



QUALITATIVE MODELLING FOR EBFM (WAMSI Project 4.1)

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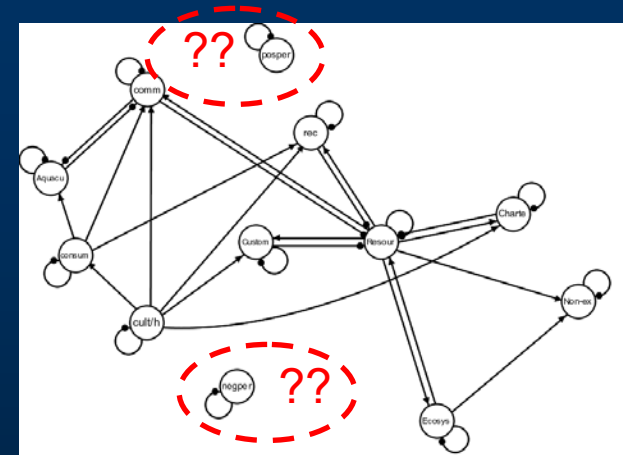
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PERTH, WESTERN AUSTRALIA

Linkages and impacts for EBFM

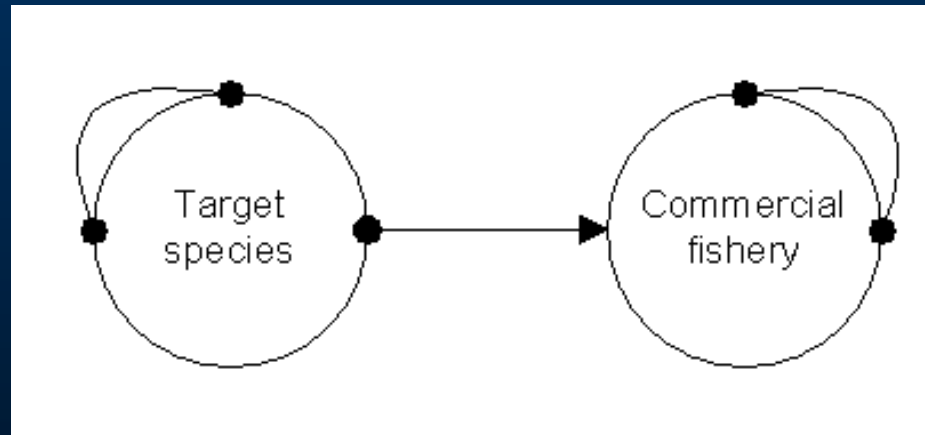
- Assets/risks identified
- Data limitations
- Numerous unknowns
 - response of social and economic components
 - links between assets
 - indirect effects of change



How can we identify and investigate these issues in this data-limited situation?

