Appendix 2. Rock Lobster

Optimising business structures and fisheries management systems for key fisheries

T.M. Ward

Project No. 2009/715

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

February 2015

PREMIUM FOOD AND WINE FROM OUR CLEAN ENVIRONMENT

SOUTH AUSTRALIA

Government of South Australia
Primary Industries and Regions SA

SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

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Office Mark Oliphant Building, Laffer Drive, Bedford Park SA 5042
Postal Box 26, Mark Oliphant Building, Laffer Drive, Bedford Park SA 5042
Tollfree 1300 732 213 Phone 08 8201 7650 Facsimile 08 8201 7659
Website www.seafoodcrc.com ABN 51 126 074 048

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Appendix 2.1. SRL Workshop Agenda

Improving the performance of CRC fisheries through review and reform of operational procedures, business structures and fisheries management systems.

Rock lobster workshop

Date: Tues-Wed, 28-29 May, 2013
Venue: DownTowner Hotel, 66 Lygon Street, Carlton, Victoria 3053 (Tel: 03 9663 5555, email: res@downtowner.com.au)

Agenda

Day 1 (28 May)

11.00 - Welcome and expectations from workshop (Tim Ward)

11.10 - Key differences and similarities in SRL fisheries (Hilary Revelle and Anabell Jones to present and lead a brief discussion)

The main objective here is to recognise that the fisheries are different – especially wrt governance/business/management structures but also operationally – and that these differences will have implications for improvement options that may be suitable in each case. Experience in prawns suggests we need to make it clear from the start that we understand these differences exist. This will also provide a good background for the Anderson analysis.

11.30 - Issues impeding profitability of SRL fisheries: Anderson Analysis (Tim Ward, SARDI)

This talk will identify impediments to economic performance using Jim's method. Results can be compared with perceptions of industry/government/other stakeholders.

12.10 - Summary of economic status/trends in SRL fisheries – (Lisa Rippon, Econsearch)

We have most of the data available for Australian fisheries. Don't have much for NZ. Lisa could you pls liaise with Malcolm/Daryl to get the relevant information).

Lunch (1-2 pm)

2.00 – WA lobster story: how a reduction in catch increased profitability (Nick Caputi, Fisheries WA)

2.30 – New Zealand CRA 8 – another good news story (Malcolm Lawson, CE, CRA8)

3.30 – Bio-economic modelling: tools for assessing effectiveness of options (Rick McGarvey)

4.00 – The challenges of MEY (Daryl Sykes)

4.30 – Group Discussion (All)

Evening – Workshop Dinner for informal discussion on issues and options (Venue TBA)

Day 2 (29 May)

9.00 - Synthesis of issues and options identified during Day 1 (Tim Ward)

9.30 - Facilitated discussion of options that may be suitable for improving the economic performance of each SRL fishery (All)

12.30 Summary of Workshop outcomes (Tim Ward)

1.00 – Workshop conclusion

Attendees

A/Prof Tim Ward (SARDI, A/Prof Caleb Gardner (IMAS), Dr Adrian Linnane (SARDI), Dr Nick Caputi (WA Fisheries), Dr Rick McGarvey (SARDI), Malcolm Lawson (CRA8), Daryl Sykes (CRA5), Annabel Jones (PIRSA), Hilary Revelle (DPIWE), Melissa Schubert (VicDPI), Gary Steele Craig Lawry (South Australian industry), Garry Kerr, Robert Rattray, Michael Blake, John Sansom (Tasmanian industry).

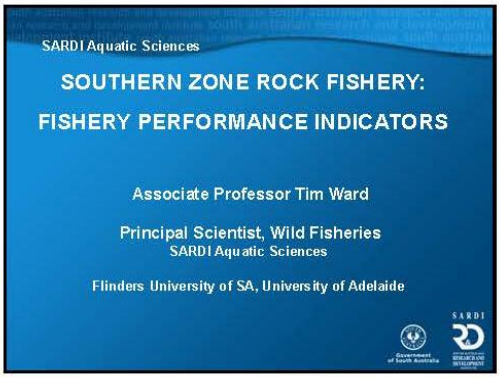
Appendix 2.2. Summary of SRL fisheries

	NEW ZEALAND	Victoria	South Australia	Tasmania
Commercial Fisheries arrangements				
Commercial Management zones	Nine - separate TACC set for each - TAC set for seven	East, West	Northern, Southern	State-wide TACC, spatial management for seasons
Access commercial	3 tonnes minimum ace	Limited licence	Limited licences	Limited licences
Commercial gear	Baited pots	Baited pots	Baited pots	Baited pot
Pot limits	None	Max 140 pots/boat	100/80 pots/boat	By boat length or tonnage and no of quota units
Tacc 11/12	All nz 2847 tonnes	66 (ez) 240 (wz)	1250 (sz) 345 (nz)	1103.24 tonnes
TACC decision period	01 April to 31 March	Annually	Annually	Annually
TACC determined by	Operation of Management Procedure	Minister's Delegate (Fisheries Victoria ED)	Minsters Delegate (PIRSA ED)	Minister, (statutory consultation with com and rec peak bodies and advisory committees
Performance Indicators in TACC decision	CPUE	Egg production, available biomass, commerical CPUE	Commercial CPUE (primary), Recruit CPUE (secondary)	Egg production, legal size biomass, total biomass, commercial CPUE
Effort limit	None	No	No	No
Mls	Varies but most at 54/60 mm tail width	110 (male), 105 (female)	98.5 (sz) 105 (nz)	110 (male) 105 (female)
Season	12 months other than CRA 3 and CRA 7	Male: Nov - Sept, female: Nov - end May	June-Sept (SZ), June-Oct (NZ)	Male Nov – Sept/ Oct, female Nov – Apr
Berried females prohibited	Yes	Prohibited (closed season females 1 Jun - 15 Nov)	Prohibited	Prohibited
Soak time limit	None	No	No	Yes
Vms	None	No	Yes (nz) no (sz)	No
Fishery Stock Assessment (period, empirical, model based)	Modelled at 5 season cycles	Model based	Model based	

