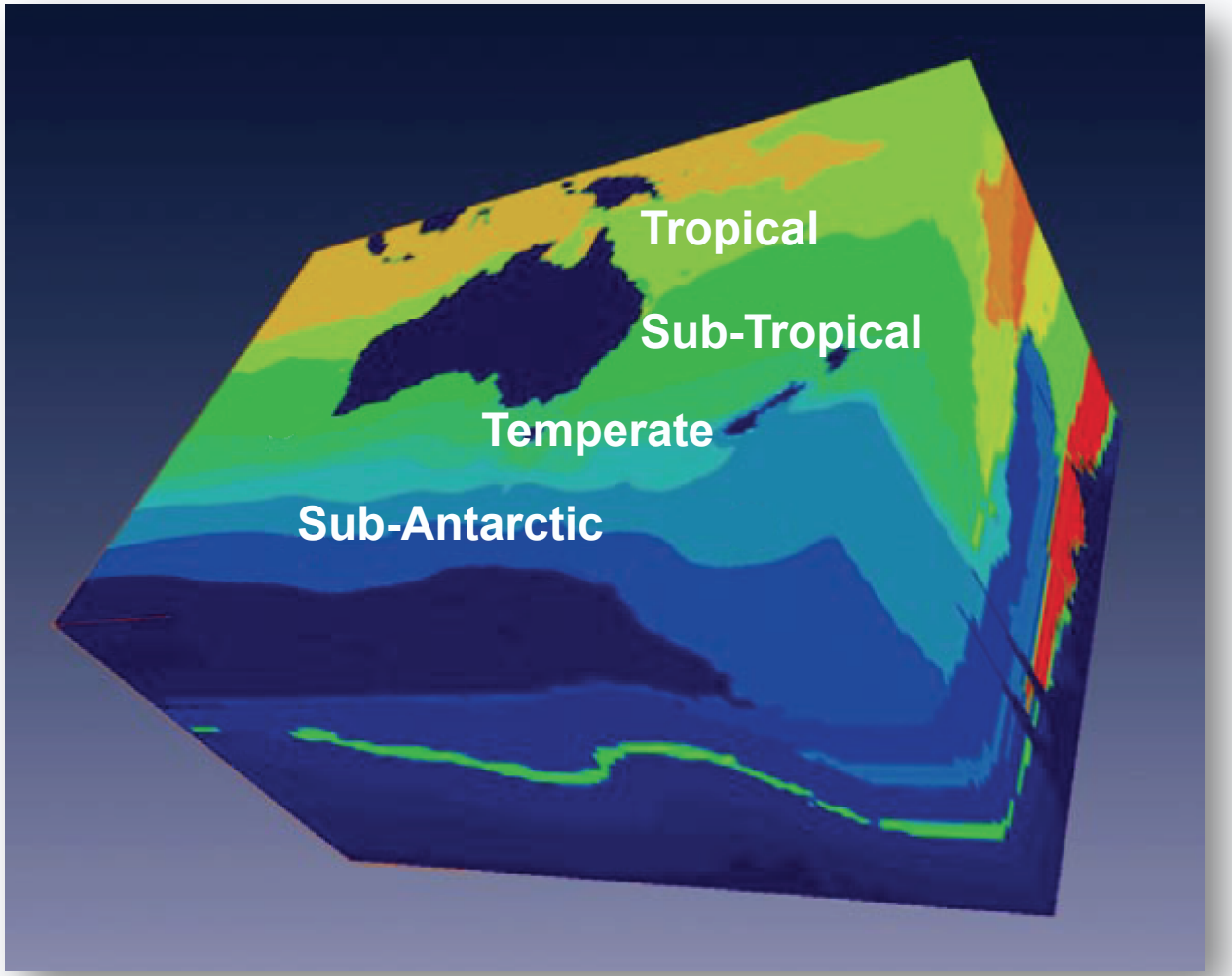
Tony Smith

Bevan Symposium, Seattle, April 2014

Outline…

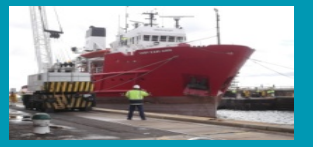
- Australia's oceans and fisheries
- Australian Fisheries policy drivers
- Scientific tools to support EBFM
- Implementing EBFM
- Successes, failures and lessons

Australian Bioregions



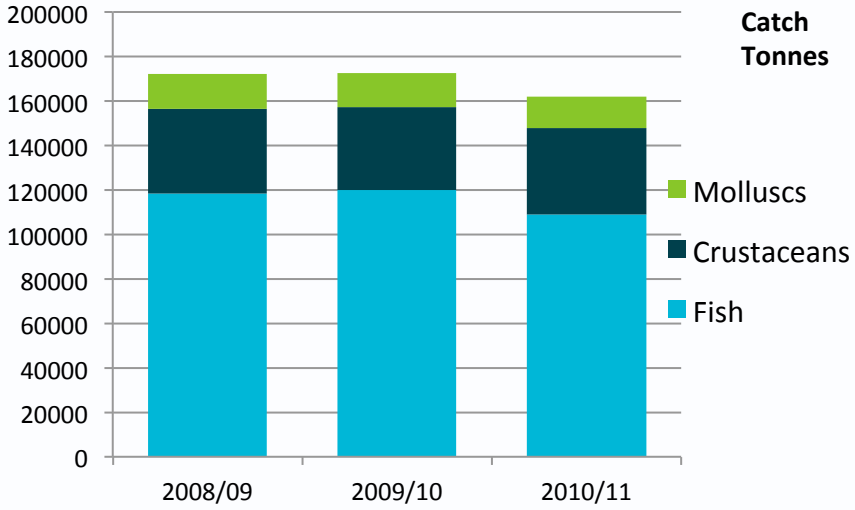
Lyne and Hayes (2005)

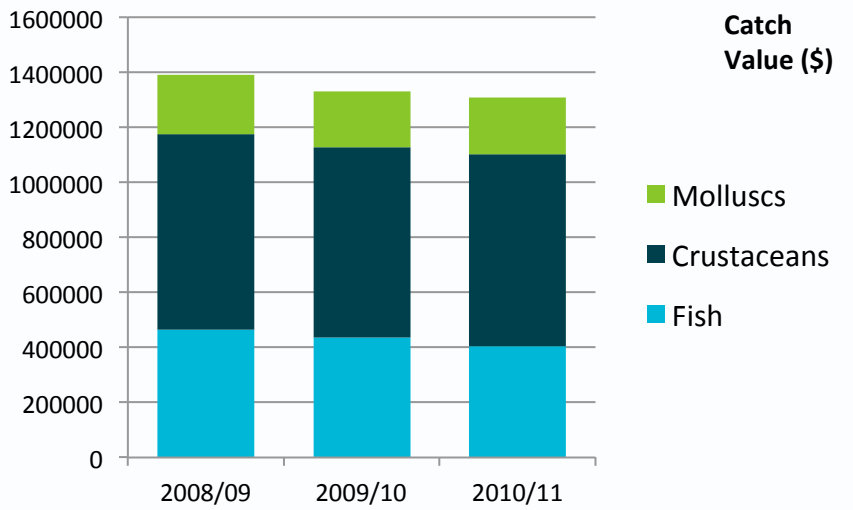
Australia's marine industries

Marine industry value	$44 billion (AIMS Index of Marine Industry 2010)	
Offshore oil & gas exploration and extraction	$24.2bn	
Marine tourism & recreational activities	$11.1bn	
Ship building, repair, maintenance services & infrastructure	$6.4bn	
Commercial fishing & aquaculture	$2.3bn	

Agriculture value
$41.8 billion

Snapshot of Australian fisheries





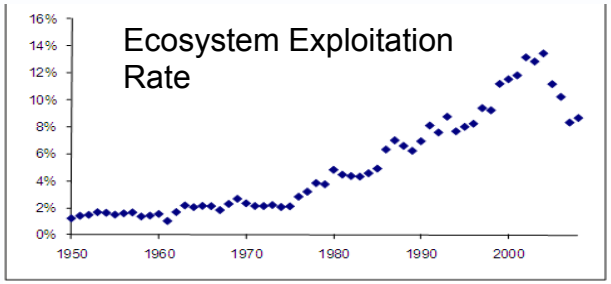
Policy Drivers in Australia

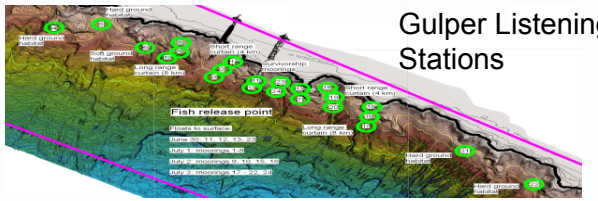
Major policy drivers include:

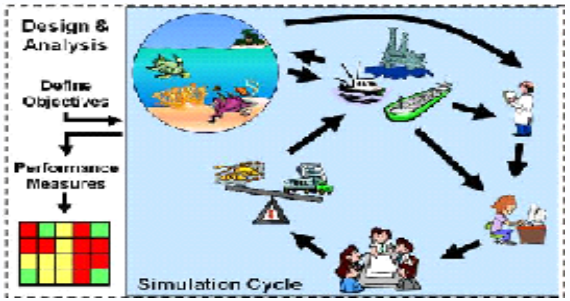
- Ecological sustainable development – whole of government, all sectors (1991)
- New Fishery Management Act (1992)
- Australia's Oceans Policy (1998)
- Environment Protection & Biodiversity Conservation Act (1999)
- **Fisheries incorporate EBFM as policy goal (early2000s)**
- Ministerial Direction on Fisheries (2005)
  - Harvest Strategy Policy - stop over-fishing and rebuild overfished stocks
  - Reduce environmental impact of fisheries
- International agreements/conventions (e.g. CBD, RFMOs)

Ecosystem Based Fisheries Management

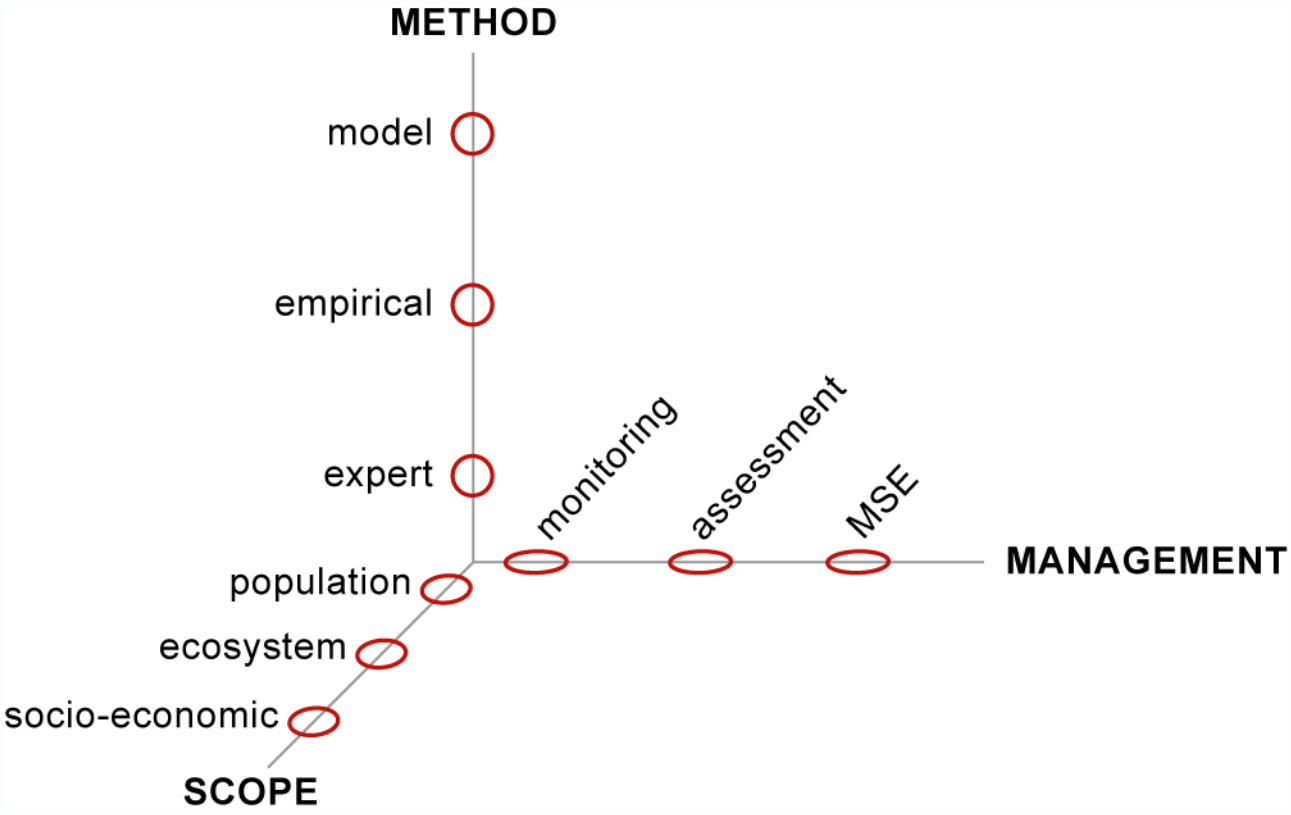
- Developing and implementing harvest strategies
- Ecological Risk Assessment for the effects of fishing
- Spatial management to mitigate impacts of fishing
- "'Whole of Fishery' management strategy evaluation







A framework for tool development



Harvest strategy policy

Core elements of the policy:

- Maintain stocks at ecologically sustainable levels
- Within that context, maximize economic returns to the Australian community
- Adopt formal harvest strategies for key commercial species