Qualitative modelling

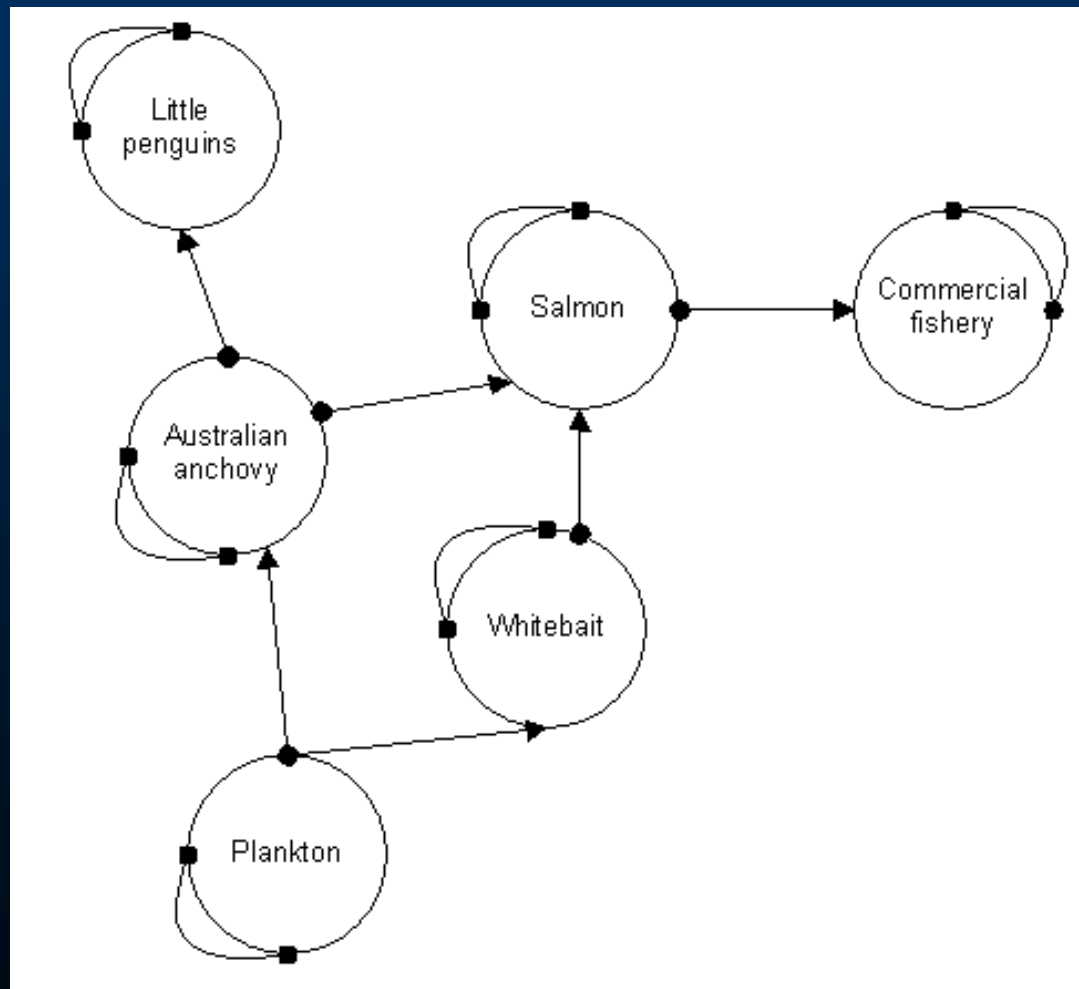
- little data required, sign of interaction between species/variables (+,-,0)



- multiple data types (social trends, public opinion, fisheries catches)

Qualitative modelling

- Feedback between variables allows investigation of direct and indirect effects of change



