Queensland Coral Fishery - Case Study

Australian Government
Great Barrier Reef Marine Park Authority

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Developing the ‘toolbox’

Australian Government
Great Barrier Reef
Marine Park Authority

- Shared story – participatory, collaborative
- Many years, much discussion
- Pragmatic work in progress

Effective Conservation = good information AND <u>changing people’s behaviour</u>

Acknowledgements

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Great Barrier Reef
Marine Park Authority

- **Management:** DPI&F, GBRMPA, EPA
- **Compliance:** QBFP, DDM
- **Science:** AIMS, JCU, Museum, CQU, independent consultants
- **Industry:** Peak body + ~ 6 key operators
- **NGOs:** WWF (limited)
- **General Public:** various open consultation periods
- **Ultimate Arbitor:** DEWHA (EPBC fisheries assessment + NDF)

Overview

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- Context – relevant to making an NDF
- Current Management Status
  - Legislative component
  - Adaptive component
- Catch & export status
- Making the NDF – risk-based approach
- Details of adaptive management tools
- Problems
- Recommendations

History of coral removal on the GBR

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- Coral mining from late 1800s, for horticultural use (lime)
- Early “scientific” collection (museums & private collections)
- Substantial tourism souveniring of curio corals (from early 1900s)
- Commercial collection/fishery (regulated since 1932)
- Until 1990s focus on curio market
- Increasing public perception issues re removal of curio coral
- Improved technology from late 1980s + cheaper equipment = increasing shift to aquarium market

History of coral removal on the GBR

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- GBRMP established 1975, largely to prevent proposed oil mining (& prevent return to coral mining)
- Gradual development of Marine Park management toolbox
- Tourism calls to close coral fishery ~2000
  - Independent Review found no sustainability grounds; but management outdated

Response = collaborative development of current coral policy

GBRMP & global coral biodiversity

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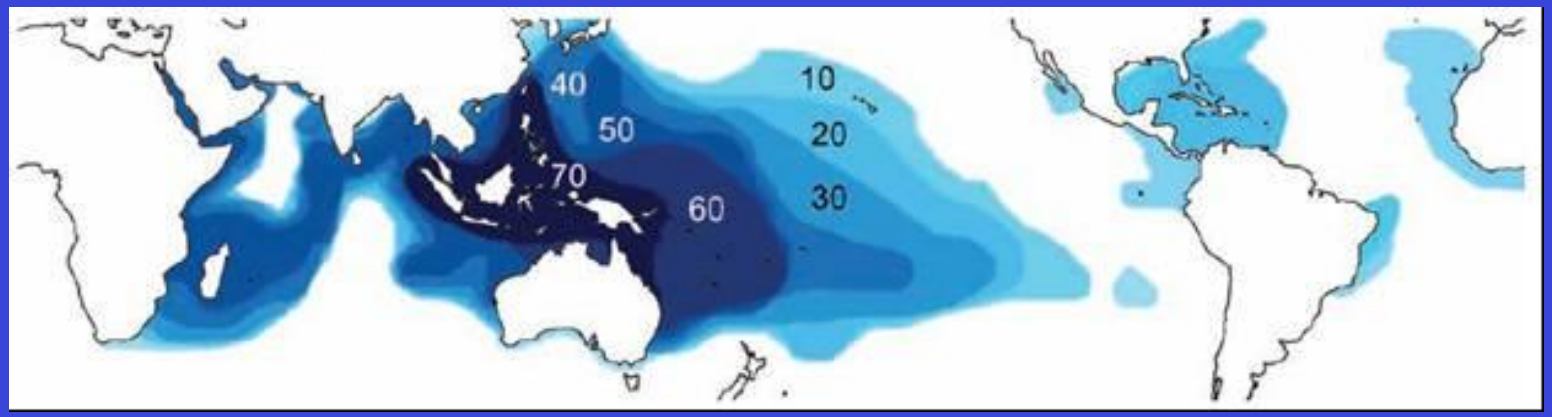
Source: Hutchings & Kingsford (Eds) 2008



- The Coral Triangle – centre for global coral biodiversity
- On GBR – ~70 genera of hard coral & more than 350 species

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What is the GBRMP?