Harvest Strategy Policy

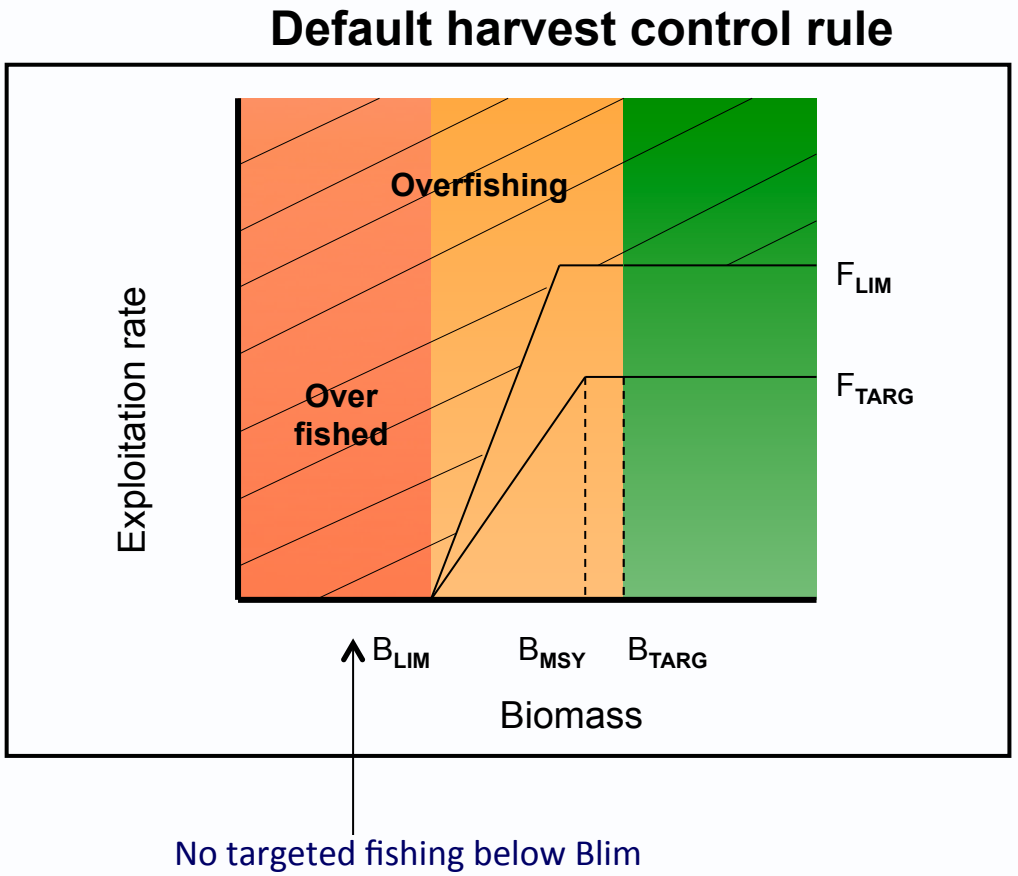
Harvest strategy = monitoring + assessment + harvest control rule

- Biomass limit is 0.5 Bmsy
- Bmsy is the rebuilding target
- Bmey is the economic target

Risk criterion

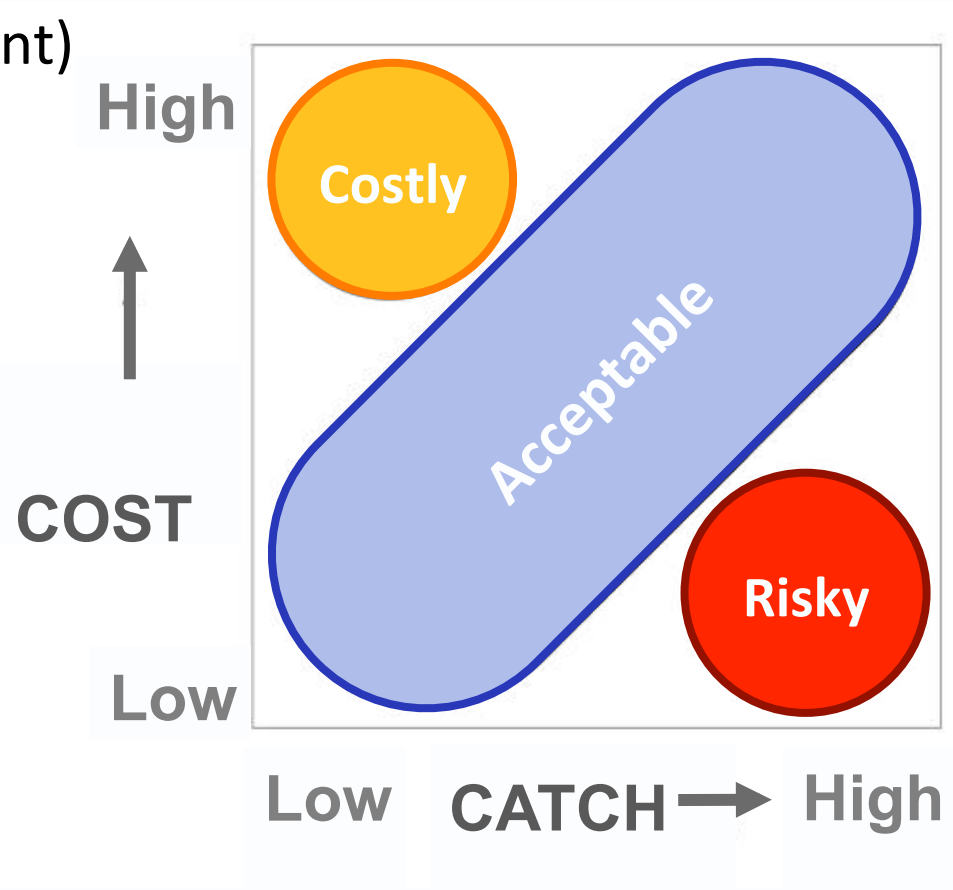
- maximum 10% chance of falling below the limit in the long term under the harvest strategy

Bmsy – biomass at Maximum Sustainable Yield

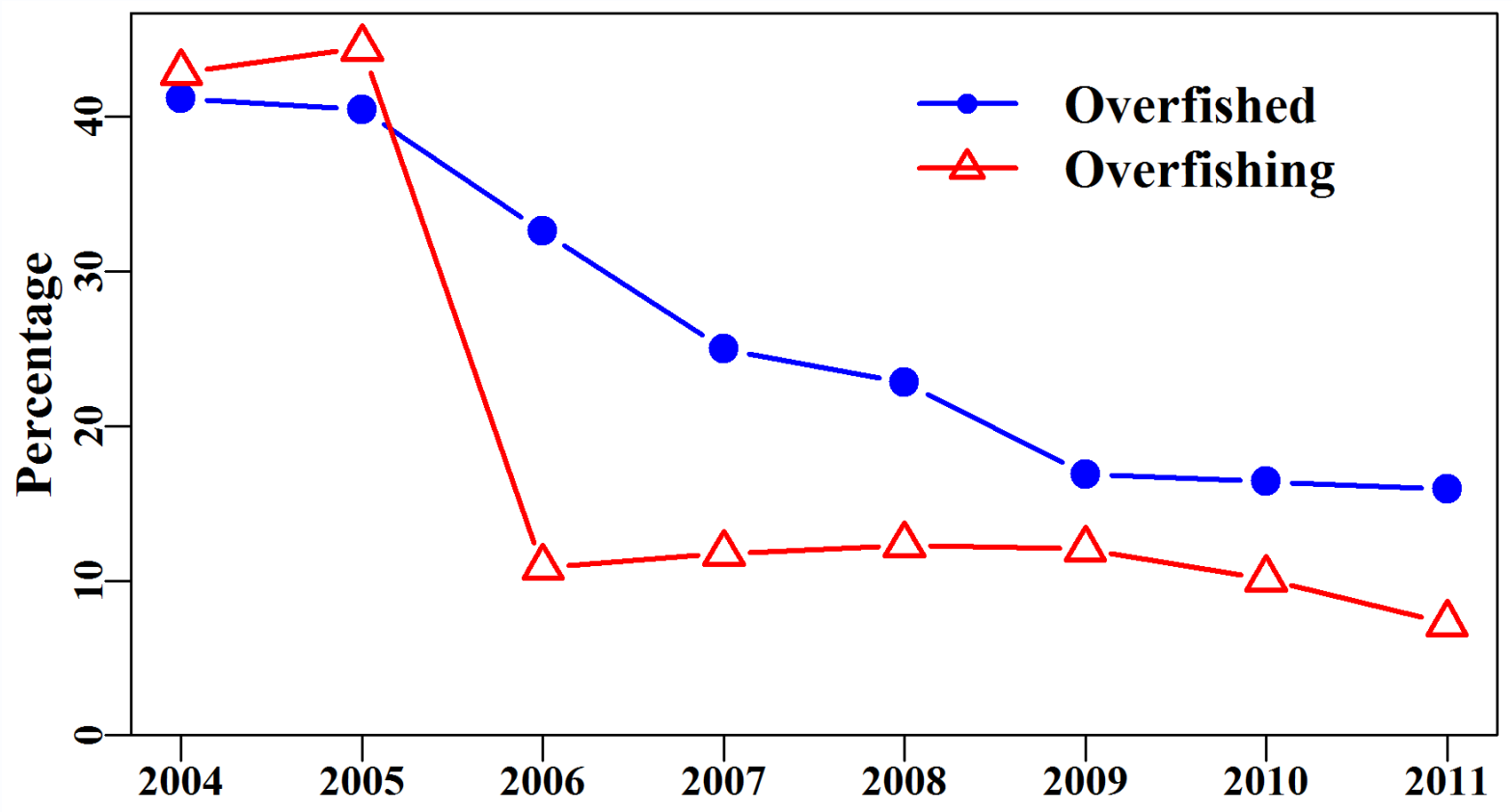


Harvest strategy implementation

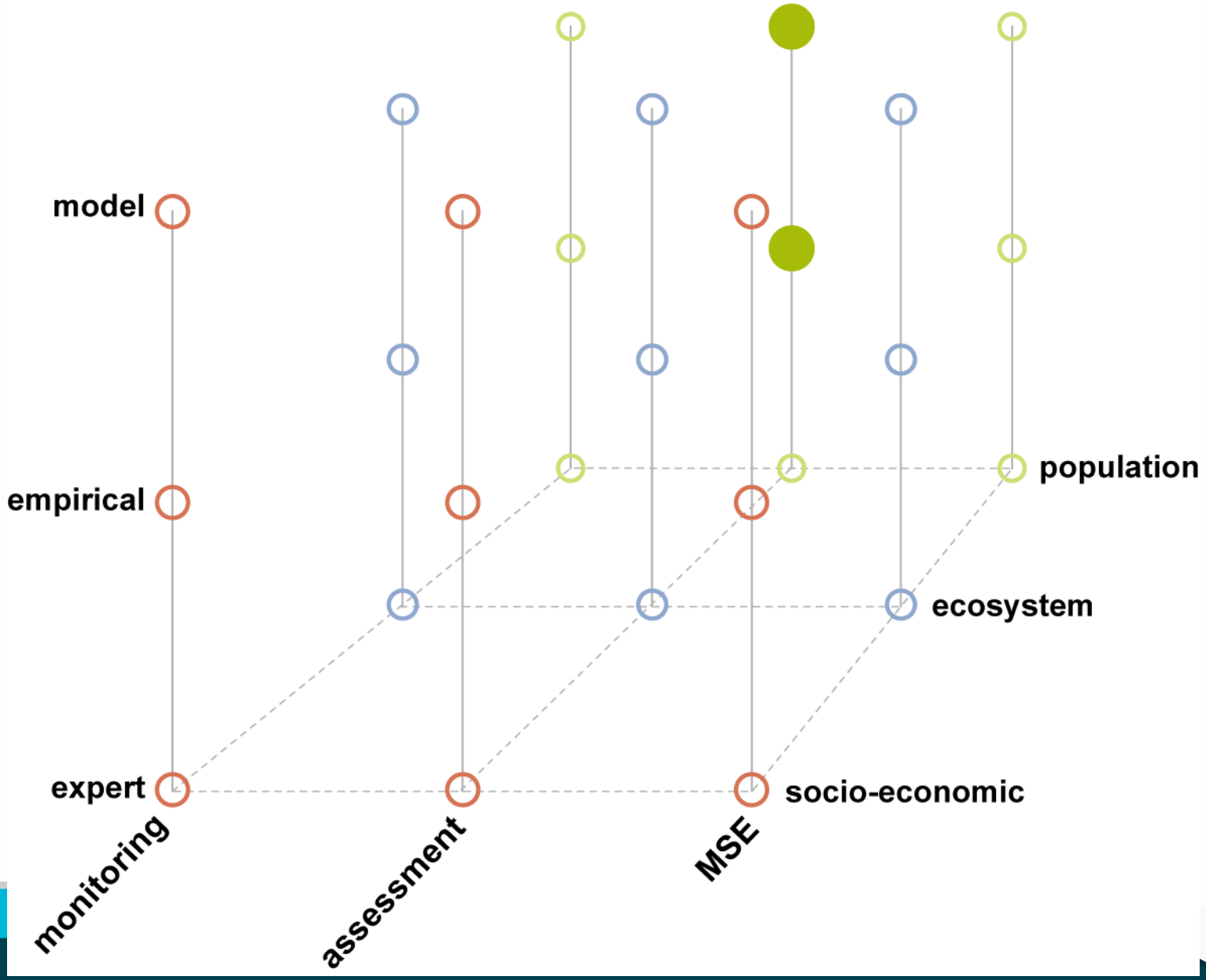
- Tier approach to harvest control rules
  - Tier 1 (robust stock assessment)
  - Tier 2 (old or uncertain stock assessment)
  - Tier 3 (estimate of F)
  - Tier 4 (CPUE trends)
- Explicit reduction in TAC as Tier level increases (more precautionary)
- Stocks can move between Tiers