Major outcomes expected

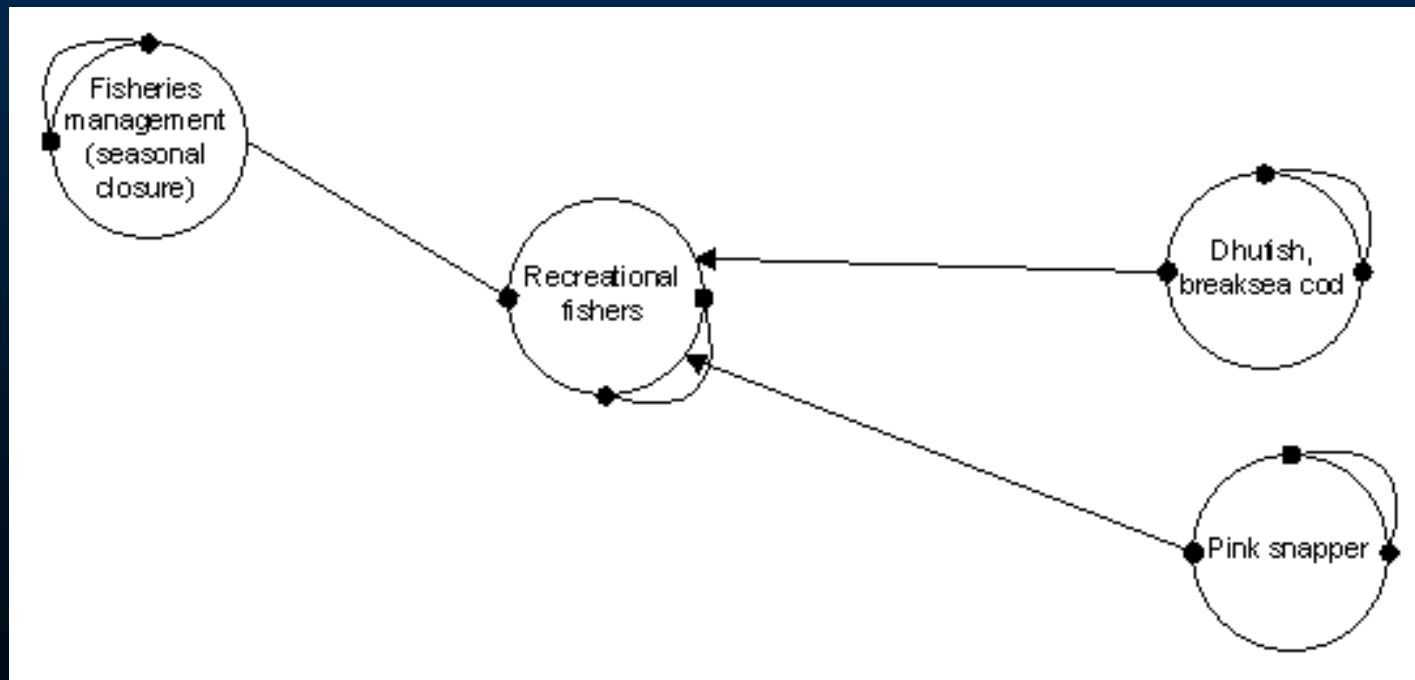
- determine social and economic links
- identify data gaps
- highlight important relationships
- investigation into the stability of modelled systems
(important for impacts of change)
- examination of alternative management strategies
- enable greater discussion with stakeholders

Completed models

- West Coast Bioregion (broad-scale)
- Cockburn Sound
- Roe's abalone
- Geraldton/Abrolhos rock lobster fishery
- Recreational fishing for demersal fish in the Metro region
 - 1) Impacts of closure on fisher behaviour
 - 2) Alternative management strategies

Recreational fishing models

- Dhufish, pink snapper and breaksea cod stocks heavily fished by recreational fishers
- Impacts of additional management (seasonal closure) investigated



