Having a crack at MEY when time, money and data are short.

Fishery Gross Margin (FGM) Model use in the South Australian Pipi (*donax Deltiodes*) Fishery

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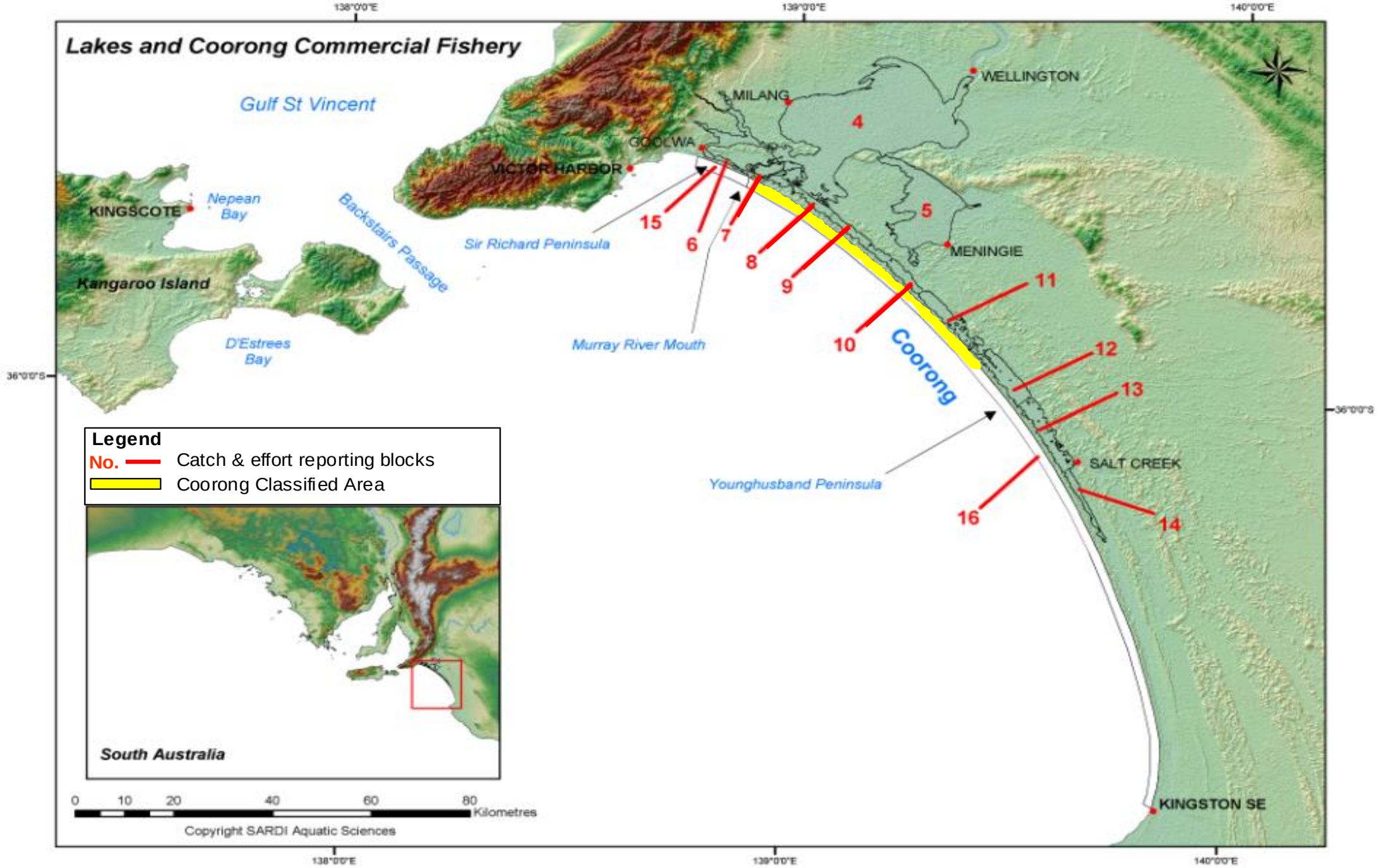
Background

- Commercial Pipi harvesting for 60 years as part of South Australia's Lakes & Coorong Fishery
- 60km SASQAP certified area Younghusband Peninsula
- Harvested using rakes – non-mechanized
- 450 tonne commercial quota fishery
- Limited entry - 25 quota holders & 18 active fishers
- Beach value $3.6m
- MSC certified