Fishery Status	NEW ZEALAND	Victoria	South Australia	Tasmania
Fishery Status	Good to excellent all nine management areas	rebuilding	Sustainably fished (both zones)	Sustainably fished but rebuilding to improve economic and social outcomes
pot lifts 11/12	n/a	EZ 114,000, WZ 475,000	NZ 287,480 potlifts, SZ 1,285,289 potlifts	
total catch 11/12	2748 tonnes	EZ 66 tonne, WZ 240 tonne	NZ 307 t, SZ 1,242 t	1/3/12 - 29/2/13 1100t
Governance structure				
Governance structure	Fisheries Act, regulatory frame work	Fisheries Management Act, Fisheries Regulations.	Fisheries Management Act, Fisheries Regulations.	Living marine Resources Management Act, Management Plan (Rules)
Management struture	Gov department; collectives of rights holders	Gov Dept,(management, licensing, monitoring and compliance) liason between Minister's office, research providers, industry.	Gov Dept,(management, licensing, monitoring and compliance) liason between Minister's office, research providers, industry.	Gov Dept,(management, licensing, monitoring and compliance) liason between Minister's office, research providers, industry, police
Process to change a management measure	Regulatory with consent of Parliament; statutory by Gazette Notice; and/or by Act amendment	Consultation with comm and rec sectors. Reg changes require approval from Governor in Council. Act changes must be approved by Parliament.	Changes to Act or Regs require Parliament decision. No statutory consultation requirements, however understood that changes would not be passed if consultation had not occurred.	Statutory consultation with com and rec industry associations, and fishery advisory committees for any change not in the m'plan. To make a change to a rule – statutory process inc 1 month public consultation and pass thru both houses of Parliament

Recreational Fisheries arrangements	NEW ZEALAND	Victoria	South Australia	Tasmania
Access Recreational	Open access	Recreational Fishery Licence (unlimited)	Pot licences, (max 2 per person)	Recreational Fishery Licence (unlimited)
Recreational bag limit	Yes - 6 lobsters per person per day	Yes	No	Yes
Boat limit	No	No	No	Yes
Recreational Possession limit	Only in one small area	No	No	Yes
Recreational gear	3 pots per person - max 6 per vessel	Hand, hoop nets	Baited pots, hand, drop net	Baited pot, hand, hoop net
Recreational lobster identification, tail clipping, etc	None	Tail clipping/hole punched (landed whole)	Tail clipping	
Recreational TAC	An allowance in setting tacs	Notional	No	Notional
Season	All year	Same as commercial	Same as commercial	Yes
Fleet structure	Potting and diving - proportion varies across all nine management areas		46 vessels NZ, 160 vessels SZ. Variety of operating types.	204 vessels, 10-20m, owner operators, fishers who lease all quota annually, employed skippers
Processing sector	10 major corporate entities		Numerous	15 companies handle about 90% of the land catch
Vertical integration	Limited other than for ACE ownership		Some	Not much
Co management	Attempted but not fully implemented	None	Co-management policy developed	Nothing formal
Industry Association	Yes	SIV, vrfish	SARLAC, SEPFA, NZRLFA	TRLFA

Appendix 2.2. Southern Zone Rock Fishery: Fishery Performance Indicators



Characteristics of Indicator Components

- Readily Available
- Accurate
- Quantifiable
- Relevant
- Understandable

Anderson and Anderson (2010)

The Fishery Performance Factors: Inputs Enabling Wealth Creation

- 39 components covering 8 dimensions:
  - Macro Factors-Environmental, Economic & Community
  - Access Rights
  - Harvest Rights
  - Collection Action
  - Management Inputs
  - Management Participation
  - Markets and Market Institutions
  - Infrastructure

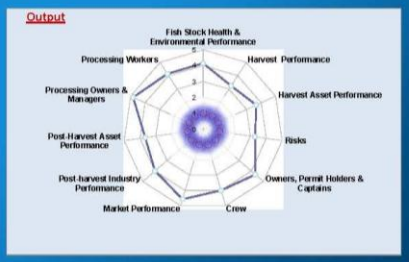
Anderson and Anderson (2010)

Two Parts – Outputs and Inputs

1) Performance Indicators of wealth creation and accumulation (outputs)
2) Performance Factors that enable wealth creation (inputs)

Anderson and Anderson (2010)