- World Heritage Area marine park
- Over 2000 km of coast
- Large latitudinal range
- Area > 345,000 km^2
- 33% closed to all fishing
- ~ 70 unique benthic habitats
- ~ 6% = “coral reef”
- Lots “inter-reef” & shoals
- Oceanography complex
  - connectivity good?

Basic biology

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Corals - difficult to generalise!

- >350 hard coral species on GBR- huge range of behaviour
- Zooxanthellate vs azooxanthellate
- Hermatypic vs ahermatypic
- Sexual reproduction – brooders vs broadcast
- Asexual reproduction – fragmentation, budding, polyp bailout/expulsion, brooded planulae
- R vs K strategies

Some coral species show enormous plasticity

Habitat types and ecosystem role

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Habitats

- Most QLD CITES-listed species are habitat generalists
- 10 species are habitat specialists – many common in deeper ‘off reef’ areas – not so accessible
- 12 are also very accessible (mostly these are habitat generalists)

Ecosystem role

- Hermatypic corals – contribute substantially to coral reef matrix, provide habitat, food, increase biodiversity
- Ahermatypic corals – often inter-reefal, some role as habitat , food & biodiversity . Major export species = ahermatypic

Current knowledge base

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- **Published Science** = mostly ‘coral reef’ habitats, mostly shallow/common species hard corals
- **Aquarists** = unusual/’rare’ species, more often deeper/turbid water coral species – some information anecdotal or in grey literature
- **Collectors** = inter-reefal habitats and species – mostly anecdotal unpublished information

Current management

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Basic Rules (multi-jurisdictional)

- Fishery area = GBRMP WHA
  - 33% no-take + extra areas too deep or exposed
- Limited entry, small (59 licenses/ 24 operators)
  - Limits on number of boats & divers
  - Hand collection (hammer/chisel)
  - Detailed catch (logbook) reporting (species/location)
- No recreational take of coral in GBRMP
  - All other removal of coral requires permit – strict guidelines applied

Current management

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Great Barrier Reef Marine Park Authority

Basic Rules (multi-jurisdictional)

- Quota (200 T per year)
  - Real-time quota debit (phone–in system prior to landing)
  - Good compliance framework
- Quota cap
  - 70% live rock & fast growing corals (2 genera)
  - 30% all other types of coral
  - Quota review reference points for 2 main collection areas (defined spatial boundaries)

Current management

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Natural limits on effort

- Diving safety regulations – limits time at depth > 10m
- Weather - significantly limits all effort
- Strong market drivers focus effort
  - Private aquaria = small pieces rock & coral - colour, shape important
  - Primary transport = air freight (20 kg boxes + economics)

Current management

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Adaptive, risk-based management framework

Focus = ecological sustainability & resilience

- Collaborative fine-scale catch monitoring
- Review reference points for high use areas
- Iterative Vulnerability Assessment (VA)
- Iterative Ecological Risk Assessment (ERA)
- Iterative Performance Measurement System (PMS)*
- Environmental Stress Response Plan*
- Industry stewardship initiatives*