Fishery Management Plan

- 10 year management plan
- Licences issued for the life of the plan
- Limited entry commercial fishery
- ITQ system for Pipi
- Resource shares formally allocated between fishing sectors
- Spatial separation (commercial only/recreational only)
- Fishery independent monitoring informs TACC setting


Lakes and Coorong Commercial Fishery
Gulf St Vincent
WELLINGTON
MILANG
GOOLWA
VICTOR HARBOR
KINGSCOTE
Nepean Bay
Backstairs Passage
Kangaroo Island
D'Estrees Bay
Sir Richard Peninsula
Murray River Mouth
MENINGIE
Coorong
Younghusband Peninsula
SALT CREEK
KINGSTON SE
4
5
6
7
8
9
10
11
12
13
14
15
16
138°0'0"E
139°0'0"E
140°0'0"E
36°0'0"S
Legend
No. Catch & effort reporting blocks
Coorong Classified Area
South Australia
0 10 20 40 60 80
Kilometres
Copyright SARDI Aquatic Sciences

Fishery Economic Characteristics

- Low stable capital base - circa $120k
- Minimal licence sales
- Overheads stable over a range of TACC levels
- Variable costs stable/t over a range of TACC levels i.e. safe assuming catch rate changes have minimal impact
- Low value (GVP $3.6m)
- Good data

Profit influencers

Price:

- Supply – total and timing, competition (imports & domestic)
- Demand – marketing, segment mix i.e. bait, vs human consumption (domestic & export), value added product.
- Exchange rate – out of our control

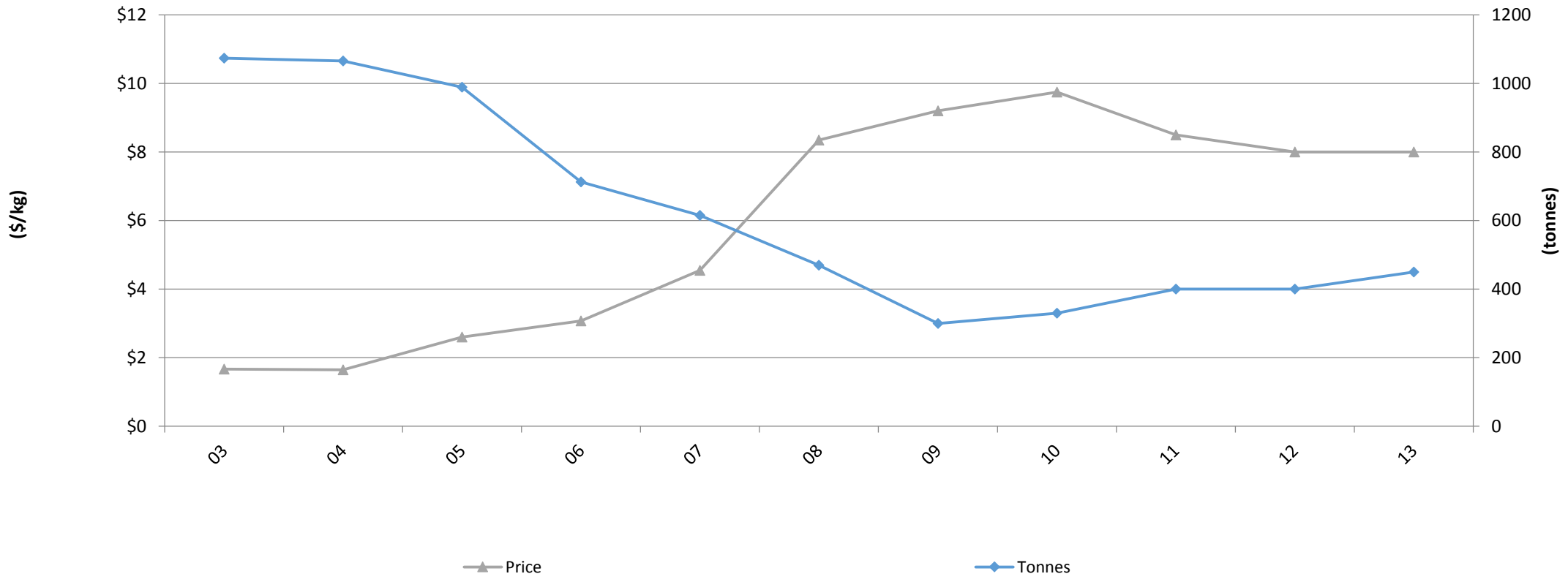
Volume:

- TACC
- Resource shares –
- Marine park no-take zones
- Innovation – aquaculture & reseeding
- Pollution – e-coli outbreaks

Costs:

- Big stocks = higher catch rates = lower costs/kg
- Boats & gear
- Operating – fuel, bait, crew, supply chain
- Overheads - business fixed costs inc. licence fees

Goolwa Pipi Catch and Price ‘03-’13



Harvest Strategy

Objectives:

1. Maintain a target Pipi relative biomass above 10 kg/4.5 m² and not less than 8 kg/4.5 m²
2. Ensuring that the Pipi relative biomass does not drop below 4 kg/4.5 m²
3. Maximise Fishery Gross Margin

Notes:

- The harvest strategy prioritises the biological status of the resource.
- Once the biological status is determined the economics is considered

Building Economics Into the Harvest Strategy

- A Fishery Gross Margin (FGM) modelling framework has been developed to aid the harvest strategy in the Lakes and Coorong Pipi fishery (EconSearch 2012).
- FGM: *is the total commercial catch multiplied by the (actual or estimated) net market price averaged across all market segments, less fishery and operator costs that vary with the TACC level*
- The model was proposed as an alternative to more complex bio-economic models that enable calculation of Maximum Economic Yield (MEY).
- Fishery Gross Margin (FGM) is used as a proxy for maximum economic yield (MEY)

Model Description

GVP – VC = FGM

Range of TACC around (+/- 50t and +/-100t) current level

Scenarios:

1. Base line with expected prices and market shares at each TACC level
2. Influences e.g. + value adding, export, etc. for premium human consumption market segment

Sensitivity analysis:

- Price of both bait and human consumption products
- Market share between bait and human consumption

Simplifying Assumptions

- Static model – doesn't take account of time i.e. the harvest strategy that generates the best return in one year may not be the best strategy when fishery profits are viewed over the next, say, 5 years
- Variable costs ($/kg) stable over a range of TACC, i.e. no link between the fish stock (relative biomass) and the cost of fishing
- Ignores fixed costs – investment in the fishery (fishing gear & equipment) and other fixed costs (permanent labour, business overheads) are not taken into account

Data Needs

- Detailed variable costs (including an estimate of unpaid labour)
- TACC scenarios (generally 4 or 5 – guided by biological status of the resource
- Average price ($/kg) in each market segment (e.g. bait, HC, premium HC) at each TACC scenario
- Catch by market segment for each TACC

Data Collected

- Price expectations and market segmentation estimates for the upcoming season based on an annual survey of small number of licence holders and market analyst
- TACC scenarios developed as part of harvest strategy
- Variable cost data collected as part of fishery economic survey in 2012/13

Variable Costs	$/kg	Share of Total
Vehicle fuel and lubricants	0.35	8%
Ice	0.01	0%
Harvesting gear	0.07	2%
Skipper fees	0.60	14%
Crew wages	1.71	41%
Provisions	0.01	0%
Repairs and maintenance to vehicle and equipment [a]	0.16	4%
Protective clothing	0.02	0%
Freight and marketing	0.61	15%
Unpaid variable labour	0.14	3%
Other [b]	0.51	12%
Total Variable Costs	**4.18**	**100%**

FGM Scenarios – 2013/14 decision: baseline and with value adding

BASELINE SCENARIOS	**Low ↓**	**No Change**	**Low ↑**	**High ↑**
TACC & Market Share:	350 tonnes	400 tonnes	450 tonnes	500 tonnes
• Human Consumption	45%	45%	40%	35%
• Bait	55%	55%	60%	65%
Average Price ($/kg)				
• Human Consumption	$11.50	$10.50	$9.50	$9.00
• Bait	$8.00	$7.50	$6.50	$5.50

VALUE ADDING SCENARIOS (1a)	**Low ↓**	**No Change**	**Low ↑**	**High ↑**
TACC & Market Share	350 tonnes	400 tonnes	450 tonnes	500 tonnes
• Human Consumption	45%	45%	45%	45%
• Bait	55%	55%	55%	55%
Average Price ($/kg):				
• Human Consumption	$11.50	$10.50	$10.50	$10.50
• Bait	$8.00	$7.50	$7.50	$7.50

FGM Decision Rules

- **Increase in TACC**

Fishery Gross Margin is expected to increase by at least 1.5% with an increase in TACC.