SZRLF

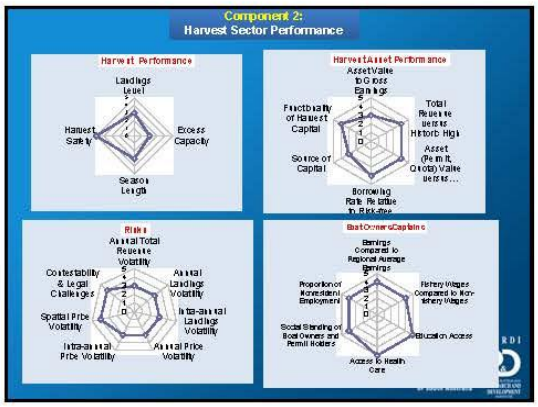


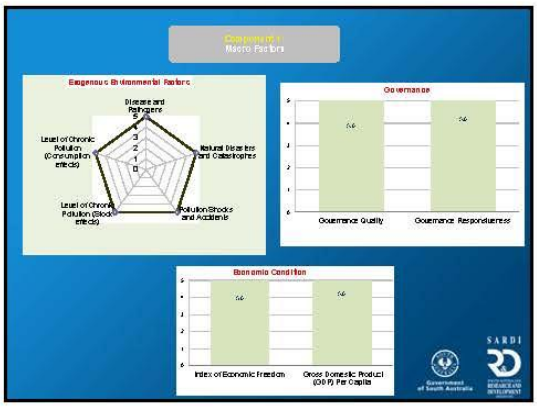
The Fishery Performance Indicators - Outputs

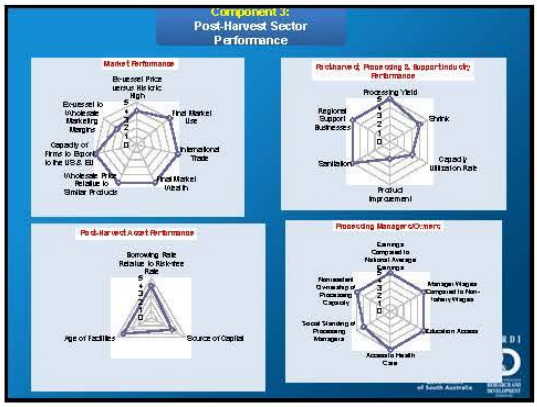
- 54 components covering 11 dimensions:
  - Fish Stock Health & Environmental Performance
  - Harvest Performance
  - Harvest Asset Performance
  - Risk
  - Owners, Permit Holders & Captains
  - Crew
  - Market Performance
  - Processing & Support Industry Performance
  - Post-harvest Asset Performance
  - Processing Owners & Managers
  - Processing Workers

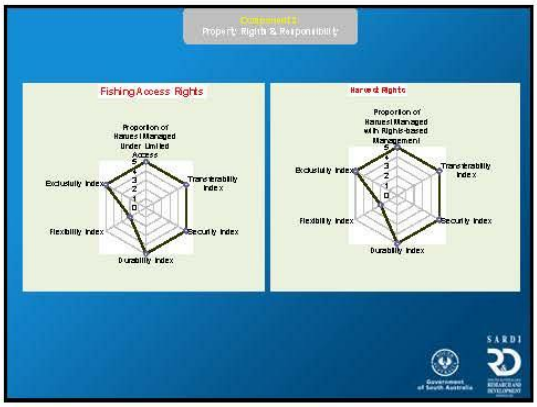
Anderson and Anderson (2010)

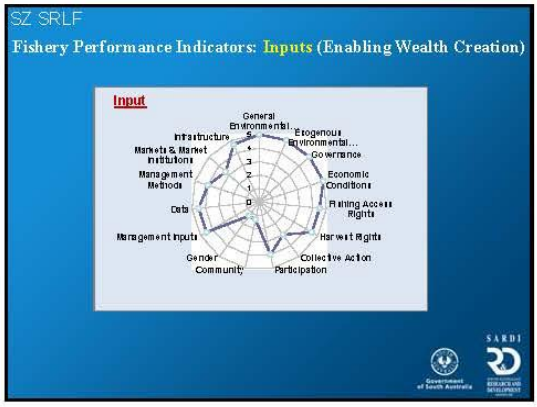
Component 1:
Ecological Sustainable Fisheries

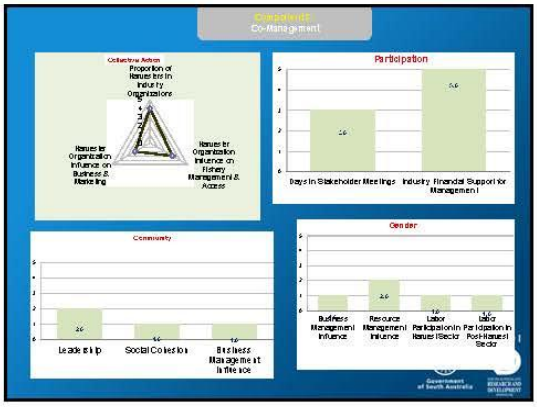

Component 2:
Harvest Sector Performance
Harvest Performance
Harvest Asset Performance
Risks
Boat Owner/Captains

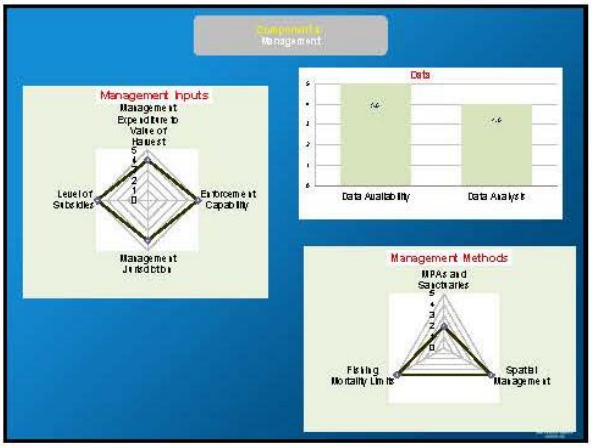

Component 1:
Macro Factors
Exogenous Environmental Factors
Governance
Economic Condition