Current Catch

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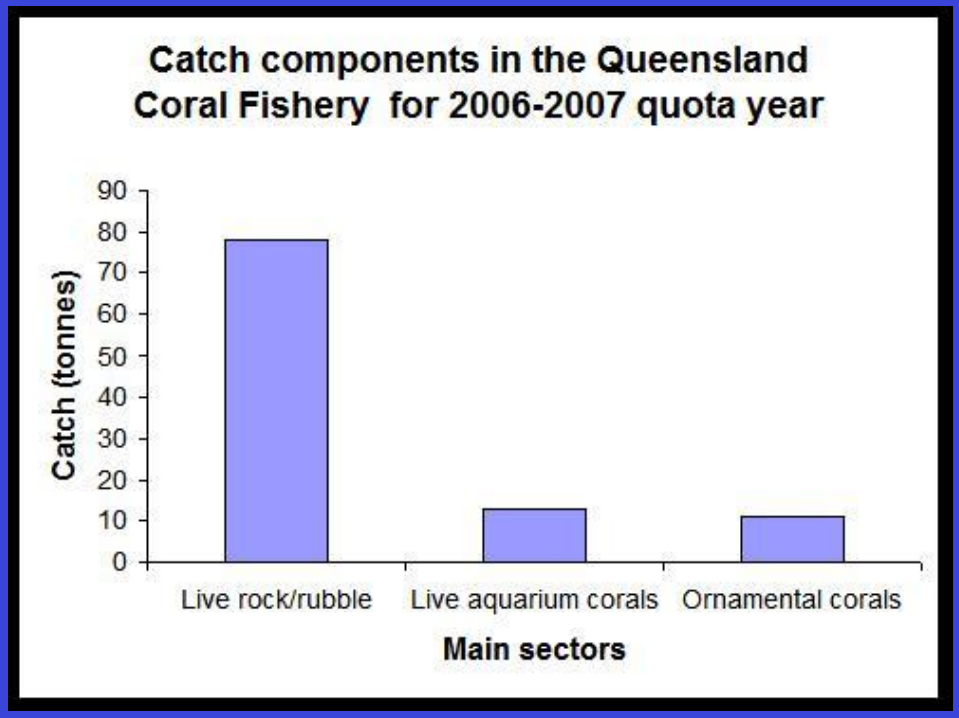
- Only ½ quota collected
- Live rock → domestic market
  - 1 Tonne = 25m^2
- Ornamental
  - Mainly *Pocillopora* & *Acropora*
  - Some export