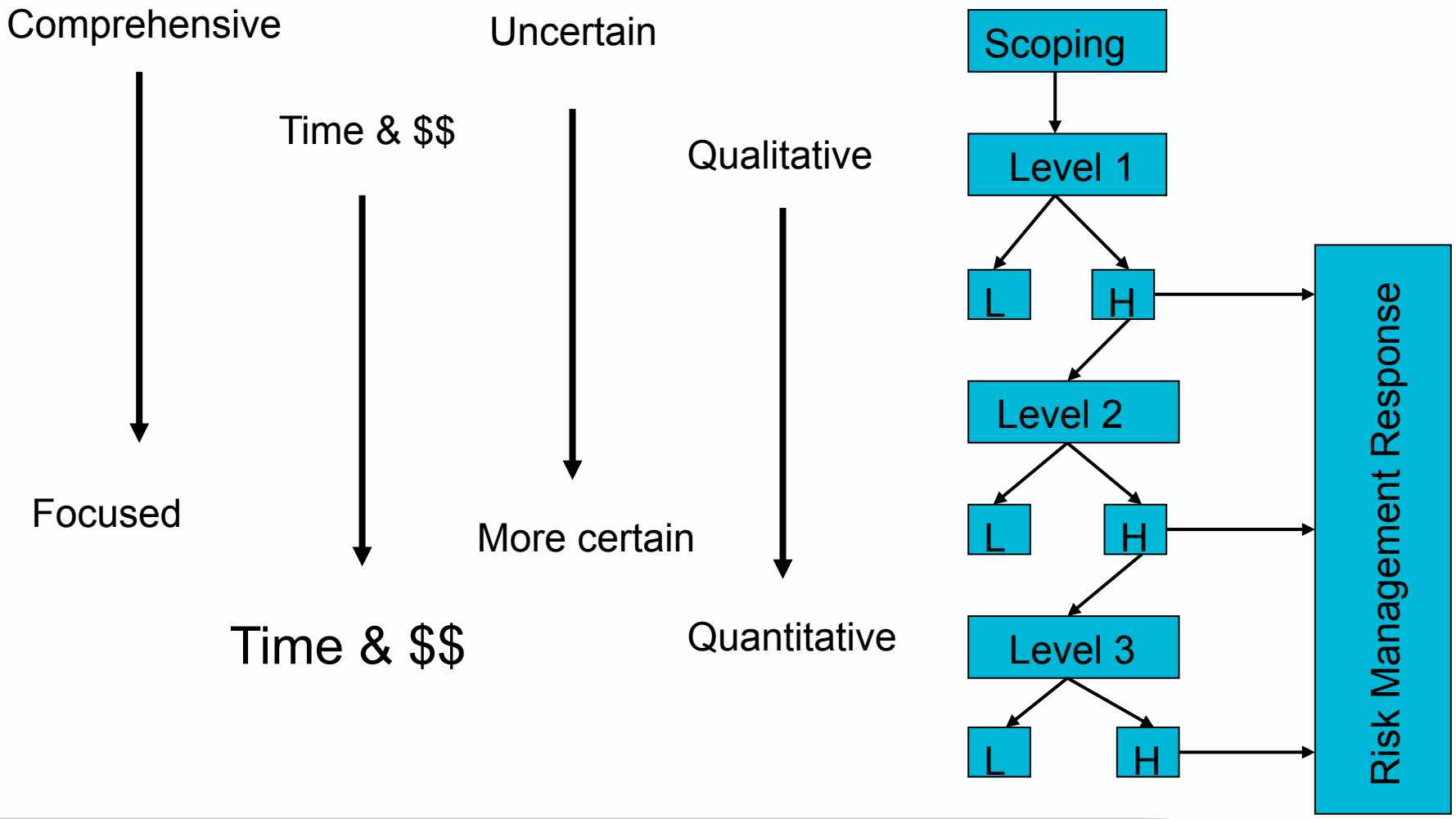
Harvest strategy policy - outcomes



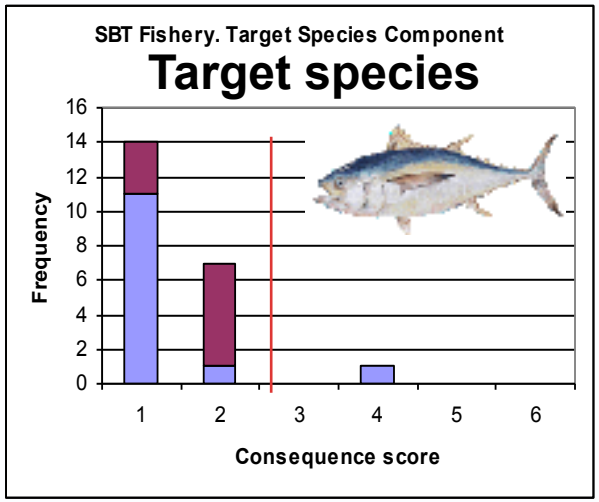
Tier Based Stock Assessment

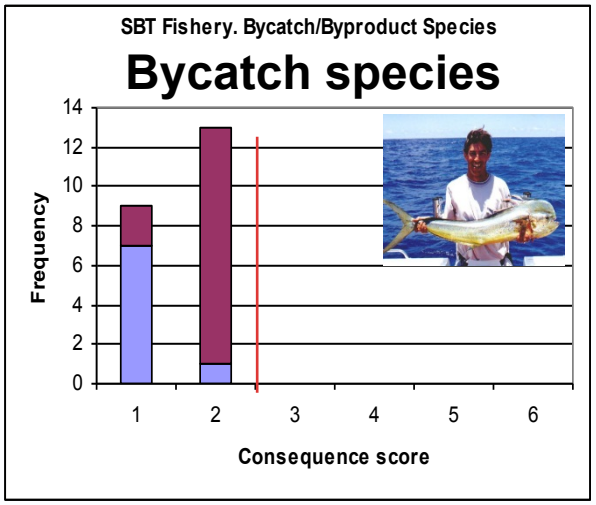


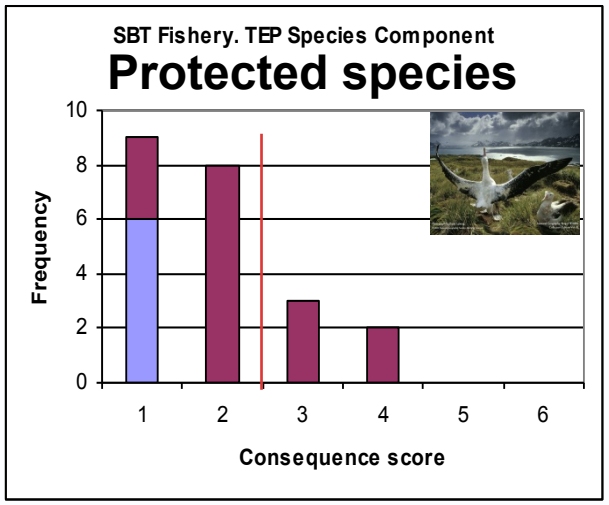
Ecological Risk Assessment - ERA



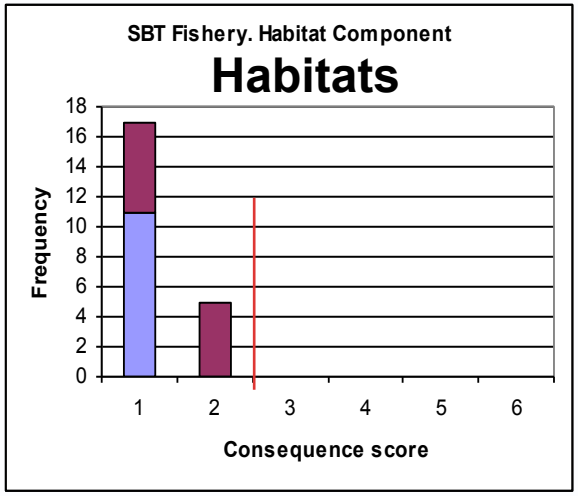
ERA Level 1 – example results

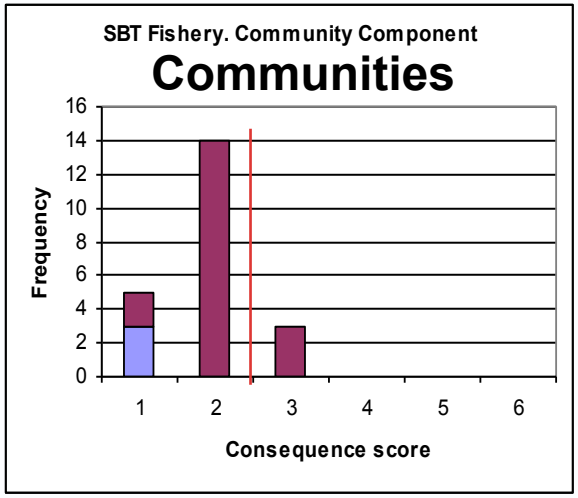