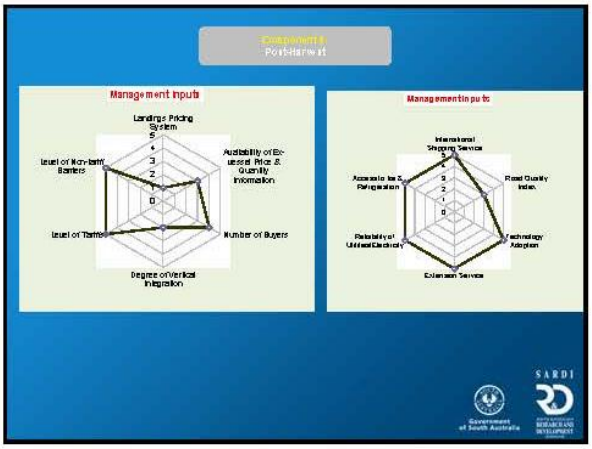

Component 3:
Post-Harvest Sector
Performance
Market Performance
Post-Harvest Asset Performance


Component 4:
Property Rights & Responsibility
Fishing Access Rights
Harvest Rights


SZ SRLF
Fishery Performance Indicators: Inputs (Enabling Wealth Creation)
Input


Component 5:
Co-Management
Participation
Community
Gender





SZ ROCK LOBSTER FISHERY: FISHERY PERFORMANCE INDICATORS

- FPIs capture issues in SZSRLF quite well

Performance
- Stock OK?
- Harvesting flexibility limited (season, gear)
- Excess capacity is high
- ROI (Asset/earnings)?

Constraints
- limits on flexibility of harvesting
- low harvest organisation influence on business and marketing
- limited transparency of landings pricing system
- limited vertical integration

Appendix 2.3. Economic Indicators for the Southern Rock Lobster Fisheries

Economic Indicators for the Southern Rock Lobster Fisheries

Seafood CRC
Southern Rocklobster Workshop

28-29 May 2013

EconSearch Pty Ltd

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Potential Economic Indicators

- State and regional economic impacts
  - Output
  - GSP
  - household income
  - employment
- Economic rent
- Other indicators
  - exchange rates, imports, exports, social characteristics

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Overview

- South Australia
  - Northern Zone
  - Southern Zone
- Victoria
  - Eastern Zone
  - Western Zone
- Tasmania
- New Zealand

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Data Sources

- SA data collected every 3 years for Economic Indicator reports to PIRSA
- Vic, Tas sourced as part of the Seafood CRC Rock Lobster bioeconomic modelling project
- NZ data sourced from Daryl Sykes

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Catch and GVP in the SA Rock Lobster Fisheries

	Southern Zone		Northern Zone		South Australia	
	(tonnes)	($m)	(tonnes)	($m)	(tonnes)	($m)
2000/01	1,716	54.7	846	28.0	2,562	82.7
2001/02	1,717	65.7	675	26.2	2,392	91.9
2002/03	1,766	63.8	595	18.8	2,361	82.7
2003/04	1,896	49.3	504	12.0	2,400	61.4
2004/05	1,897	54.4	446	11.6	2,343	66.0
2005/06	1,889	65.7	476	15.4	2,365	81.2
2006/07	1,894	78.8	492	18.0	2,531	97.5
2007/08	1,850	75.7	459	15.9	2,411	92.2
2008/09	1,407	85.4	403	19.3	1,925	105.4
2009/10	1,243	70.7	310	15.1	1,642	86.4
2010/11	1,244	67.0	313	14.3	1,695	82.4
2011/12	1,242	79.1	307	16.9	1,636	96.7

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Potential Economic Indicators

- Gross value of production and prices
- Cost of management
- Boat level financial performance indicators
  - income
  - operating costs
  - profitability
  - return on investment

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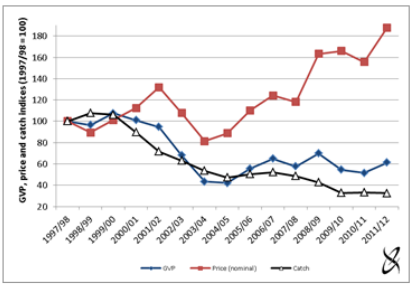
GVP, Price and Catch Indices Northern Zone Rock Lobster (1997/98 =100)



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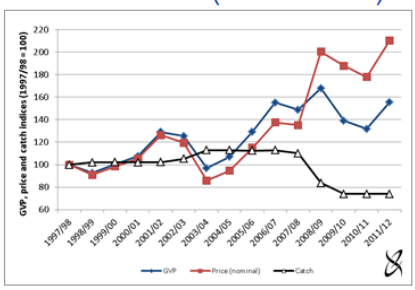
GVP, Price and Catch Indices Southern Zone Rock Lobster (1997/98=100)



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Survey Results

- Financial performance indicators
  - Income, costs and profitability as an average per boat
- Economic impact of the fishery
  - Direct and flow-on economic benefit created as a result of the operations of the fishing industry
- Economic rent

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Costs of Management, SA Rock Lobster Fisheries