- Aquarium
  - Not all CITES-listed!
  - Mix of hard/soft corals, corallimorphs, zooanthids etc.
  - Some export



Number collected vs exported July 2006- May 2008

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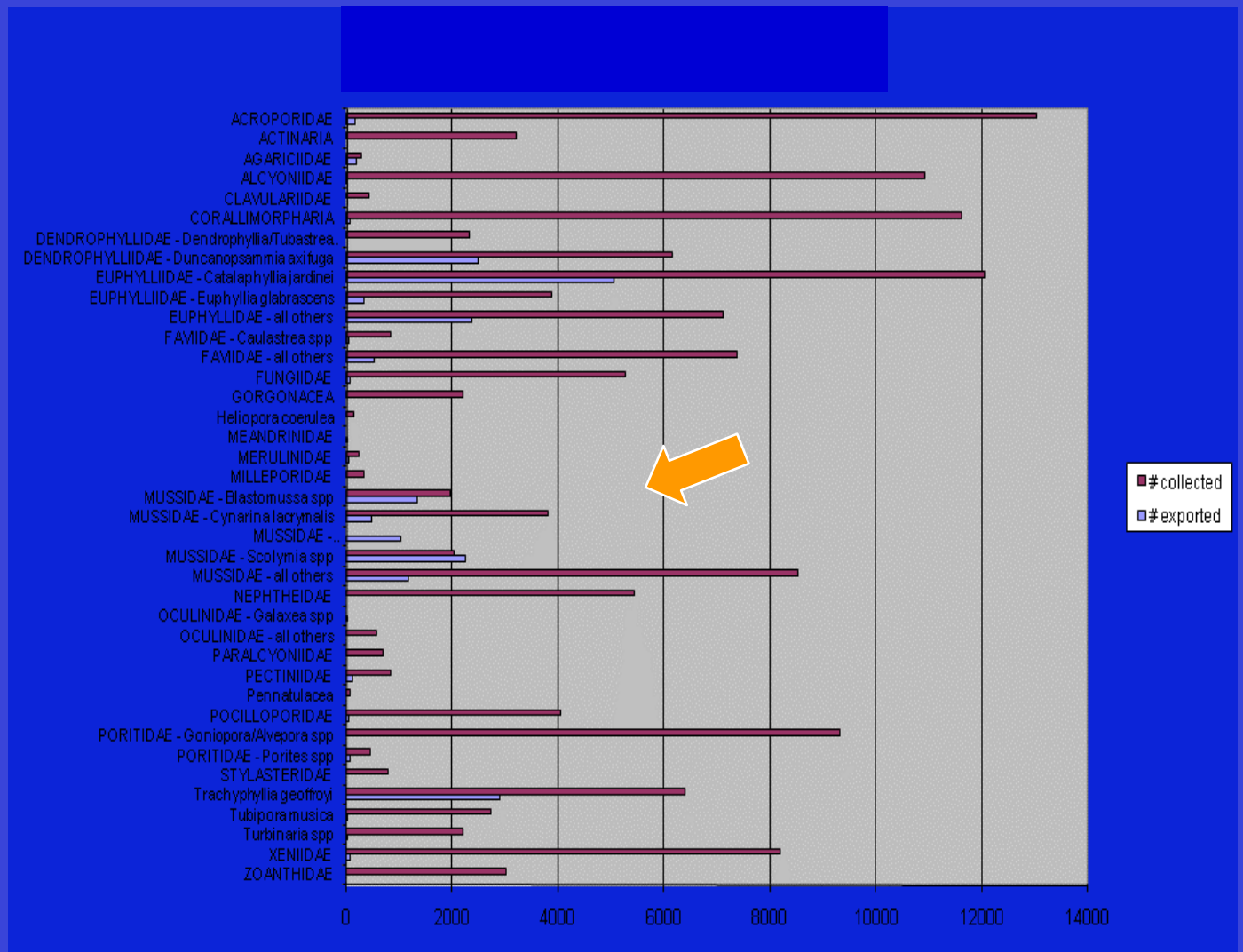