By-catch and habitats eliminated from further consideration in this example

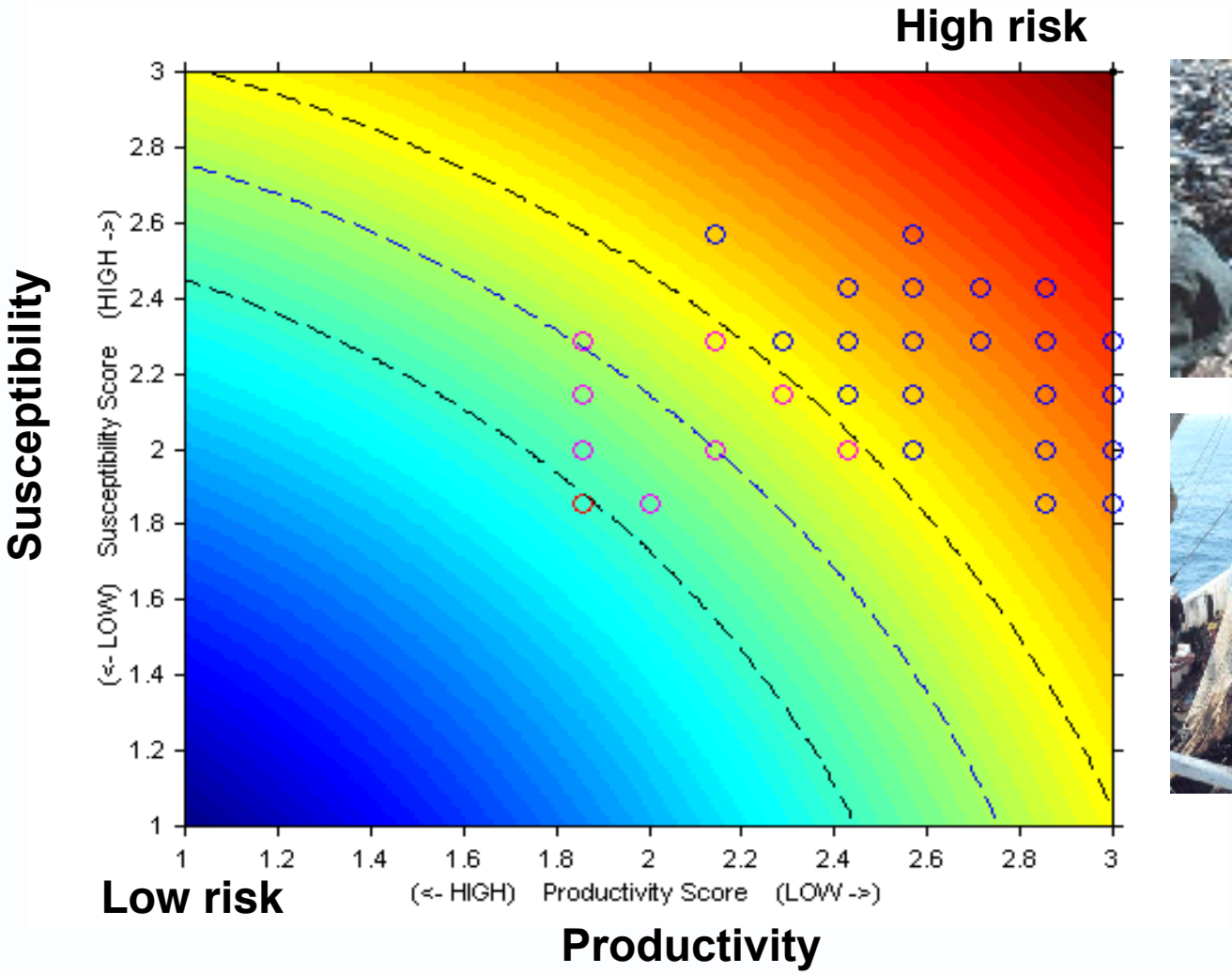




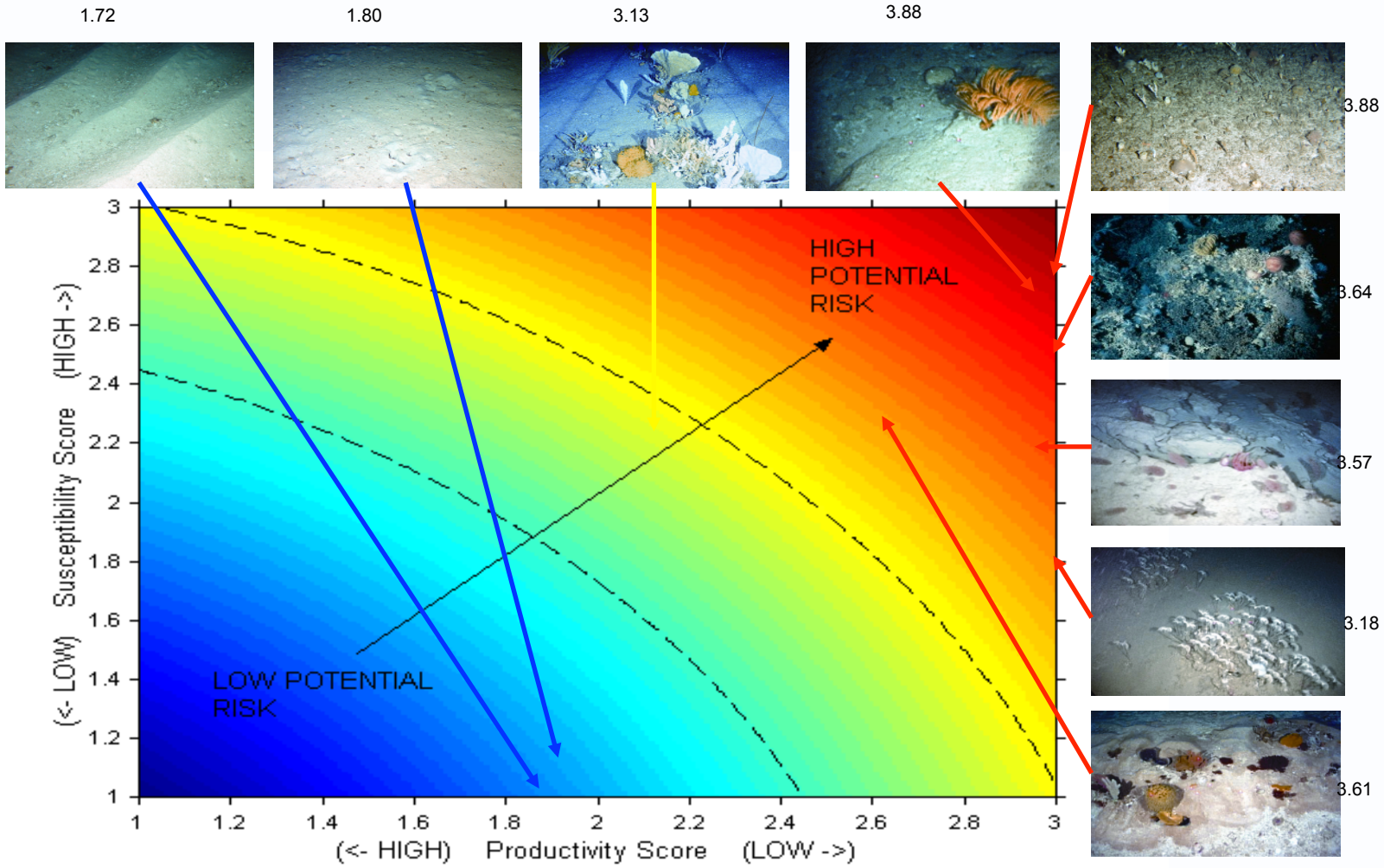
Confidence
- Low
- High

Risk score

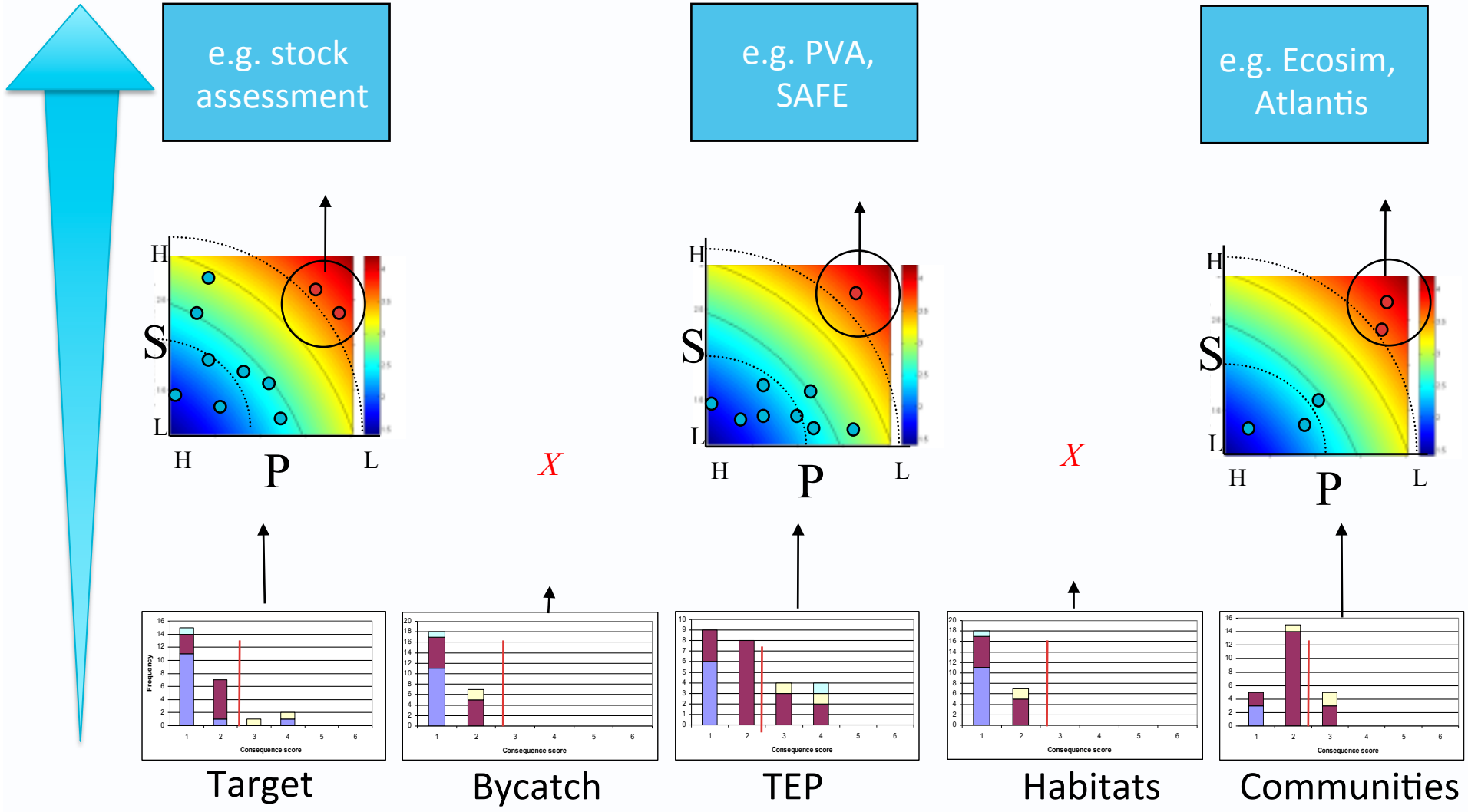
ERA Level 2 – demersal bycatch species



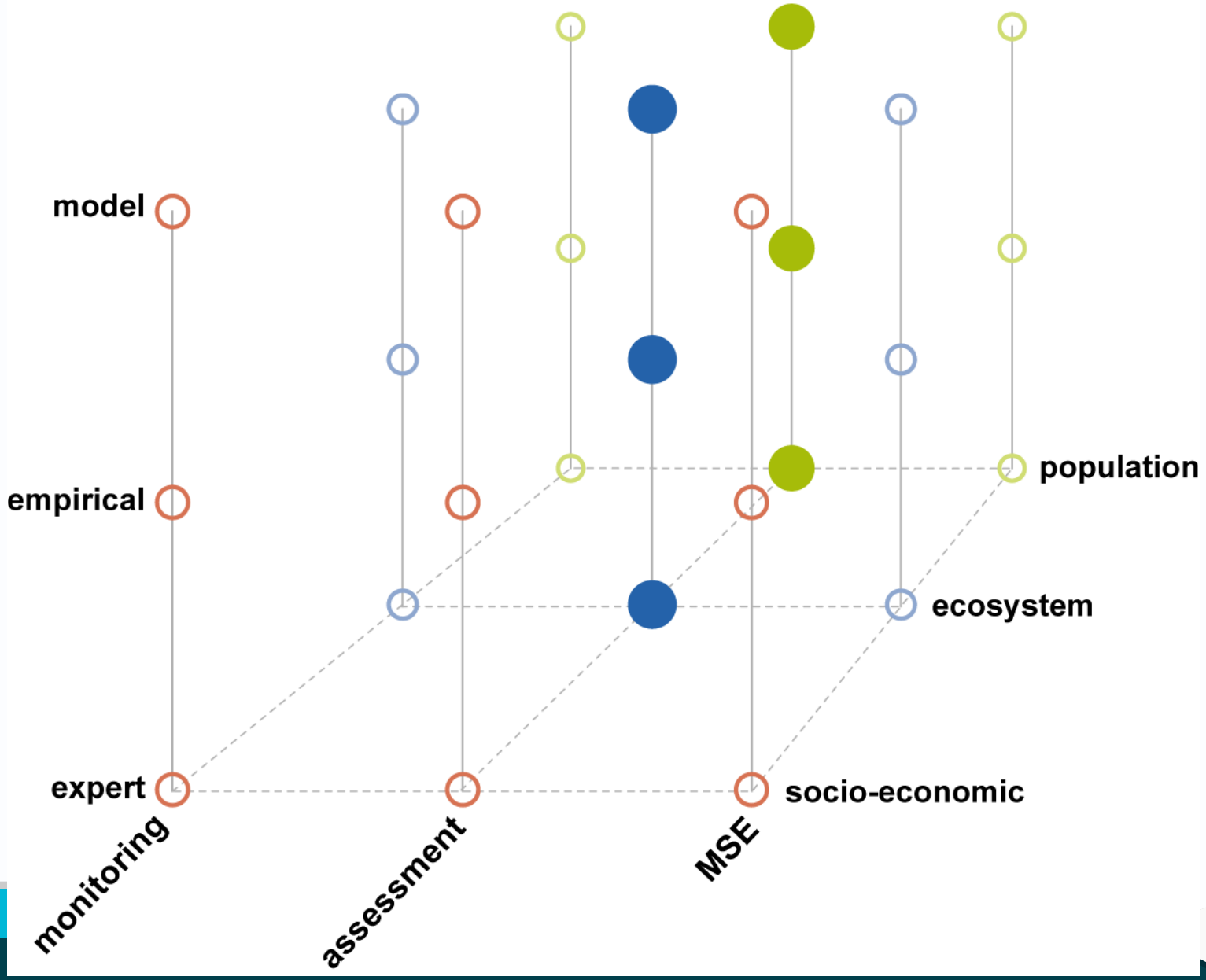
ERA Level 2 – seabed habitats impacted by bottom trawling