Recreational fishing models

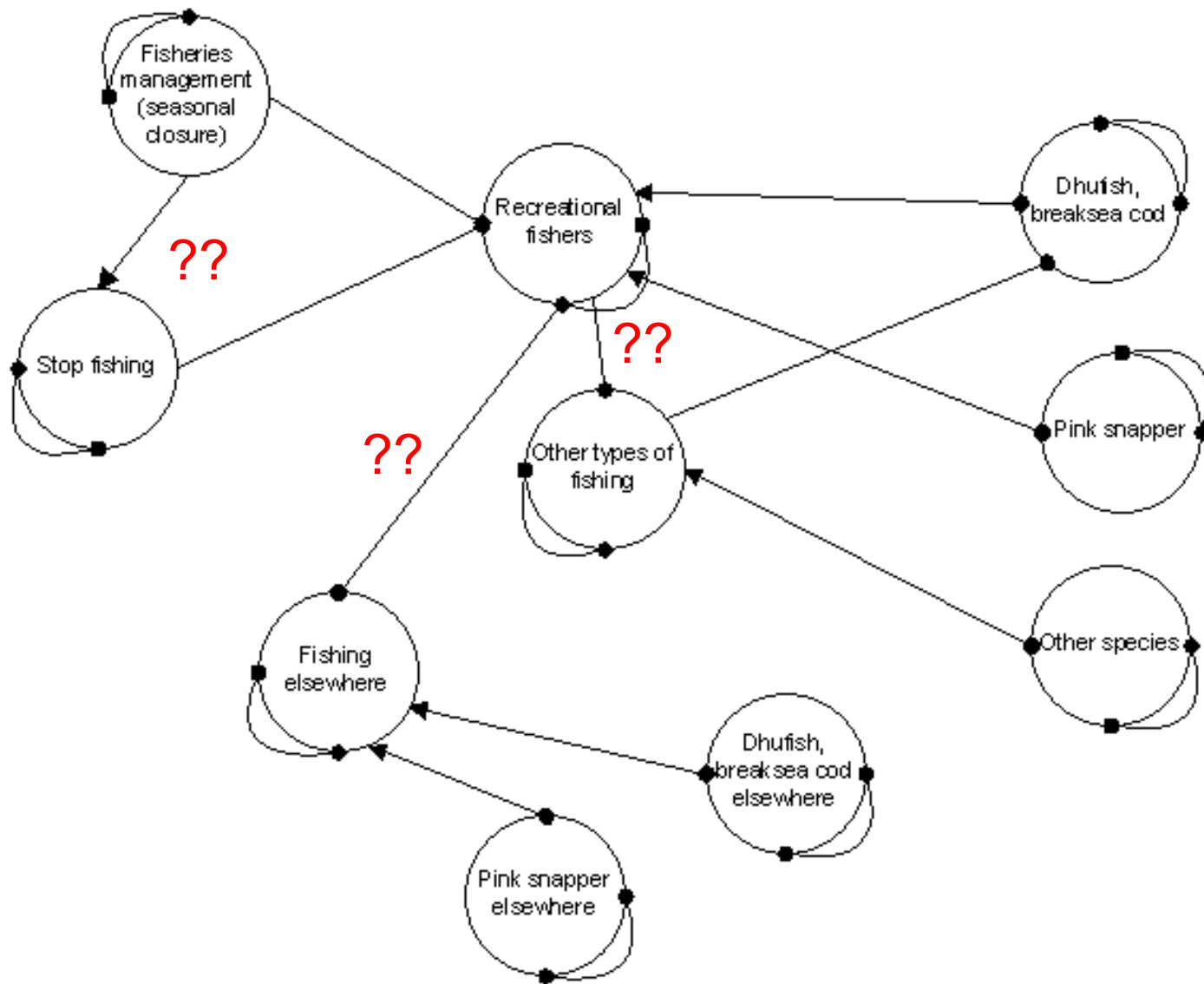
No available information on how fisher behaviour

Fishers may:

- travel to fish elsewhere
- shift to other types of fishing (e.g. beach fishing for herring)
- stop fishing altogether
- all or some changes in behaviour may occur

Need to assess all to understand the impacts of the seasonal closure

Recreational fishing models



Recreational fishing models

- Data collection necessary
- 8 alt. models → all combinations of behavioural change

Fisher behaviour following management	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Increase in stop fishing	Y	N	Y	Y	Y	N	N	N
Increase in fishing elsewhere	Y	Y	N	Y	N	Y	N	N
Increase in other types of fishing	Y	Y	Y	N	N	N	Y	N

Recreational fishing models

Results

- Increase in the abundance of pink snapper (in Metro region) regardless of model structure
- Ambiguous response in dhufish and breaksea cod (in Metro), decline in abundance for these fish elsewhere

Extreme scenario to investigate alternative management strategies that may allow dhufish and breaksea cod abundance to increase

Recreational fishing models

Alternative management strategies

1) Spatial closure (Metro)

2) Spatial closure (Metro) and additional restrictions on fishing elsewhere

Variable	Spatial closure	Spatial closure & restrictions elsewhere
Dhufish, breaksea cod (Metro)	+	+
Pink snapper (Metro)	+	+
Dhufish, breaksea cod (Elsewhere)	-	+
Pink snapper (Elsewhere)	-	+

Management implications

Further data collection and research necessary

- recreational fishing, and the social and economic drivers behind recreational fishing
- economic components (e.g. Australian dollar, international market, links between these components)
- level of illegal fishing
- influence of lobby groups on government

Assess new management strategies

Future directions

Ongoing need to investigate links between social, economic and ecological aspects within ecosystems

- Create additional models as new issues come to light
- Continue liaison with external and internal stakeholders to modify models
- Use in conjunction with other techniques