Current status of the fishery

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CITES-listed Catch/Export information

- 52 CITES-listed genera/species fished
- 48 widespread distribution, 4 mainly West Pacific, some locally rare
- 23 exported (>100 pieces in 2yrs)
- Total export ~21,000 pieces
- Exported species = most not ‘reef builders’

Current status of the fishery

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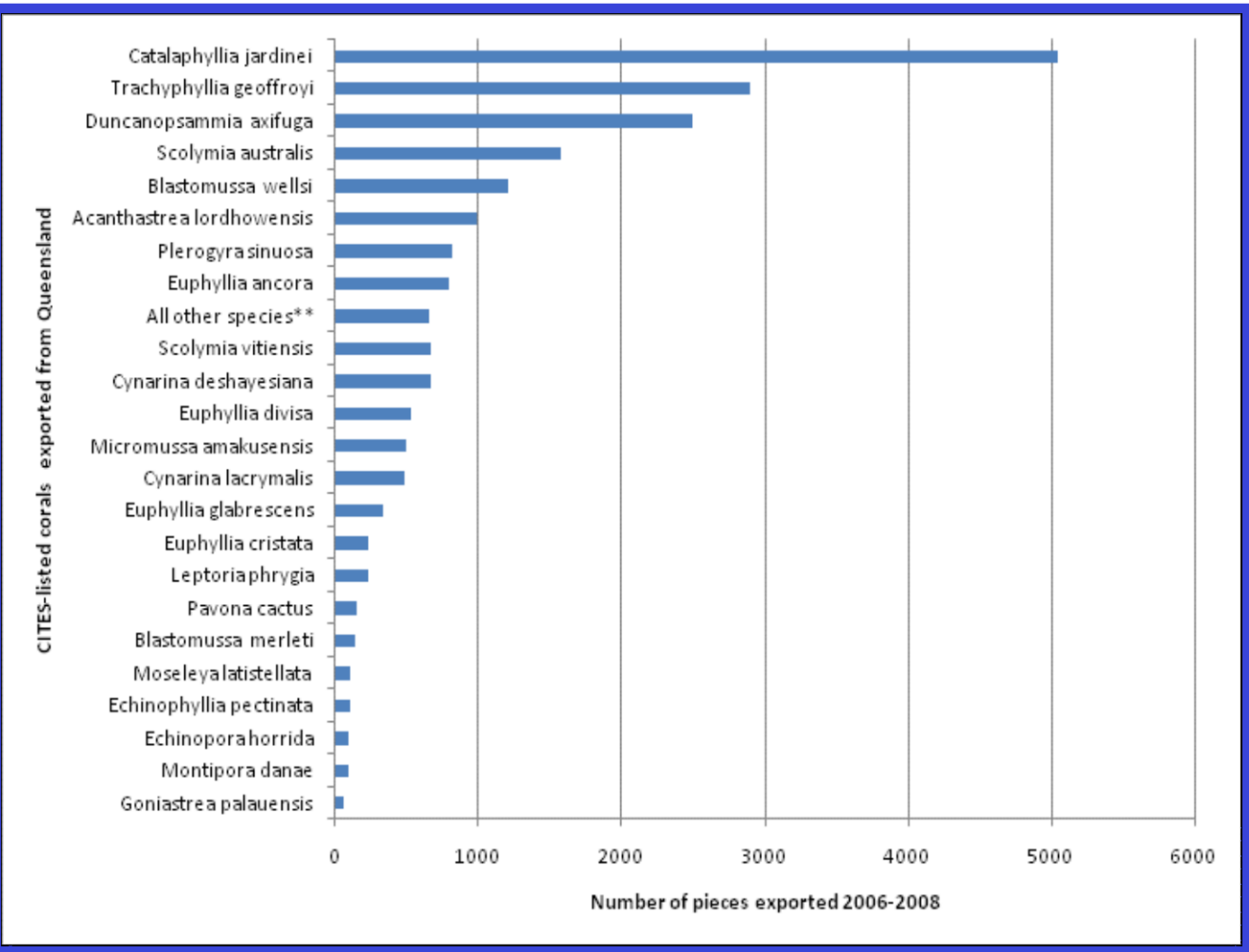

Species of CITES-listed coral exported from the Queensland Coral Fishery from July 2006 to May 2008.

Note: All other species** = 47 different species where less than 50 pieces per species have been exported during this period.

(Source DEWHA CITES section export figures, 2006-2008)

Making an NDF

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- Coral doesn't fit CITES easily
- QLD started from scratch, built from bottom-up (2003-2006)
  - Fishers initially hostile
  - No reliable catch data
  - Limited scientific information on target species
  - No export*

Making an NDF

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- Existing national adaptive risk-based fisheries framework (*EPBC Act*) = used this for NDF
- Stepwise approach
- Incorporated all available information
- 2008 = 2 yrs data; participatory/collaborative management
- Now time to review adaptive components

Tools – Vulnerability Assessment

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- Simple flexible structure
- Identifies key issues & species
- Quantify factors that make species vulnerable to harvest
- Pre-assessment tool for ERA

- Taxa list generated from collectors stock lists
- Desk-top study
- Vulnerability = average across ranks
- To be reviewed when more info available

Tools – Vulnerability Assessment

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- **Accessibility** (1-5 scale, 1= very limited)
- **Habitat/ecological niche** (2 = generalist & 4 = specialist)
- **Distribution** (1-5 scale, 1= widespread)
- **Susceptibility to bleaching** (2-4 scale, 2 = low)
- **Abundance** (1-5 scale, 1= very common)

Tools – Vulnerability Assessment

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Vulnerability risk categories for coral taxa in the QCF

Vulnerability Risk	Average score from criteria	Description
Very Low	<2	These taxa are not vulnerable to harvesting activity in the QCF.
Low	2–2.99	These taxa are at low risk from QCF harvesting activity.
Medium	3–3.99	These taxa have characteristics that make them moderately vulnerable to over harvesting by the fishery.
High	4–5	These taxa have characteristics that make them highly vulnerable to over harvesting by the fishery.