	Licence Fees ($,000)	Gross Value of Production ($,000)	Fees/GVP (%)	Catch (t)	Fee/Catch ($/kg)	No. Licence Holders (no.)	Fee/Licence Holder ($/licence)
Northern Zone Rock Lobster Fishery							
2007/08	$1,175	15,935	7.4%	459	$2.56	68	$17,287
2008/09	$1,118	19,331	5.8%	403	$2.78	68	$16,447
2009/10	$1,165	15,117	7.7%	310	$3.76	68	$17,126
2010/11	$1,179	14,306	8.2%	313	$3.77	68	$17,339
2011/12	$1,066	16,948	6.3%	307	$3.47	68	$15,673
Southern Zone Rock Lobster Fishery							
2007/08	$2,628	75,731	3.5%	1,850	$1.42	181	$14,518
2008/09	$2,523	85,371	3.0%	1,407	$1.79	181	$13,941
2009/10	$2,594	70,720	3.7%	1,243	$2.09	181	$14,332
2010/11	$2,695	67,020	4.0%	1,244	$2.17	181	$14,891
2011/12	$2,605	79,111	3.3%	1,242	$2.10	181	$14,391
Total							
2007/08	$3,803	91,666	4.1%	2,309	$1.65	249	$15,274
2008/09	$3,642	104,702	3.5%	1,810	$2.01	249	$14,626
2009/10	$3,759	85,837	4.4%	1,553	$2.42	249	$15,095
2010/11	$3,874	81,326	4.8%	1,557	$2.49	249	$15,559
2011/12	$3,671	96,059	3.8%	1,549	$2.37	249	$14,741

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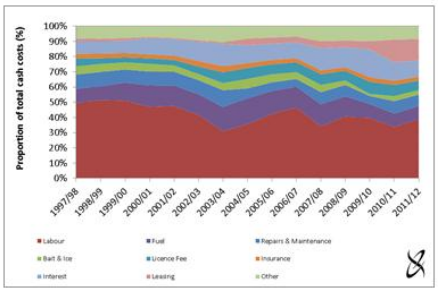
Cost Shares (Northern Zone)



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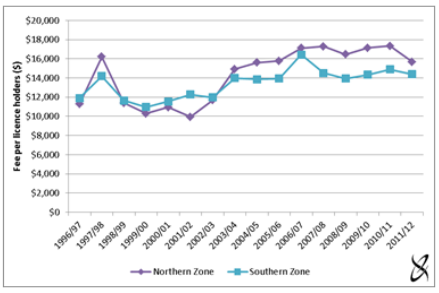
Fee per Licence Holder, SA Rock Lobster Fisheries



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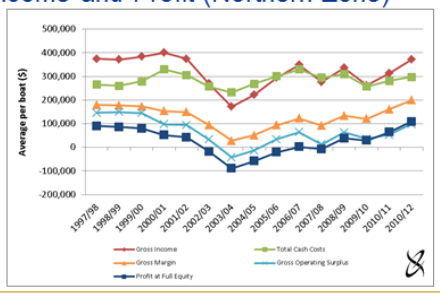
Financial Performance Indicators – Income and Profit (Northern Zone)



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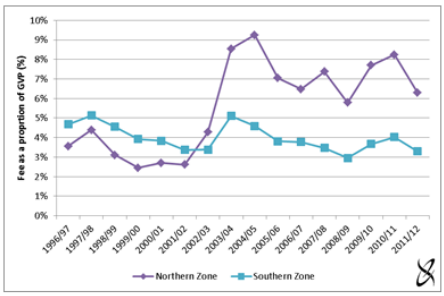
Fee as a Proportion of GVP, SA Rock Lobster Fisheries



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Financial Performance Indicators – Return on Investment (Northern Zone)

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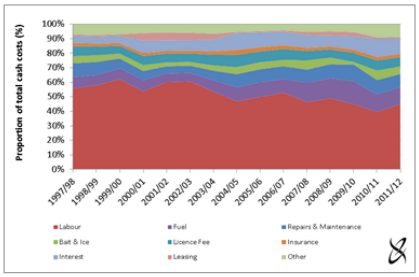
Cost Shares (Southern Zone)



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Economic Impact of the Southern Zone Rock Lobster Fishery in SA, 2011/12

Sector	Output $m	Employment fte jobs	Household Income $m	Contribution to GSP $m
Direct effects				
fishing	79.1	426	23.5	54.7
downstream	20.6	98	5.2	7.7
Flow-on effects	107.7	493	29.5	54.2
Total	**207.4**	**1,017**	**58.2**	**117.1**
Total/Direct	2.1	1.9	2.0	1.9
Total/Tonne	$166,900	0.82	$46,800	$94,200

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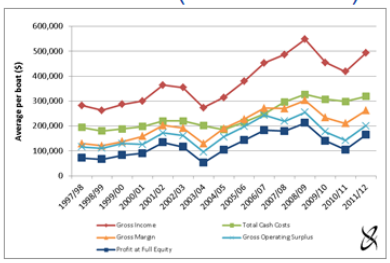
Financial Performance Indicators – Income and Profit (Southern Zone)



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Economic Rent in the SA Rock Lobster Fisheries, 2011/12 ($'000)

	2011/12		
	Northern Zone	Southern Zone	Total SA
Gross Income	16,948	79,111	96,059
Less Labour	5,297	23,010	28,307
Less Cash Costs	6,864	22,706	29,570
Less Depreciation	1,763	7,667	9,430
Less Opportunity Cost of Capital (@10%)	1,285	6,124	7,409
Economic Rent	1,740	19,604	21,344

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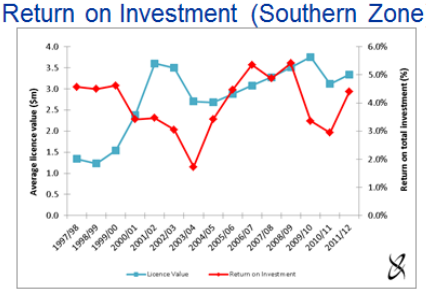
Financial Performance Indicators – Return on Investment (Southern Zone)