Ecological Risk Assessment – triage



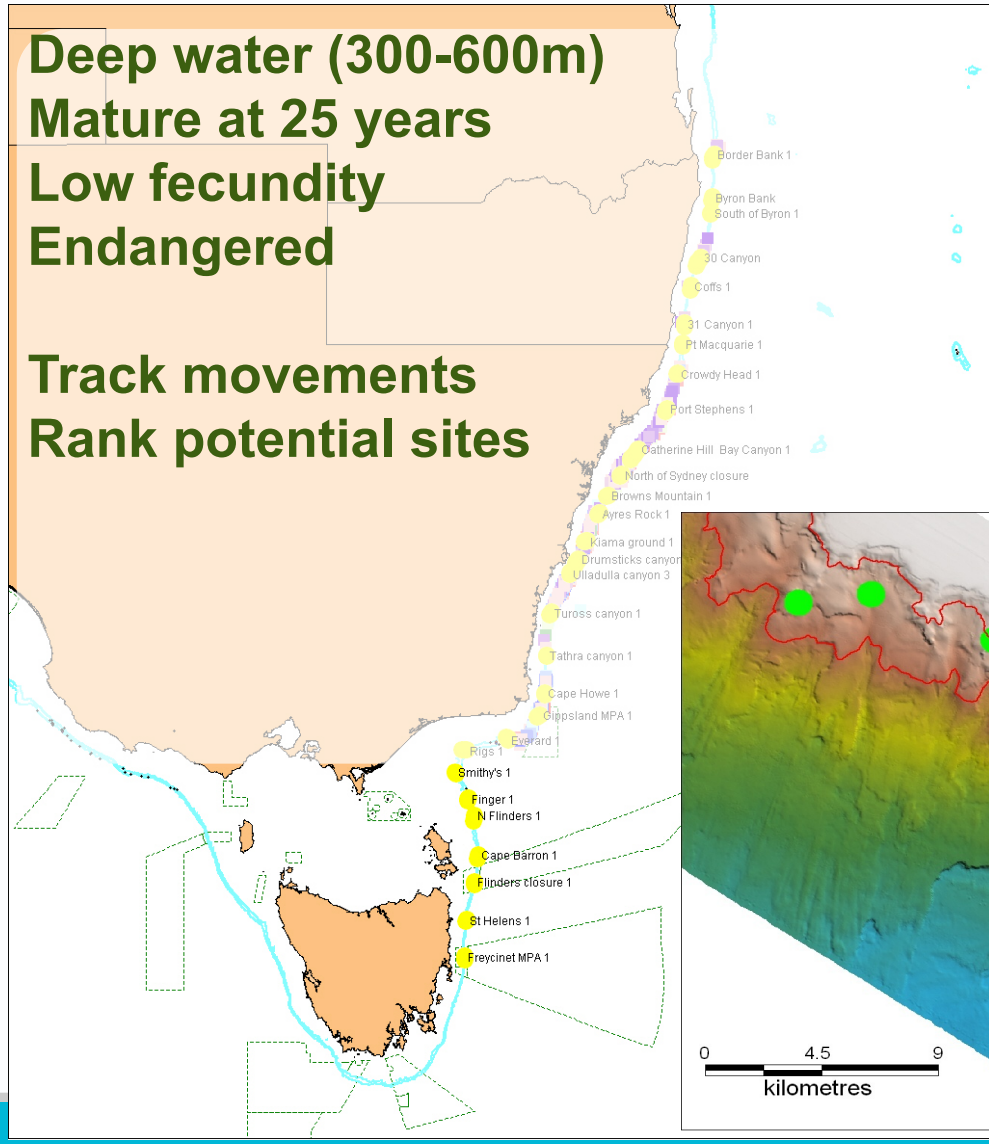
Ecological Risk Assessment

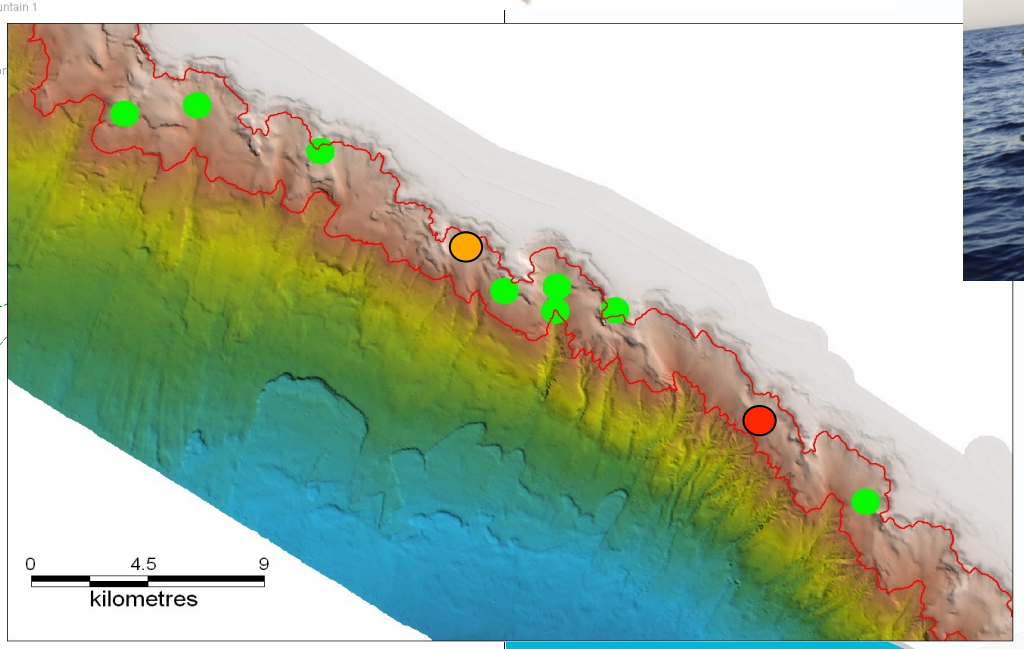


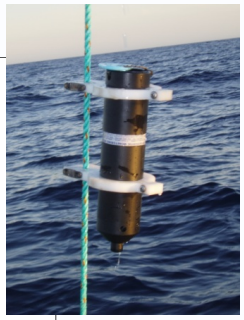
Fisheries conservation zones

Deep water (300-600m)
Mature at 25 years
Low fecundity
Endangered

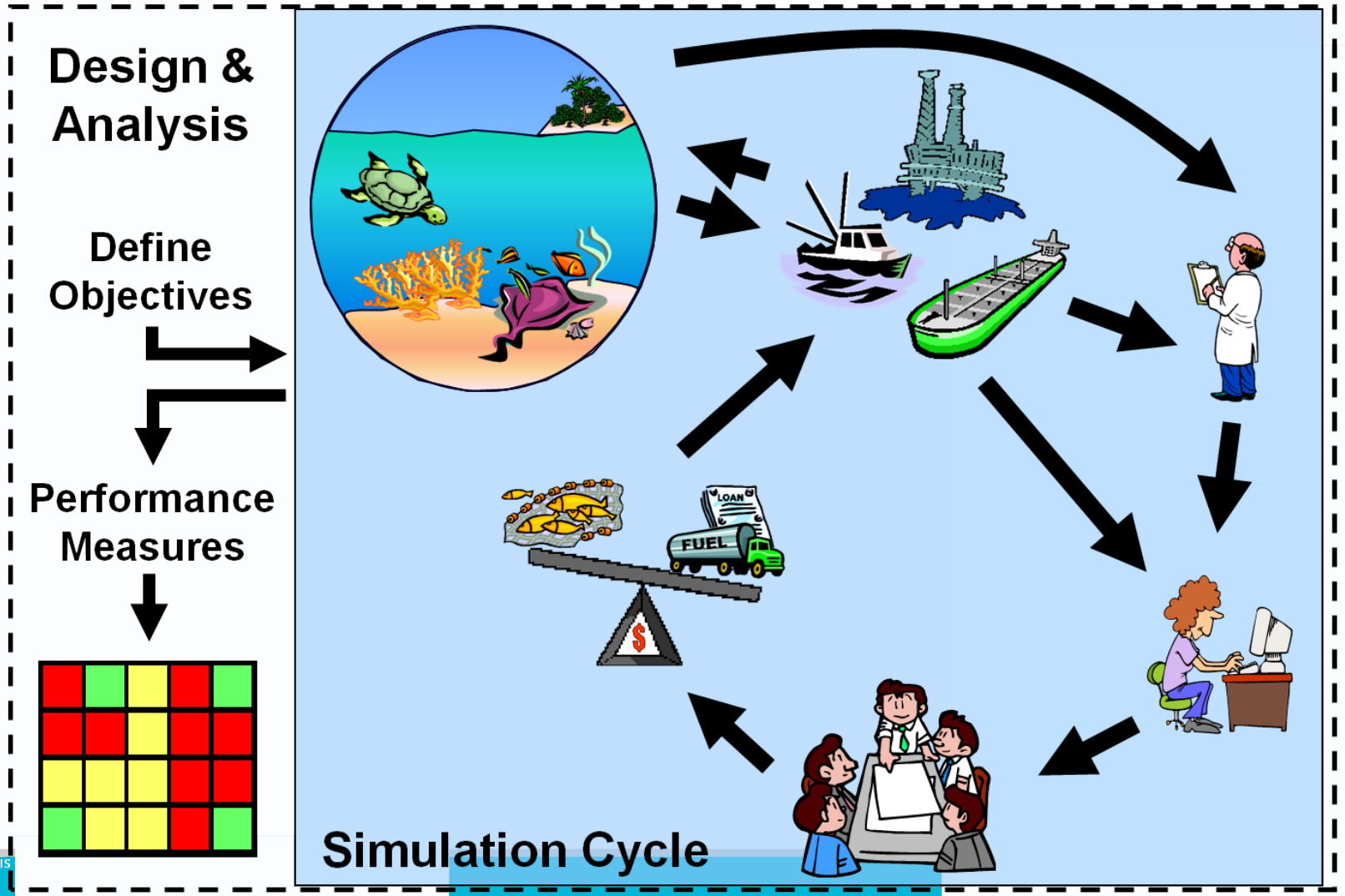
Track movements
Rank potential sites





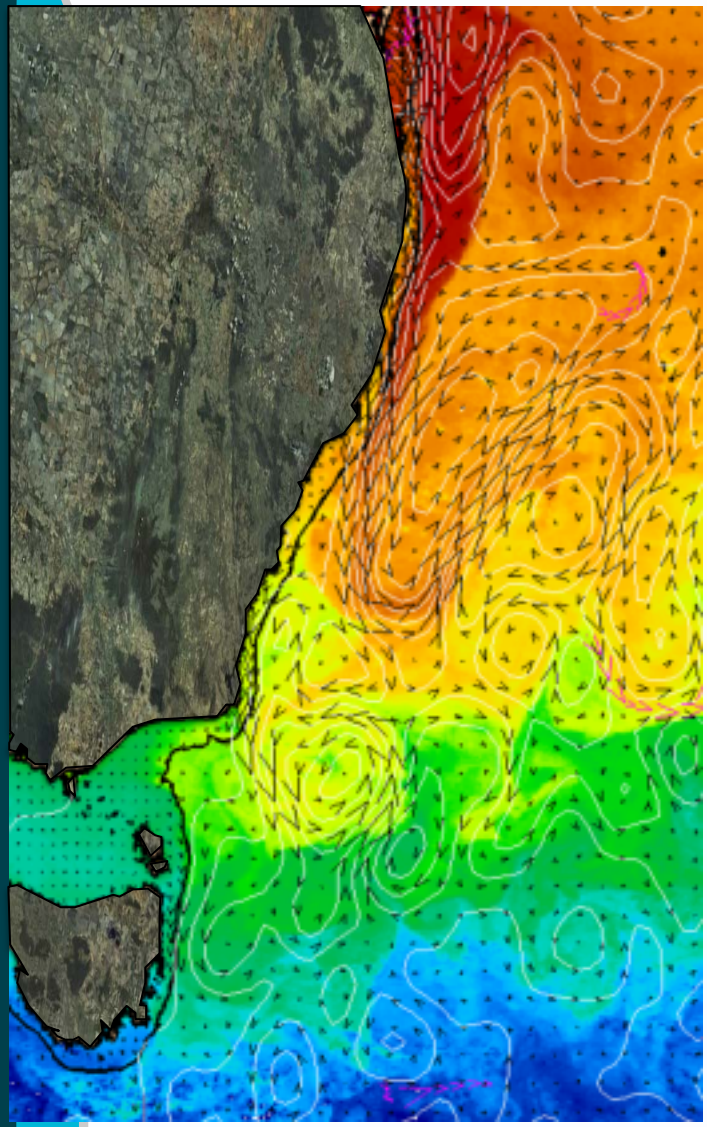


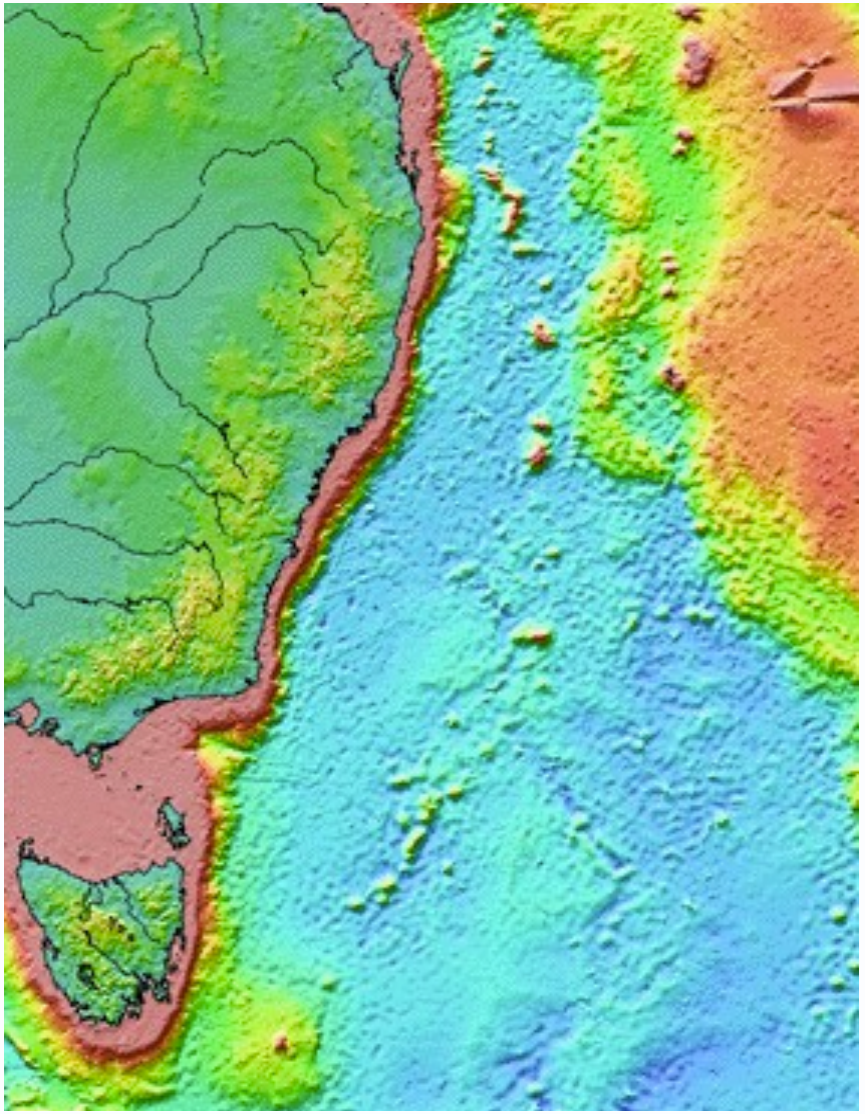
Management Strategy Evaluation MSE



Atlantis SE - Fisheries Ecosystem

Putting It Together





MANAGEMENT

SOCIOECONOMIC

INDUSTRIES

PREDATORS

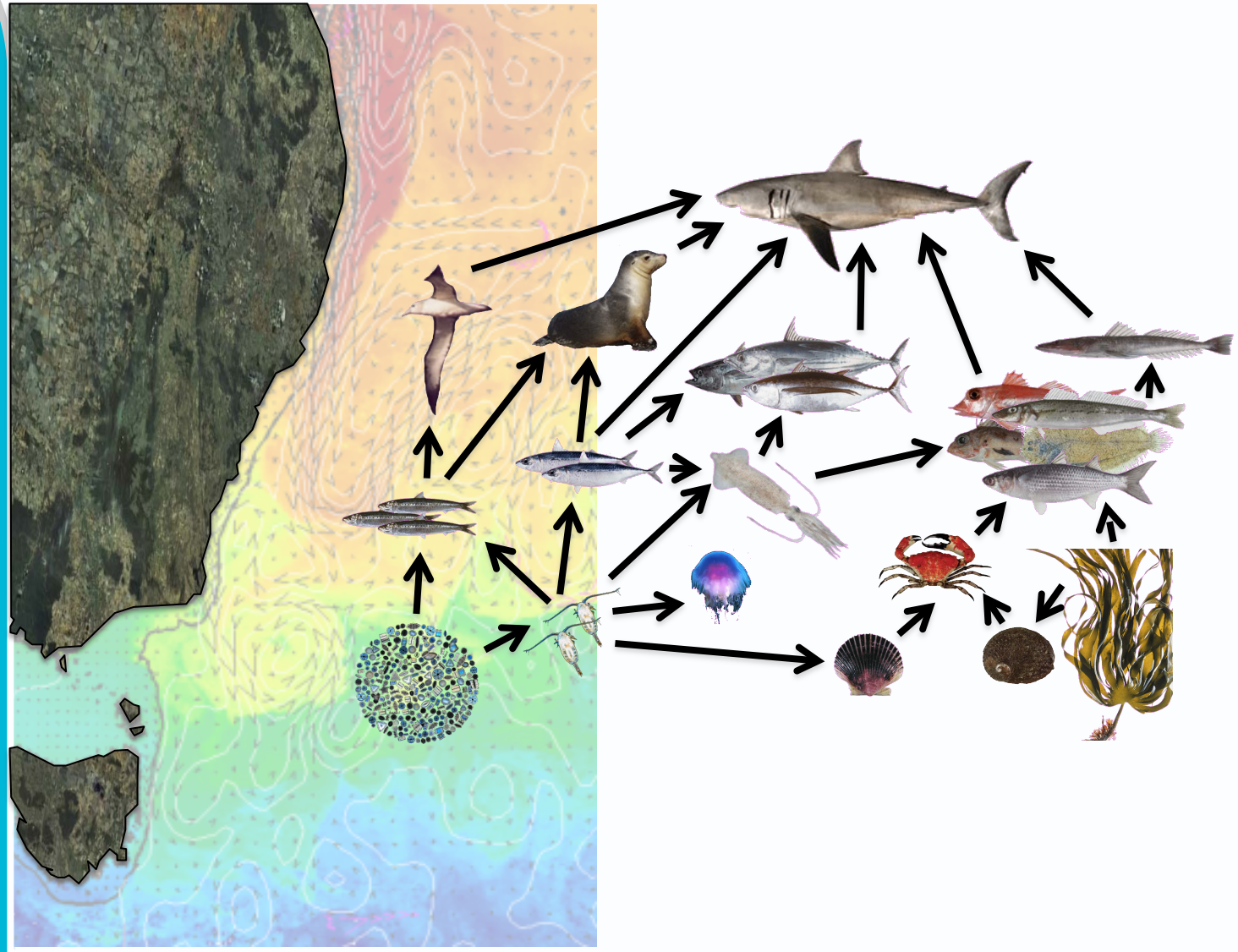
FOOD WEB

PLANKTON

HABITAT

ENVIRONMENT

Atlantis SE - Putting It Together



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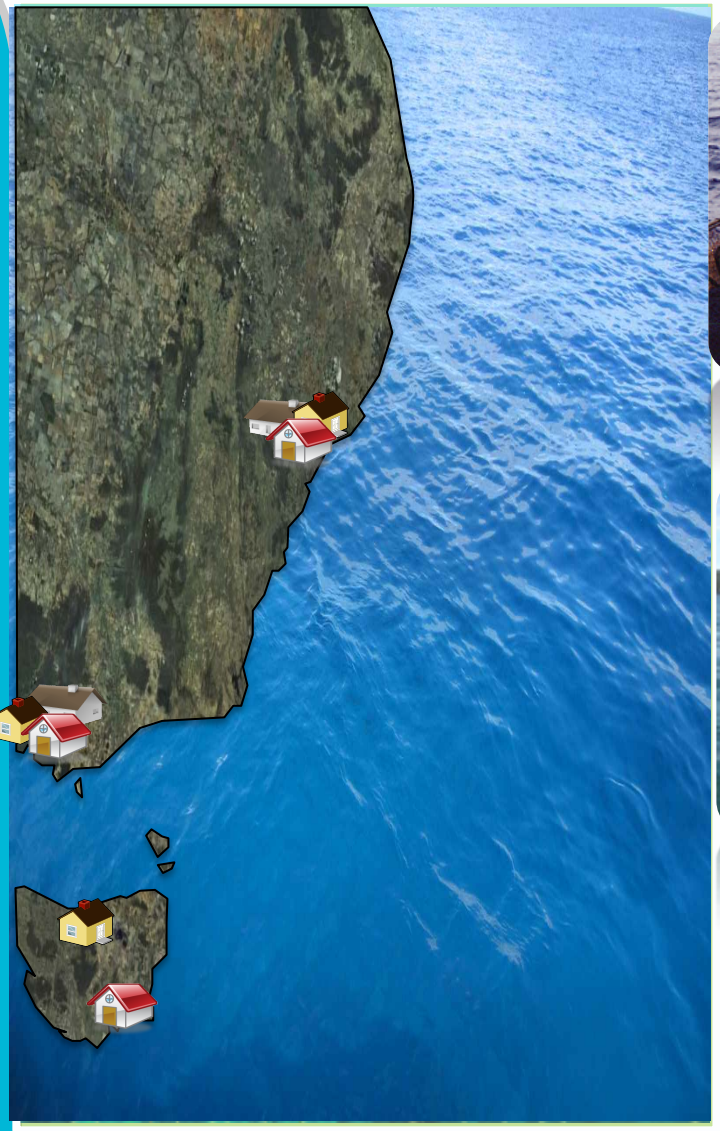