- ***No change in TACC***

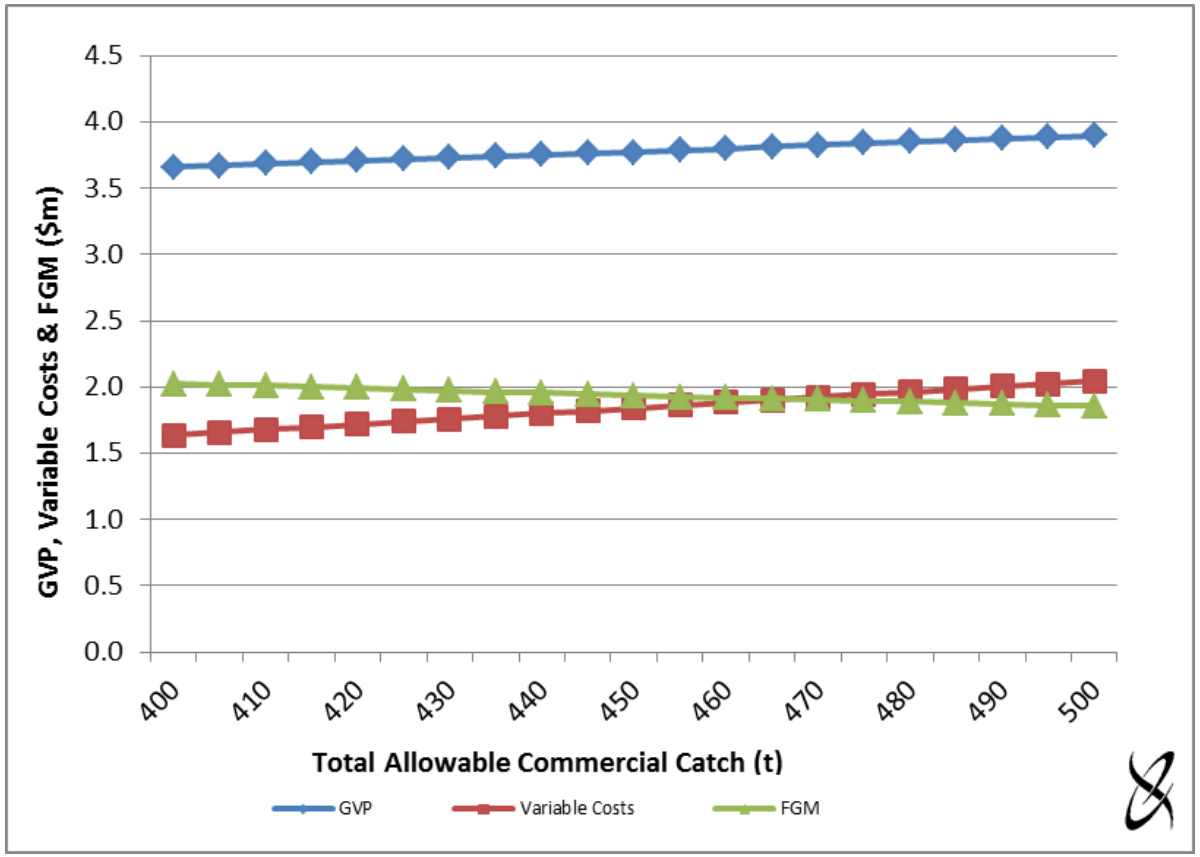
Fishery Gross Margin is not expected to increase by at least 1.5% from a higher TACC.

- ***Decrease in TACC***

Fishery Gross Margin is expected to increase by at least 1.5% with a decrease in TACC.