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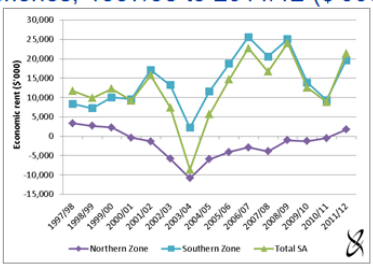
Economic Rent in the SA Rock Lobster Fisheries, 1997/98 to 2011/12 ($'000)



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Economic Impact of the Northern Zone Rock Lobster Fishery in SA, 2011/12

Sector	Output $m	Employment fte jobs	Household Income $m	Contribution to GSP $m
Direct effects				
fishing	16.9	95	7.0	7.5
downstream	5.3	26	1.4	2.1
Flow-on effects	35.4	161	9.8	17.7
Total	**57.7**	**282**	**18.1**	**27.3**
Total/Direct	2.6	2.3	2.2	2.8
Total/Tonne	$188,000	0.92	$58,900	$89,000

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Other Indicators

- Rock Lobster exports from South Australia
- Exchange rates

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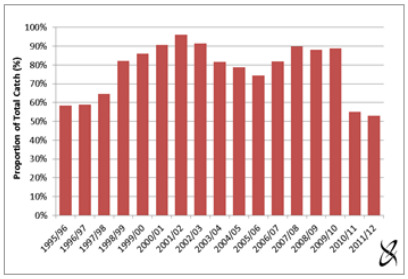
Rock Lobster Exports from SA, Proportion of Total Catch, 1995/96 to 2011/12



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VICTORIA

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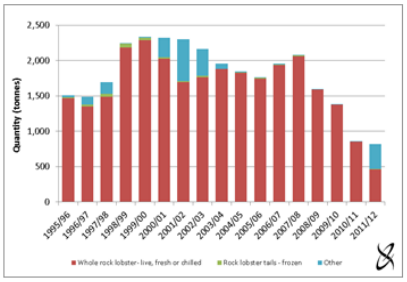
Rock Lobster Exports from SA by Product Type, 1995/96 to 2011/12



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Survey

- Eastern Zone
  - dominated by 1 business, that owns half the quota but no boats.
  - 2 completed surveys
- West Zone
  - Initially 8 licence holders indicated to Vic DPI they would participate
  - 6 completed surveys
  - Dislike of a series of quota cuts, cautious licence holders

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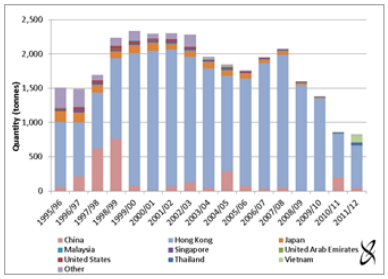
Rock Lobster Exports from SA by Destination Country, 1995/96 to 2011/12



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Survey

- Eastern Zone
  - <1% of TACC
- West Zone
  - ~17% of TACC

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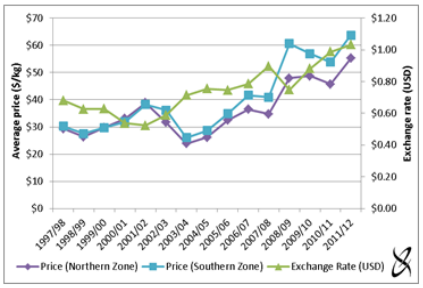
Exchange rates and SA Rock Lobster prices, 1997/98 to 2011/12



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Catch and GVP

Year	Western Zone		Eastern Zone		Victoria	
	(tonnes)	($m)	(tonnes)	($m)	(tonnes)	($m)
1997/98	452	14,528	67	2,257	519	16,785
1998/99	492	14,964	63	1,972	555	16,936
1999/00	515	16,125	75	2,406	590	18,531
2000/01	554	19,525	73	2,586	627	22,111
2001/02	446	19,195	59	2,595	505	21,790
2002/03	438	17,015	50	1,974	488	18,989
2003/04	435	12,159	54	1,574	489	13,733
2004/05	419	12,374	54	1,662	473	14,036
2005/06	405	13,927	55	1,921	460	15,848
2006/07	325	12,820	51	2,061	376	14,881
2007/08	319	12,526	50	1,962	369	14,488
2008/09	241	11,822	41	2,075	282	13,897

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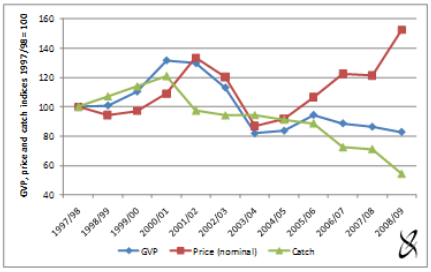
GVP, Price and Catch