Of 52 genera/species assessed, only 1, *Montipora* emerged as a moderate risk, all other CITES-listed genera were a low vulnerability risk

31 had a low susceptibility to bleaching

Tools – Vulnerability Assessment

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RESULTS

- Of 52 genera/species assessed, only 1, *Montipora* emerged as a moderate risk, all other CITES-listed genera were a low vulnerability risk
- Note also:
  - 31 had a low susceptibility to bleaching
  - 10 habitat specialists (*Cataleaphyllia, Caulastrea, Cycloseris, Diaseris, Heteropsammia, Plerogyra, Montipora, Scolymia, Symphyllia, Trachyphyllia*)
  - 12 were readily accessible (no over lap except *Diaseris & Montipora*)

Tools – Ecological Risk Assessment

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- Provides formal assessment of effects of fishery on harvested species = risk
- VA used to develop scope & issues & 'component tree'
- ERA relies on best available expertise, incl. managers, scientists & fishers
- Because VA identified few species at, or above, low risk experts agreed to include all current/likely export species and live rock

- **Recording expert rationale and known strands of evidence for every step of the risk assessment is CRITICAL**

Tools – Ecological Risk Assessment

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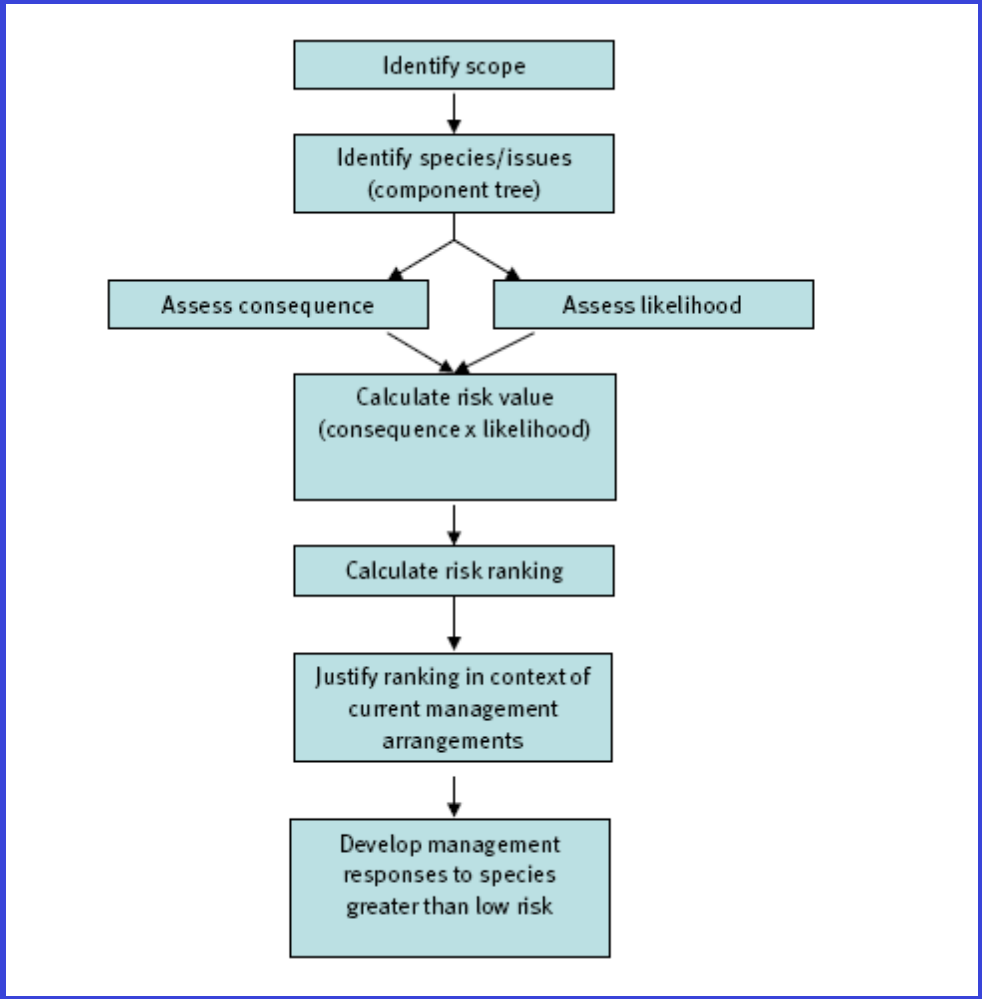

Tools – Ecological Risk Assessment

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Table 3. Risk matrix – numbers in cells indicate risk value, the colours/shades indicate risk rankings (see Table 4 for details). Adapted from Fletcher et al. (2002).