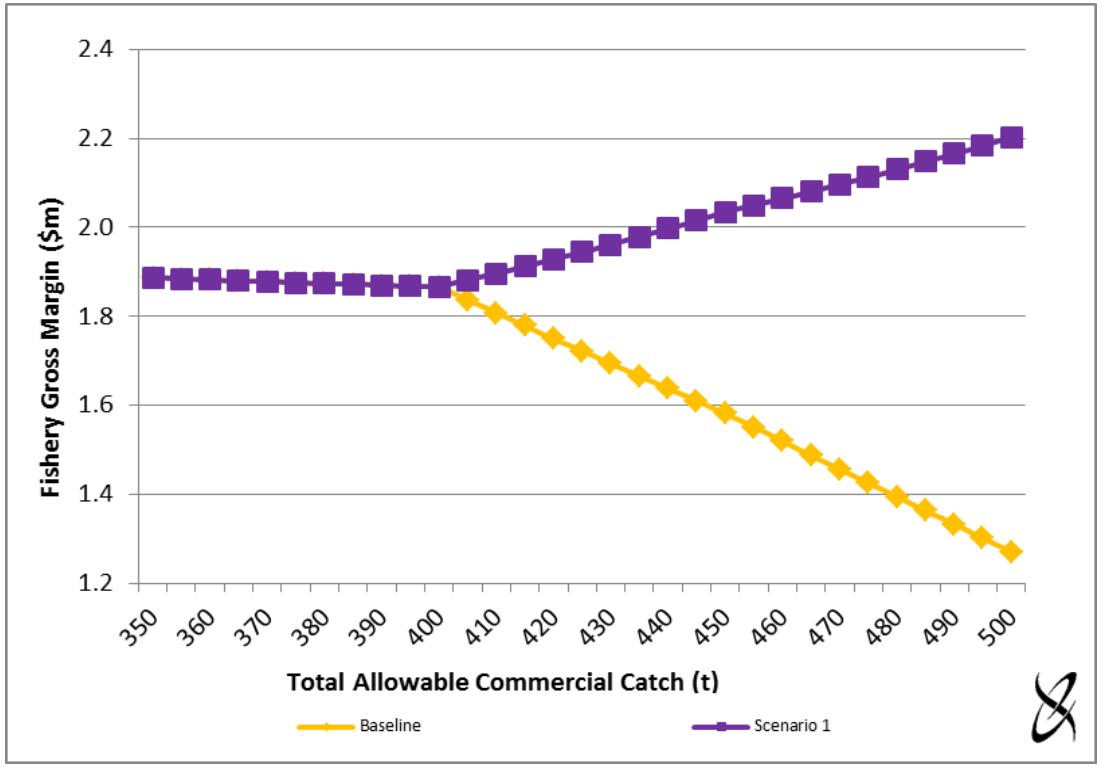
FGM 2012/13 - Baseline Scenario

- Possible 500t
- Decision 400t



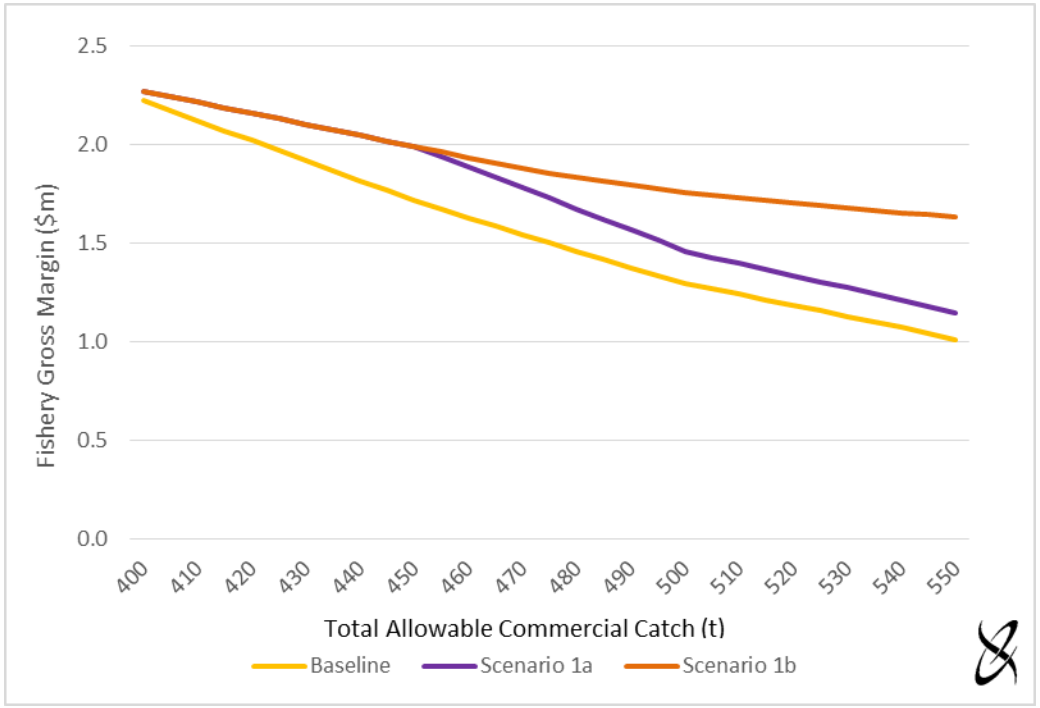
FGM 2013/14 – Baseline & Value Adding Scenarios