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Licences

	Licence Fee ($'000)	GVP ($'000)	Fee/GVP (%)	Catch (tonnes)	Fee/Catch ($/kg)	Licence Holders (No.)	Fee/Licence Holder ($/licence)
Eastern Zone							
2004/05	67	1,662	4.0%	54	$1.23	52	$1,279
2005/06	91	1,921	4.7%	55	$1.65	52	$1,741
2006/07	84	2,061	4.1%	51	$1.65	48	$1,755
2007/08	96	1,962	4.9%	50	$1.92	46	$2,091
2008/09	83	2,075	4.0%	41	$2.03	46	$1,810
Western Zone							
2004/05	368	12,374	3.0%	419	$0.88	85	$4,325
2005/06	540	13,927	3.9%	405	$1.33	85	$6,350
2006/07	410	12,820	3.2%	325	$1.26	85	$4,827
2007/08	427	12,526	3.4%	319	$1.34	85	$5,025
2008/09	417	11,822	3.5%	241	$1.73	85	$4,906
Total							
2004/05	434	14,036	3.1%	473	$0.92	137	$3,169
2005/06	630	15,848	4.0%	460	$1.37	137	$4,601
2006/07	495	14,881	3.3%	376	$1.32	133	$3,718
2007/08	523	14,488	3.6%	369	$1.42	131	$3,995
2008/09	500	13,897	3.6%	282	$1.77	131	$3,819

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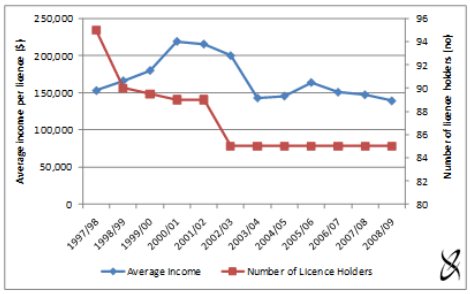
Financial Performance – Western Zone



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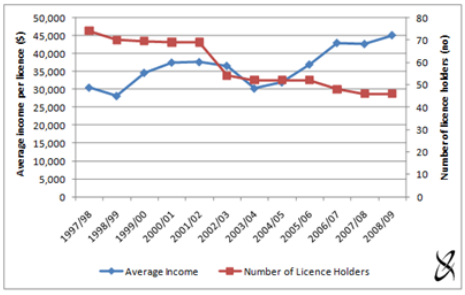
Financial Performance – Eastern Zone



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Financial Performance – Western Zone 2008/09

	Average per Boat			
	Low Catch	Medium Catch	High Catch	All Boats
Number of Boats	20	25	16	61
Income:				
Catch (kg)	1,700	4,000	6,700	4,000
Average Price ($/kg)	$49	$49	$49	$49
Gross Income ($)	84,100	198,100	328,800	198,800
Total Costs	106,800	188,600	306,100	191,700
Boat Cash Income	-21,700	7,600	23,700	2,100
Boat Business Profit	-30,175	-7,595	-15,540	-17,205
Profit at Full Equity	-875	31,905	47,960	23,195
Boat Capital:				
Fishing Gear & Equip	36,500	101,300	261,600	128,700
Licence Value	688,800	962,100	1,566,700	1,028,800
Total Boat Capital	740,800	1,063,400	1,828,300	1,157,600
Rate of Return on Fishing Gear & Equip	-1.5%	31.5%	18.3%	19.6%
Rate of Return on Total Boat Capital	-0.1%	3.0%	2.6%	2.2%
Employment (fte)	1.0	1.3	2.3	1.6

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Financial Performance – Eastern Zone 2008/09

	Average per Boat		
	Low Catch	High Catch	All Boats
Number of Boats	11	10	21
Income:			
Catch (kg)	1,000	3,000	2,000
Average Price ($/kg)	$51	$51	$51
Gross Income ($)	60,800	161,800	98,800
Total Costs	67,100	136,900	84,600
Boat Cash Income	-6,300	15,900	4,200
Boat Business Profit	-14,975	3,420	-6,180
Profit at Full Equity	-6,375	24,620	8,320
Boat Capital:			
Fishing Gear & Equip	56,500	83,200	69,200
Licence Value	156,000	408,000	276,000
Total Boat Capital	212,600	491,200	346,200
Rate of Return on Fishing Gear & Equip	-11.6%	29.6%	12.0%
Rate of Return on Total Boat Capital	-3.1%	5.0%	2.4%
Employment (fte)	1.0	1.3	1.1

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TASMANIA

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Survey

- A total of 20 responses were received which represented 8 per cent of the total active vessels in the fishery

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Catch and GVP

Year	Catch (tonnes)	Value of Catch ($m)	TACC (tonnes)
1999/00	1,486	42	1,503
2000/01	1,485	50	1,503
2001/02	1,495	59	1,503
2002/03	1,512	64	1,524
2003/04	1,497	48	1,524
2004/05	1,515	42	1,524
2005/06	1,512	48	1,524
2006/07	1,520	58	1,524
2007/08	1,550	62	1,524
2008/09	1,472	70	1,524
2009/10	1,357	64	1,471
2010/11	1,225	64	1,324
2011/12	1,079	59	1,103

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NEW ZEALAND

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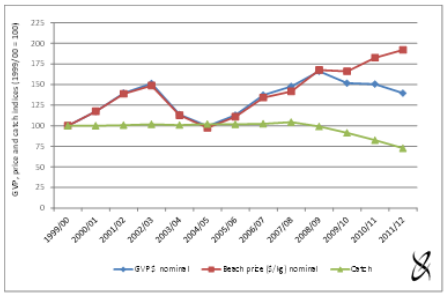
GVP, Price and Catch



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Catch and GVP, 2011/12

- Total Catch was 2,752t
- TACC was 2,752t
- GVP of $188m
- 259 Active Boats
- 259 Fishing Permits

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Financial Performance, 2010/11