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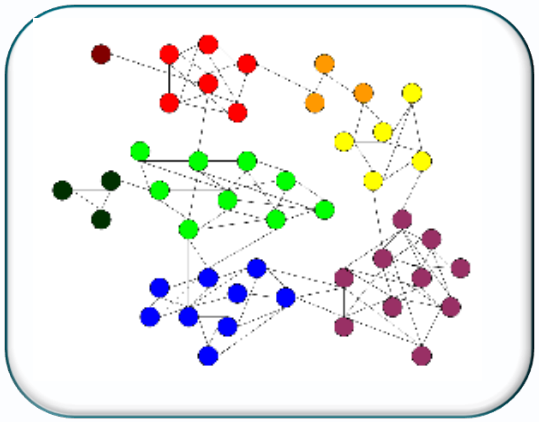

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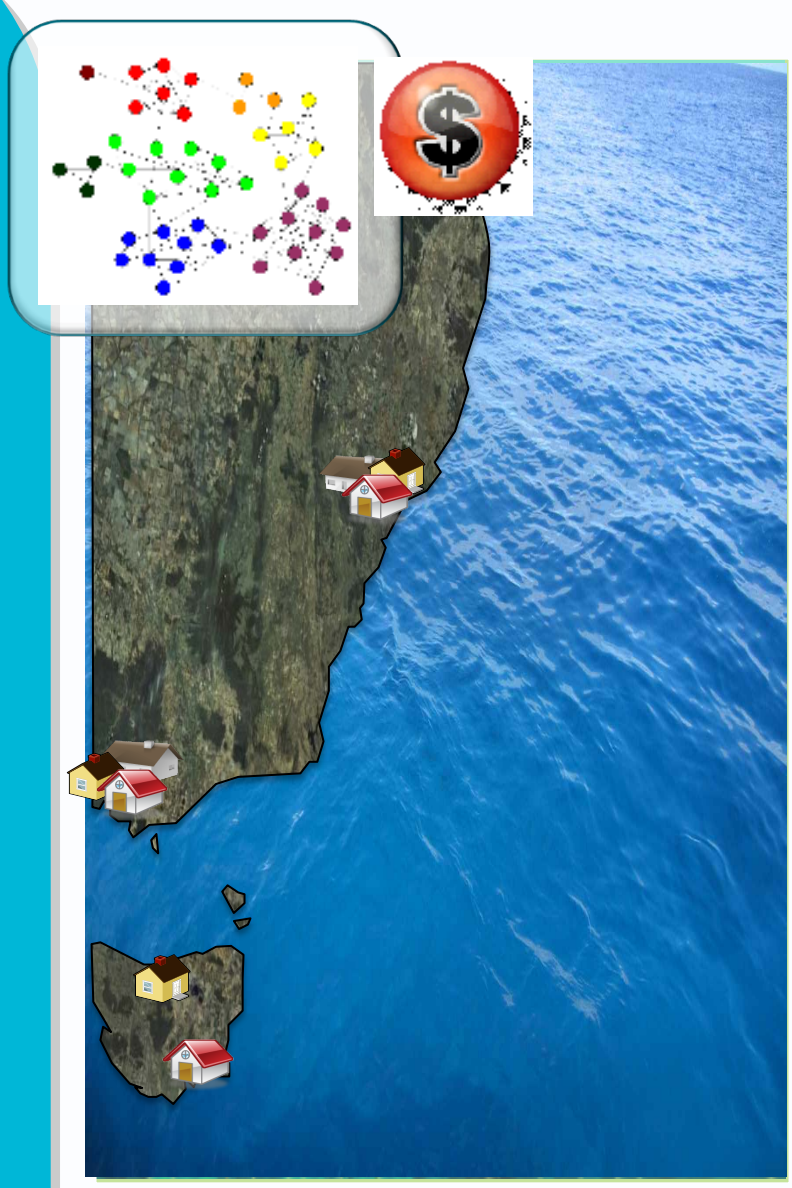

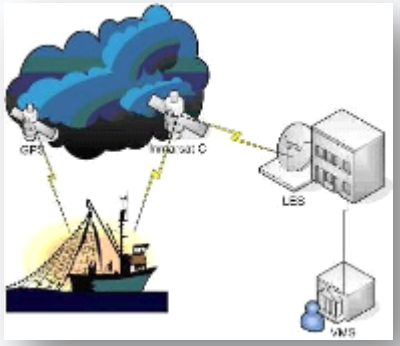

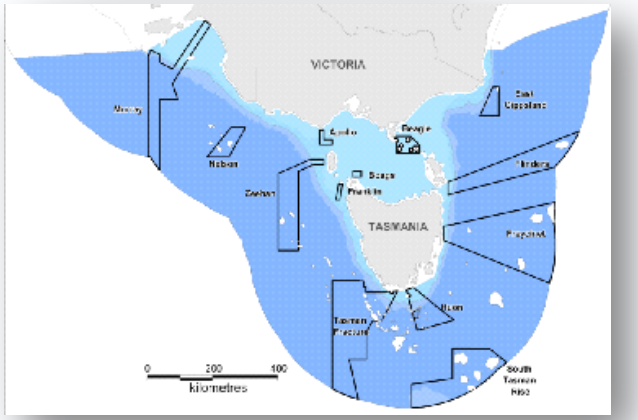

MANAGEMENT

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PLANKTON

HABITAT

ENVIRONMENT

Management scenarios

- **Status Quo** - effort high, push into marginal areas until economic collapse; shift in targeting to extreme trophic levels, system and public opinion collapses

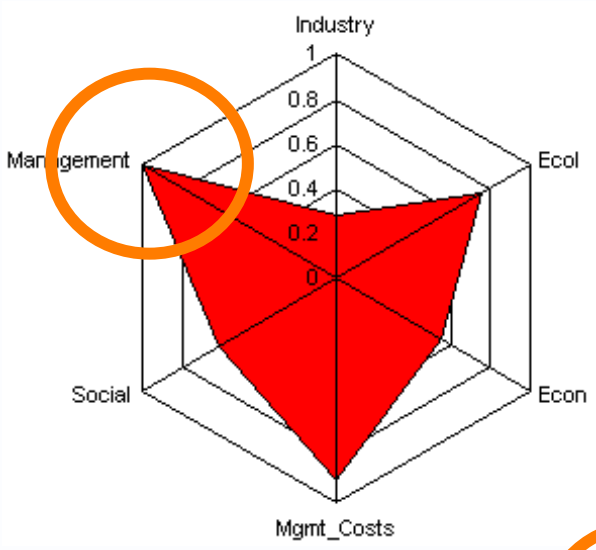
- **Quota on Everything** - effort high until fleet adjust (economically driven); deepwater unprofitable so shift to shelf; overcatch issues; trawl benefits most

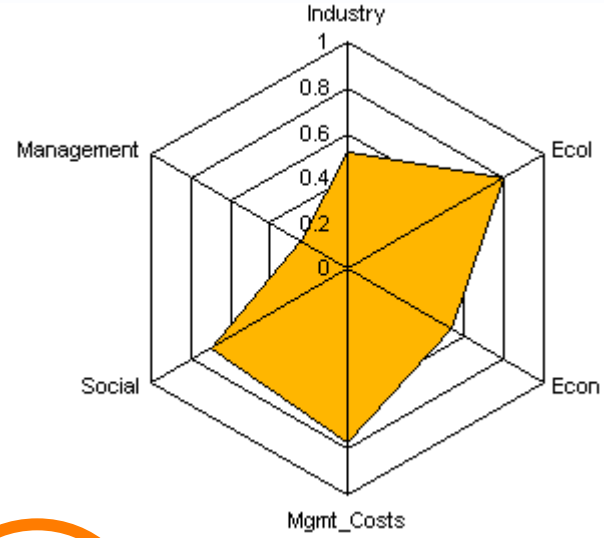
- **Integrated Management** – fleet readjust quickly; footprint concentrated on hot-spots; byproduct quota critical; discarding issues; gear switching not common; good all-round

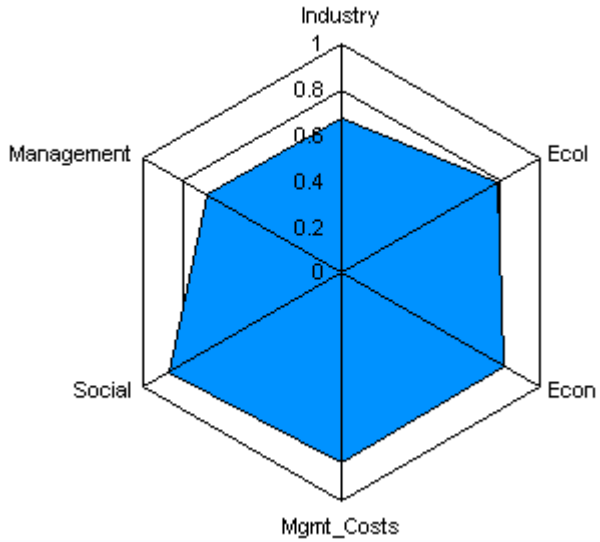
- **Conservation Driven** - closures very restrictive; strong recovery; significant industry and human cost

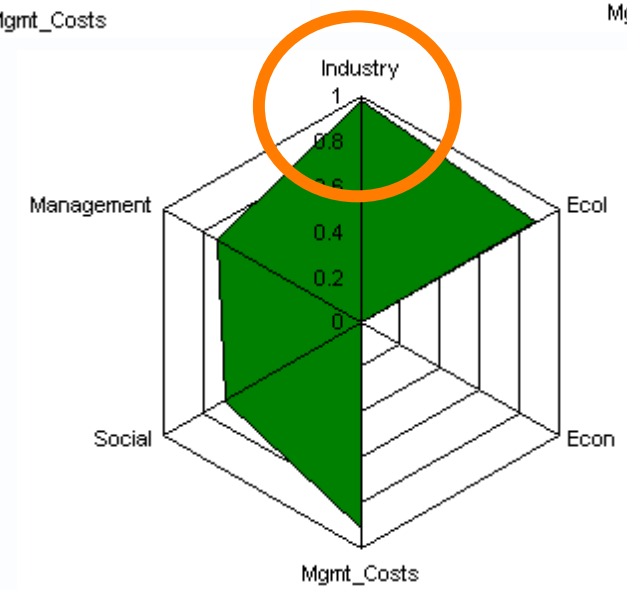
- **Pragmatic Reality** - ban on discards has large implications (grounds, constraining byproduct TAC, discontinuity in indicators, product quality, volume of trades); patchy success