- Possible 450t
- Decision 400t without value adding & 450t with value adding



FGM 2014/15 – Baseline & Two VA Scenarios

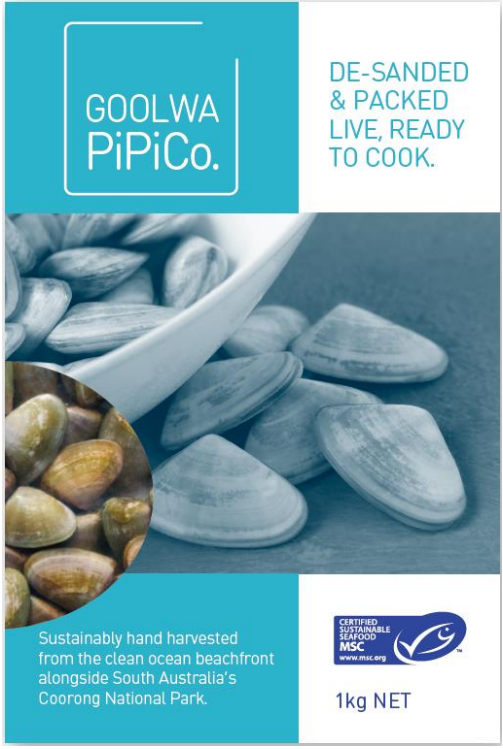
- Possible 500t – decision 450t
- Why not 400t? Concerns about loss of market share



Strengths

- Cheap and cheerful
- No ‘black box’ – everyone gets it and a conversation can occur
- Cost effective – bioeconomic models not practical in small-scale fisheries
- Data collection cost
- Annual update cost
- Industry input = ‘ownership’
  - The fights are now about price not biology
  - Only data requirements are price, price elasticity of demand and variable costs (+TACC)
  - Can be easily calculated and tracked over time to evaluate fishery management targets
  - Higher the TACC, the more difficult it will be to meet the threshold which implies a conservative bias to the decision rule
- Helps to meet legislative requirements for optimal utilisation?

Weaknesses



- Price expectations swings (see table)
- Price elasticity estimates are implicit in responses from licence holders and market analyst but are still estimates subject to uncertainty (no one has perfect information)
- It is a static model and therefore fails to take account of time.
- Does not link fish stock (relative biomass) to the cost of fishing, i.e. the model assumes the marginal cost of fishing ($/kg) to be constant over all levels of TACC
- Ignores fixed costs and only considers variable costs
- The value 1.5% is an arbitrary figure but seems to be based on what quota holders consider to be worthwhile

Fluctuating Price Expectations

TACC	400 tonnes			450 tonnes			500 tonnes		
	12/13	13/14	14/15	12/13	13/14	14/15	12/13	13/14	14/15
Bait									
Baseline	6.80	7.50	7.75	6.10	6.50	6.00	5.55	5.50	5.25
Scenario 1	7.13	7.50	7.75	6.75	7.50	7.75	6.13	7.50	5.25
Human Consumption									
Baseline	10.30	10.50	10.75	9.50	9.50	9.00	8.90	9.00	7.75
Scenario 1	10.75	10.50	10.75	10.63	10.50	9.00	9.88	10.50	7.75
Scenario 1 - Prem.			11.00			10.50			10.50

Conclusions

- Cost effective alternative to MEY modelling
- Works in small scale quota managed fisheries
- Don’t need to be an economist to understand it
- Industry and managers can have a ‘conversation’ with a common language
- The process to develop and now use the harvest strategy has significantly improved co-management of the fishery
- Pipis will take over the world