Likelihood		Consequence					
		Negligible	Minor	Moderate	Severe	Major	Catastrophic
		0	1	2	3	4	5
Remote	1	0	1	2	3	4	5
Rare	2	0	2	4	6	8	10
Unlikely	3	0	3	6	9	12	15
Possible	4	0	4	8	12	16	20
Occasional	5	0	5	10	15	20	25
Likely	6	0	6	12	18	24	30

Tools – Ecological Risk Assessment

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Table 4. Risk ranking definitions. Adapted from Fletcher et al. (2002).

RISK		Reporting	Management Response
Negligible	0	Short Justification Only	Nil
Low	1-6	Full Justification needed	None Specific
Moderate	7-12	Full Performance Report	Continue Current Management Arrangements
High	13-18	Full Performance Report	Changes to management required
Extreme	19-30	Full Performance Report	Substantial additional management needed urgently

Tools – Ecological Risk Assessment

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- No taxa collected in the fishery came out with a rank greater than ‘low risk’
- ERA to be reviewed in 3 years (or as needed if substantial new information available)
- ERA provides transparent mechanism to identify monitoring & research needs

- Experts agreed to keep watching brief on harvest rates of all species

Tools – Performance Management System

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- Becoming a std fisheries tool in Australia
- In development for coral fishery
- Establishes objectives, KPIs (e.g. rates of change) & management responses (e.g. adjust quota units)
- Provides formal & transparent process to review catch data
- Relies on best available data/information relevant to objectives
- Involves stakeholders, has public reporting requirements

Tools – Stress Response Plan

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- In development…..
- Outlines harvest strategy to adopt when reefs show evidence of stress (bleaching due to several causes)
- Links to existing and well respected monitoring programmes
- Aims to promote resilience through transparent, non-emotive, timely responses
- Allows for continuum from voluntary moratorium at local scale to temporary spatial closure
- It is hoped this will be a pilot for a more inclusive approach to managing local access by all users to “stressed” areas of reef

Tools – industry stewardship

Australian Government
Great Barrier Reef Marine Park Authority

- Compiling comprehensive Code of Conduct, incl. documenting harvest strategies
- Looking to co-fund grant-based research on best practice
- Forward planning to develop certification programme – 3rd party auditable
- Pilot monitoring programme – integrate with community capacity to ground-truth results in shallow areas
- Attending conferences to share knowledge with other sectors (+ engage with Coral-list)

Problems

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- Taxonomy/life history plasticity – doesn't fit CITES framework,
- Taxonomic issues compromises quality/accuracy of data
- Units of measure - #s alone is misleading
- Question of spatial scale and ecosystem function in diverse systems
- Trade is tip of the iceberg – cumulative impact from other processes more important?
- Can't ignore social and economic factors – they drive human behaviour
- Fossil coral???
- Scientific movement of coral?

Recommendations

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- Ecosystem-based NDF framework for coral - single species rarely collected in isolation
- Adaptive & risk-based – rarely have good info on species & habitats
- Need a ‘”toolbox” and stakeholder participation - need transparency & buy-in
- Incorporate best available “expert” information & regular review – converging lines of evidence

Global Perspectives

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Context

- Recent global & local shift to live aquarium corals
- Entire aquarium industry worldwide > US $15 billion
- 100’s of millions of people visit public aquaria annually
- Est. 10% of households in many countries have private aquaria

Coral collection opportunities:

- Education
- Economic
- Research
- Medical