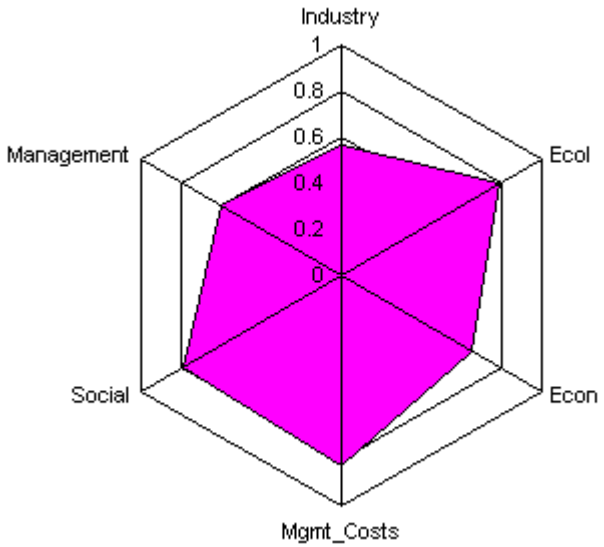
Strategies and tradeoffs



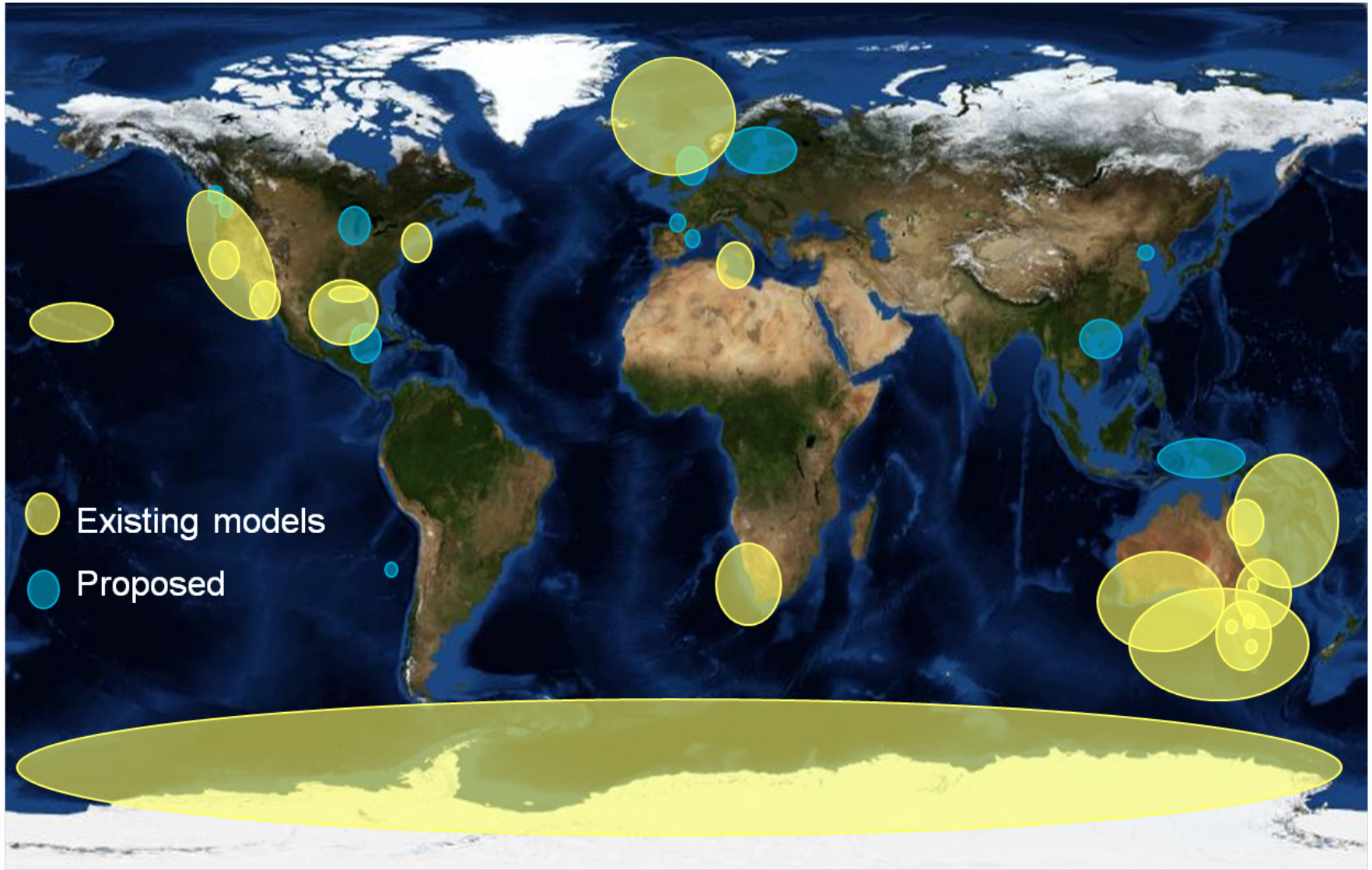




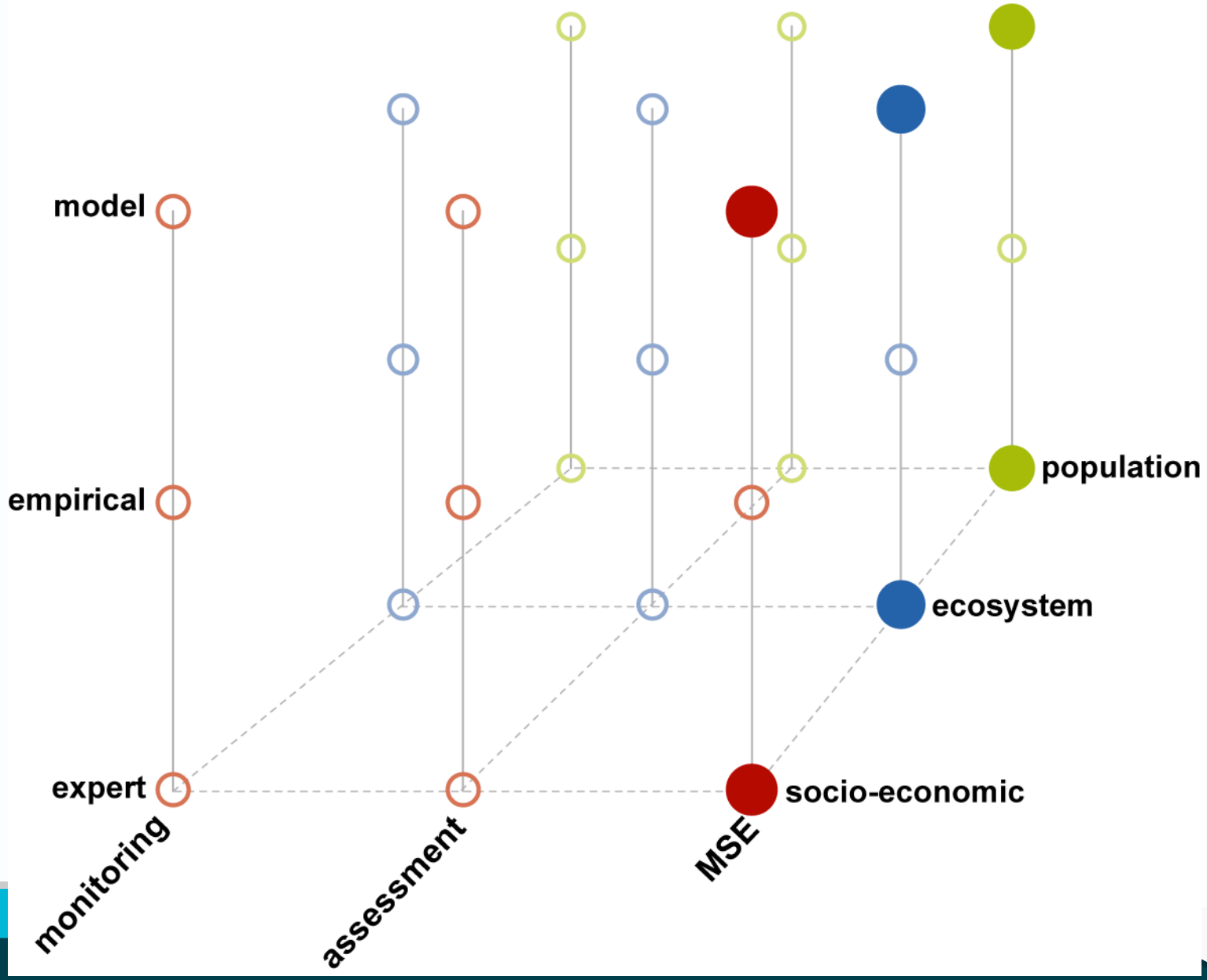




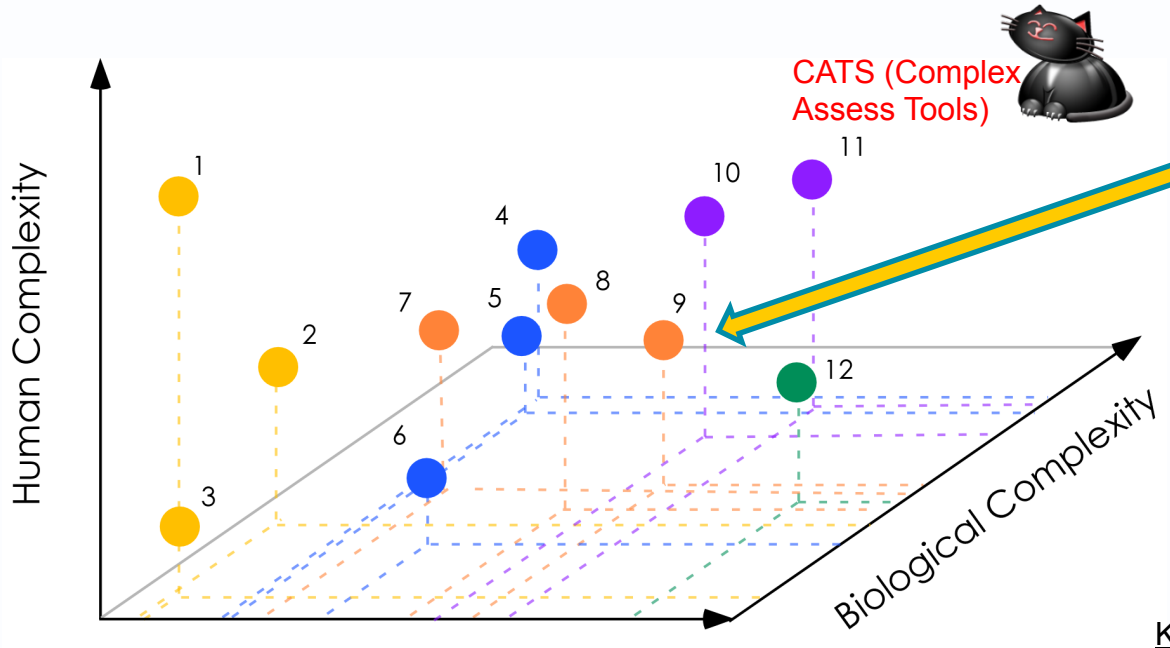
Atlantis Implementations - 2012



MSE (EBFM)


model
empirical
expert
population
ecosystem
socio-economic
monitoring
assessment
MSE

MICE



CATS (Complex Assess Tools)

MICE

Models of
Intermediate
Complexity for
Ecosystem
assessments

NATS (Not All Trophic Species)

"Complexity" refers broadly to the amount of detail incorporated in the model structure, eg, biological complexity could be in terms of the number of species groups or the detail included for a single group

Key to models

[1] Social network models (e.g. BBN, AB)
[2] Biological risk assessment models (e.g. PSA)
[3] Input-output economic analyses (e.g. Australian wild fisheries)
[4] Integrated fishery bio-economic models (e.g. NPF Economic)
[5] Single species fishery assessment models (e.g. TS Lobster)
[6] Species Distribution Models (e.g. SBT/YFT Habitat)
[7] Ecopath with Ecosim (e.g. Pelagic longline fisheries off eastern Australia)
[8] Qualitative Models using signed digraphs (e.g. PICT fisheries resources)
[9] Minimally Realistic Models (e.g. Catchment dynamics and NPF)
[10] Coupled Models (e.g. GoC spatial MSE)
[11] End-to-End Models (e.g. SE Atlantis)
[12] Integrated Catchment-Coastal Models (e.g. SE Qld)

Ref: Plaganyi et al 2011 Mar. Freshw. Res.

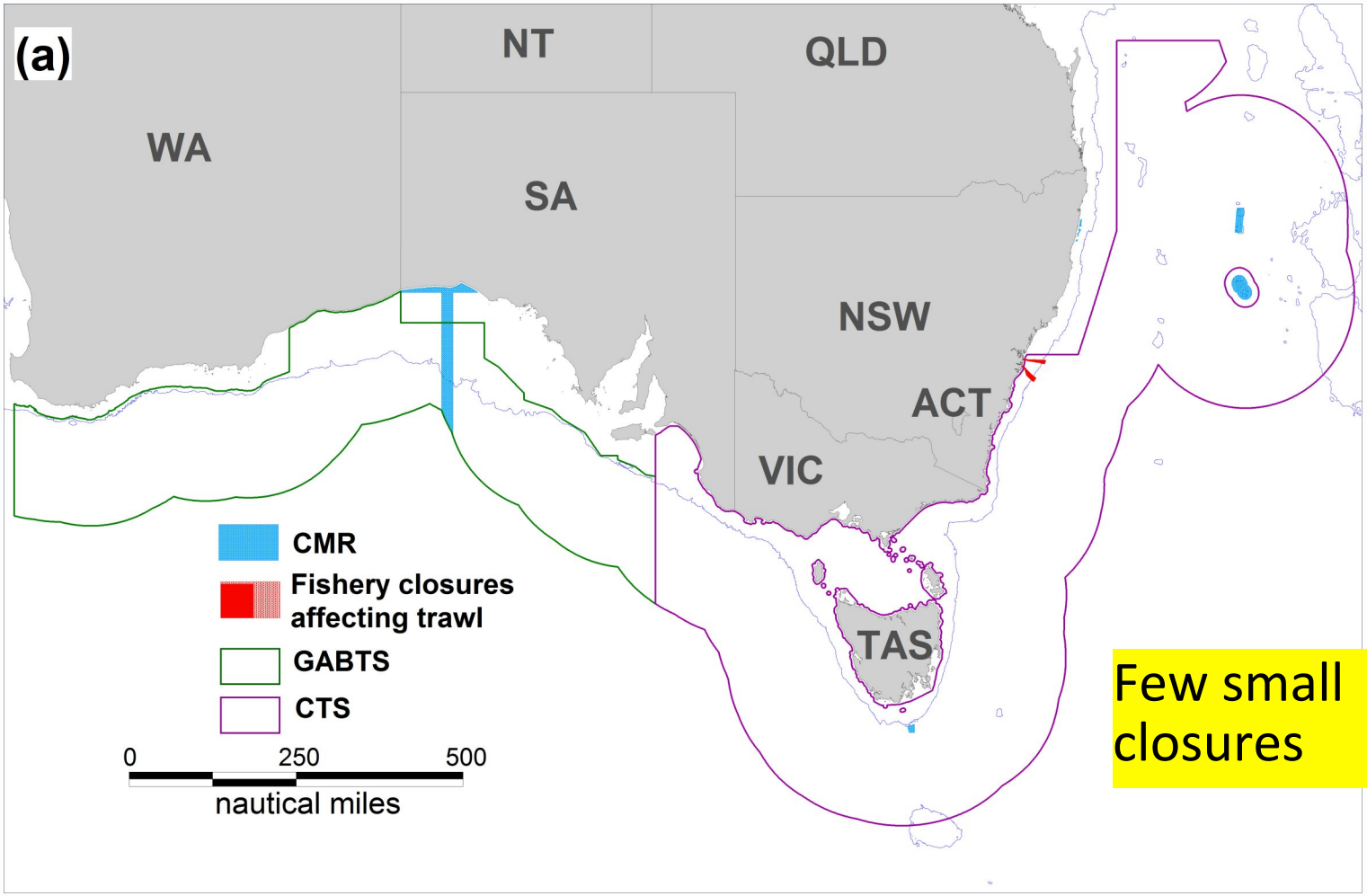
Key concepts underlying tools

- Strategic approach to tool development
- Pragmatic and tactical approach
- Tools to support adaptive management
- Indicators, assessment tools, MSE
- **Hierarchical approach / triage**
- **Risk based and data poor/poor data methods**
- Integrating ecological, economic and social
- **A diversity of tools in the toolbox**

Implementing EBFM

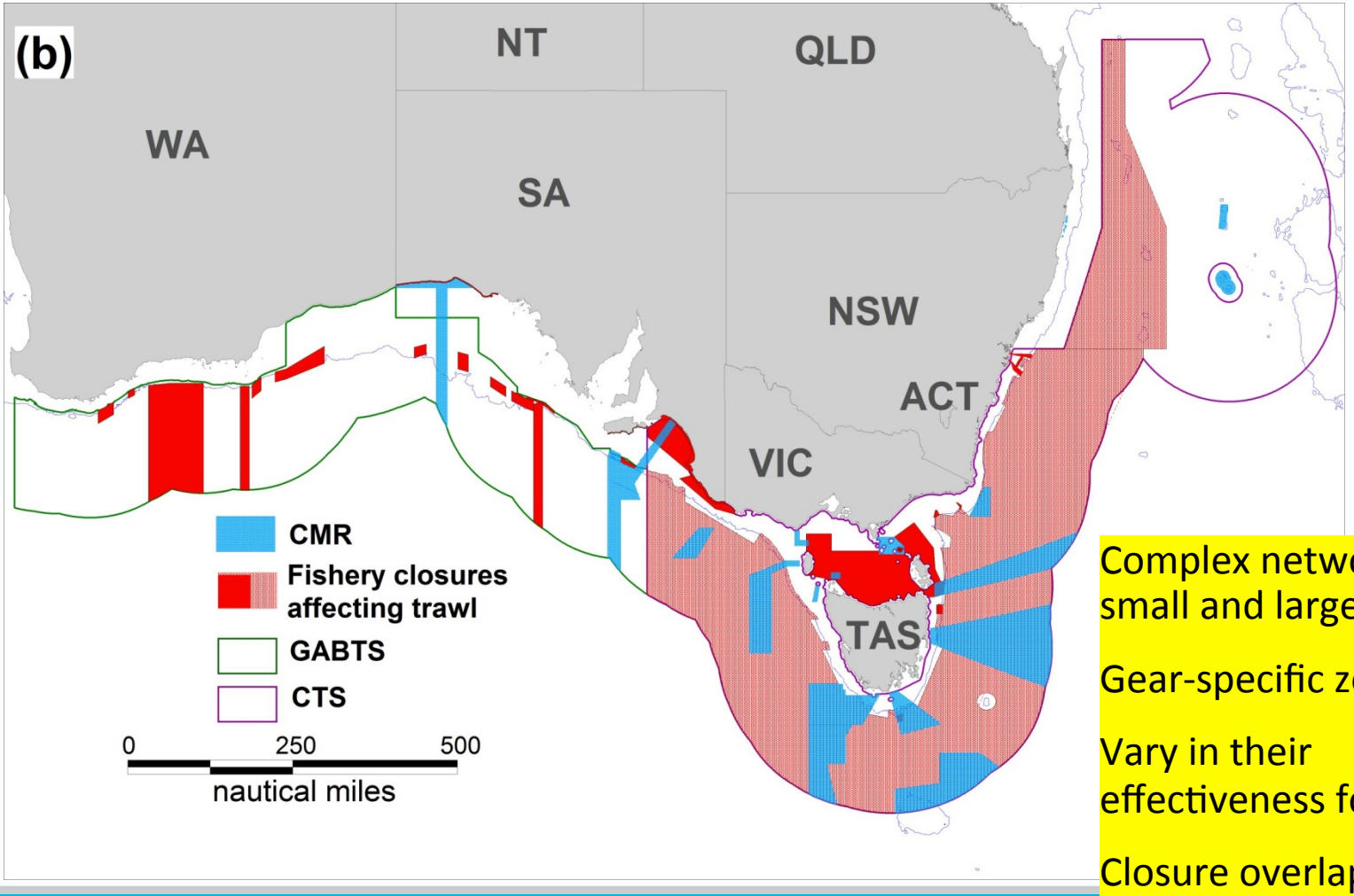
- Harvest strategy policy has led to reduction in overfishing
- Implementing harvest strategy policy has also reduced fleet sizes, effort and ecological footprint
- A variety of measures to deal with bycatch and protected species
  - Threat abatement plans for seabirds
  - National plan of action for sharks
  - Species recovery plans
- Large increase in use of spatial management

Closed area context: trawl closures in 2000



From:
Smith et al. (2011). A review of impacts of demersal trawling on marine ecosystems in the SESSF. Report to the Australian Fisheries Management Authority, 41 pp.

Closed area context: trawl closures in 2009



Complex network of small and large closures

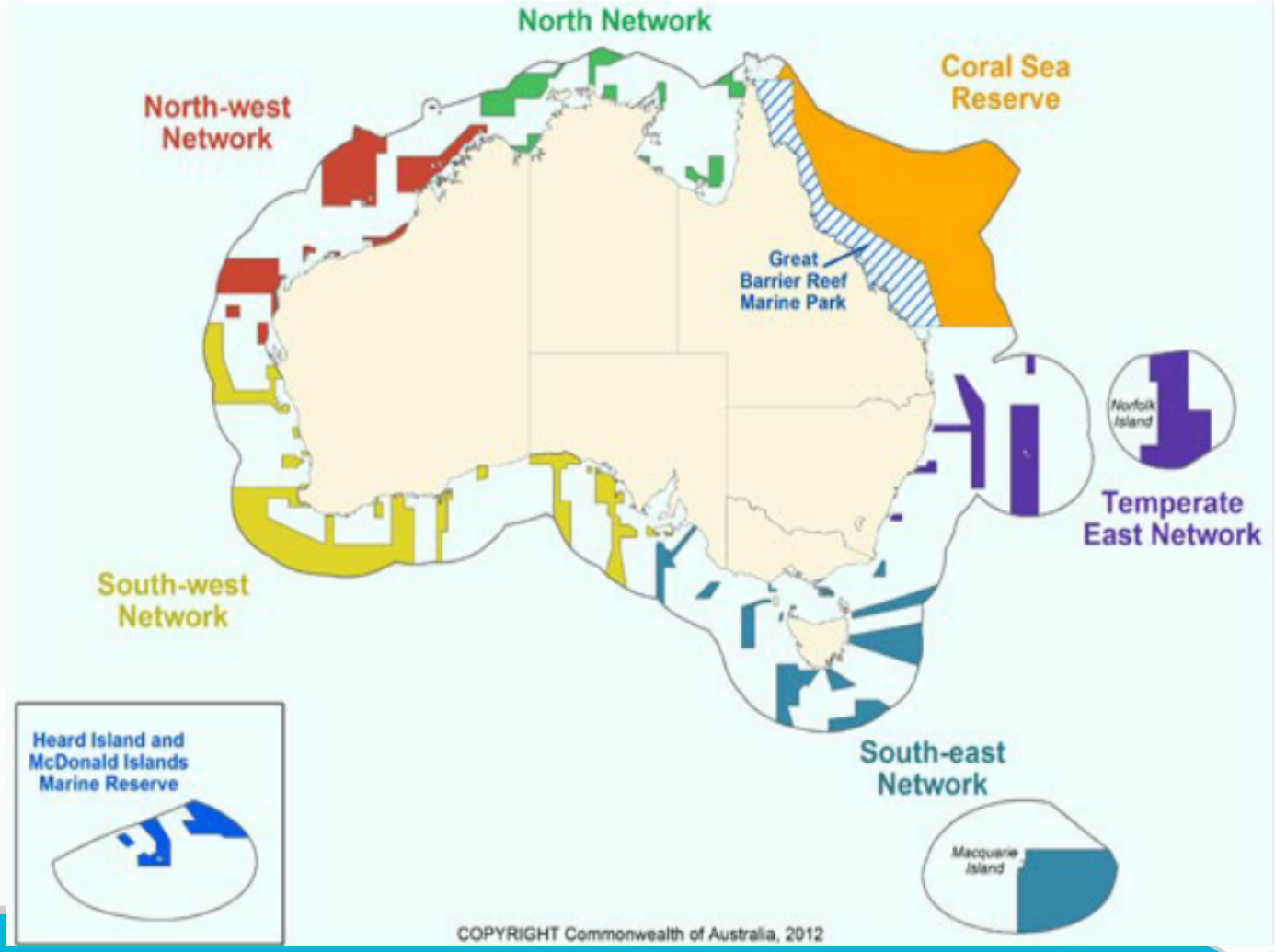
Gear-specific zoning

Vary in their effectiveness for gulpers

Closure overlaps

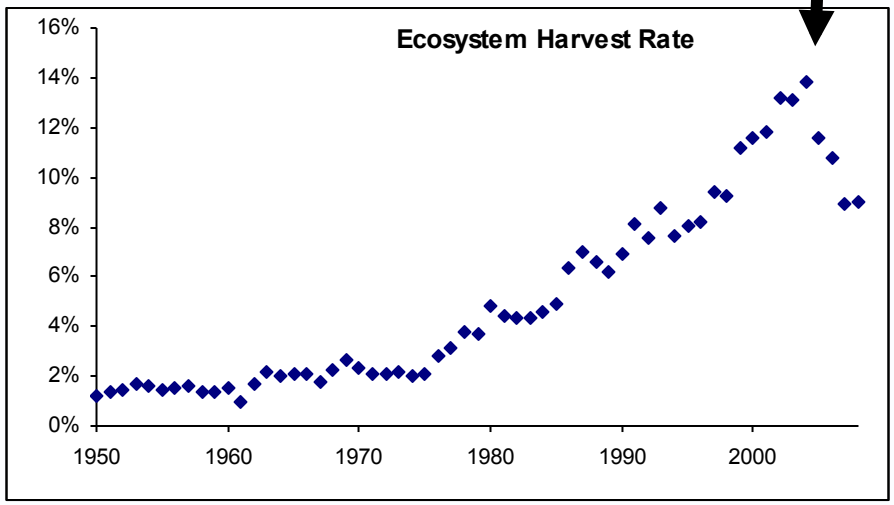
From:
Smith et al. (2011). A review of impacts of demersal trawling on marine ecosystems in the SESSF. Report to the Australian Fisheries Management Authority, 41 pp.

Commonwealth Marine Reserve Network 2012



Successes
Trends in exploitation rate in the SE fishery

Harvest strategies introduced



10%

Harvest rate

1950

2000

Year

MSC certification for a tropical shrimp fishery

A spectacular failure

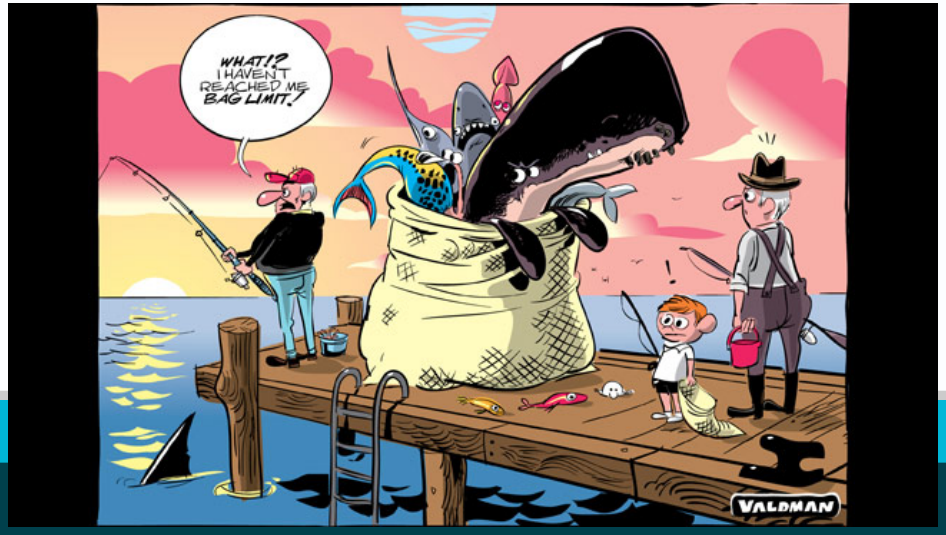
Implementing EBFM

- Unusual alliance of eNGO and recreational fishing lobbies

SHEILA N.

IT'S COMING
WHAT'S THE CATCH?

BANNED
PEOPLE POWER WINS!
AUSTRALIANS CLAIM BACK
THEIR OCEANS


WHAT!? I HAVEN'T REACHED MY BAG LIMIT!
VALDMAN

WE STOPPED IT!

VEGETABLE STOCK
MEAT STOCK
FISH STOCKS
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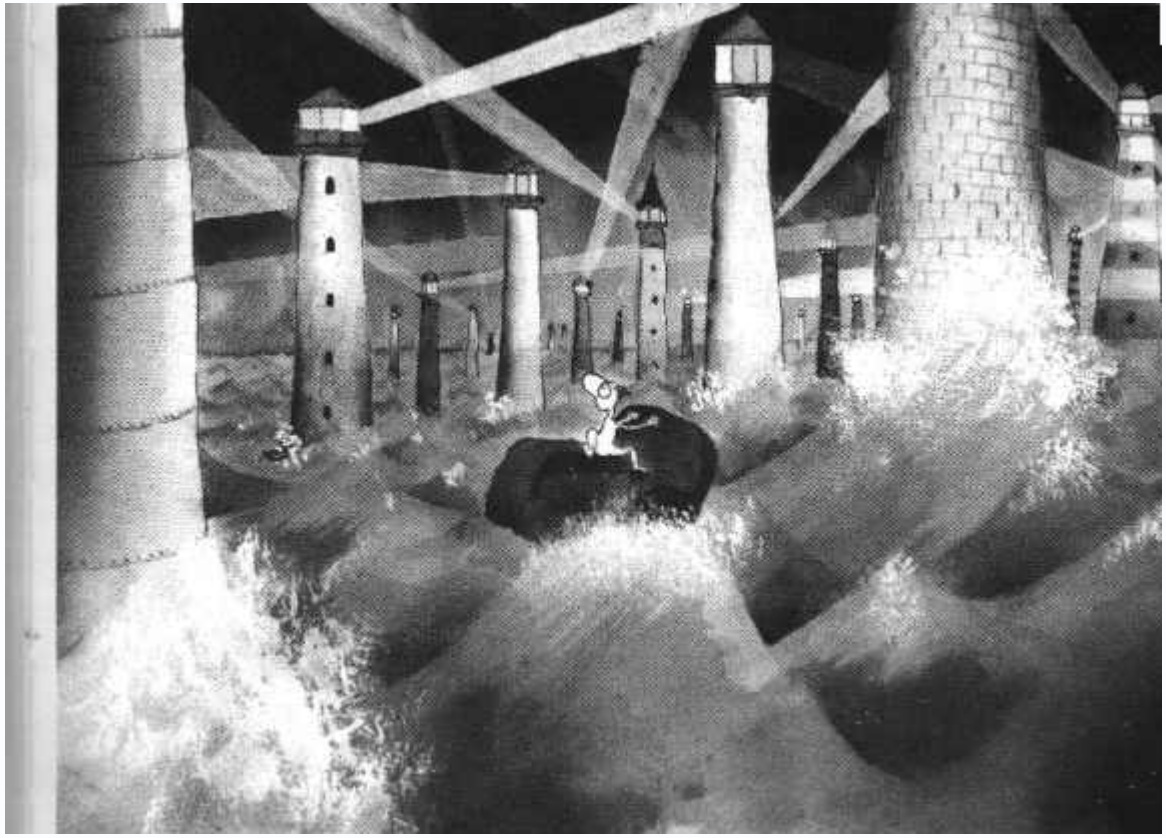
Lessons for MSA?



Similarities and differences

- Many similarities, especially to US west coast tools and management
  - A lot of “cultural” interchange
  - Similar strong commitment to “end overfishing”
- Some substantial differences in legislation and policy approaches
  - Prescription, flexibility
- Similarities and differences in “companion” legislation
  - E.g. NEPA versus EPBC
- Triage, prioritization, risk based approaches
- Similar interests in “developing the toolbox”

Thank you

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