		2010/11 Average per Licence	Share of TECC[2]
(1)	Total Boat Gross Income	$296,353	
(3)	Total Variable Costs	$164,817	60%
(7)	Total Fixed Costs	$108,246	40%
(8)	Total Boat Cash Costs (3 + 7)	$273,063	100%
	Boat Gross Margin (1 - 3)	$131,536	
(9)	Total Unpaid Labour (2 + 5)	$13,295	
	Gross Operating Surplus (1 - 8 + 9)	$36,585	
(10)	Boat Cash Income (1 - 8)	$23,290	
(11)	Depreciation	$32,113	
(12)	Boat Business Profit (10 - 11)	-$8,823	
(13)	Profit at Full Equity (12 + 4 + 6)	$58,117	
	Boat Capital		
(14)	Fishing Gear & Equip	$380,745	
	Licence Value	$1,095,725	
(15)	Total Boat Capital	$1,476,470	
	Rate of Return on Fishing Gear & Equip (13 / 14 * 100)	15.3%	
	Rate of Return on Total Boat Capital (13 / 15 * 100)	3.9%	

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Licences

- The Government imposes a cost recovery levy of $110.20 per tonne per annum
- General Industry levy was $129.00 per tonne per annum
- Rock Lobster industry levy was $106.00 per tonne per annum
- Total levy per tonne (average across nine zones) = $345.20
- Total levies paid = $964,356 (Approx 0.5% GVP)

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Rent, 2010/11

	2010/11
Gross Income	$63,624
Less Labour	$4,790
Less Cash Costs	$53,834
Less Depreciation	$6,894
Less Opportunity Cost of Capital (@10%)	$8,174
Economic Rent	**-$10,068**

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Financial Performance – CRA 5, 2011/12

	Average per Boat	
Number of Boats	25	
Income:		
Catch (kg)	14,000	
Average Price ($/kg)	$67	
Gross Income ($)	933,999	
Costs:		
Fuel, bait, maintenance, crew shares	258,000	17.00 per kg
Levies & Charges	5,379	0.3842 per kg
Annual catch entitlement	420,000	30.00 per kg
Other fixed costs	71,400	30% of variable costs
Total Costs	734,779	
Boat Cash Income	201,121	
Boat Business Profit	117,121	15% depreciation
Profit at full equity	173,121	10% interest
Boat Capital:		
Fishing Gear & Equip	560,000	
Licence Value	7,840,000	196,000,000 total value of quota
Total Boat Capital	8,400,000	
Rate of Return on Fishing Gear & Equip	30.9%	
Rate of Return on Total Boat Capital	2.1%	

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Summary, 2011/12

	South Australia	Tasmania	Victoria *	New Zealand
Total (t)	1,636	1,079	282	2,752
Gross Value of Production ($m)	96.66	58.99	13.90	146.70
Average Price (AUS/kg)	59.08	54.65	49.29	53.31
Number of licences/permits	249	198**	131	259

* 2008/09
** Number of active licences

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Summary, 2011/12

	South Australia Southern Zone	South Australia Northern Zone	Victoria Eastern Zone	Victoria Western Zone *	Tasmania**	New Zealand CRA 5***
Income	488,415	371,180	98,800	193,800	296,353	935,900
Total Costs	319,203	297,520	94,600	191,700	273,063	734,779
Boat Cash Income	174,212	73,660	4,200	2,100	23,290	201,121
Boat Business Profit	126,393	35,056	-6,180	-17,205	-8,823	117,121
Profit at Full Equity	168,809	108,530	8,320	25,195	58,117	173,121
Boat Capital:						
Fishing Gear & Equip	381,939	281,391	69,200	128,700	380,745	560,000
Licence Value	3,336,990	1,628,218	276,000	1,028,800	1,095,725	7,840,000
Total Boat Capital	3,718,929	1,909,609	345,200	1,157,500	1,476,470	8,400,000
Rate of Return on Fishing Gear & Equip	42.9%	38.6%	12.0%	19.6%	15.3%	30.9%
Rate of Return on Total Boat Capital	4.4%	5.7%	2.4%	2.2%	3.9%	2.1%

* 2008/09
** 2010/11
*** NZ$

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Economic Indicators for the Southern Rock Lobster Fisheries

Seafood CRC
Southern Rocklobster Workshop

28-29 May 2013

EconSearch Pty Ltd

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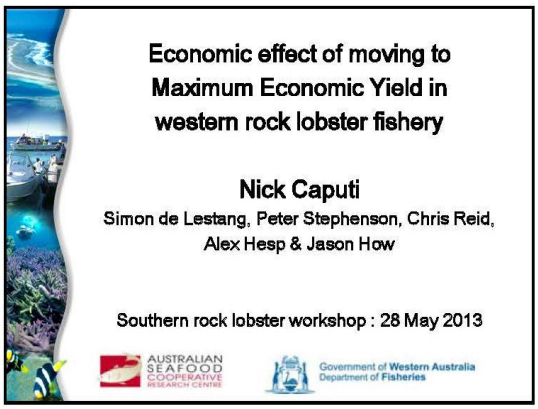
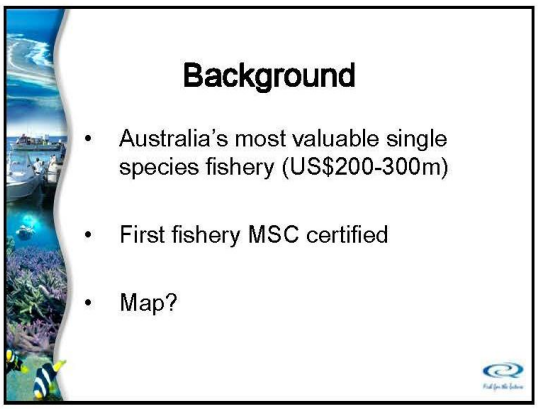
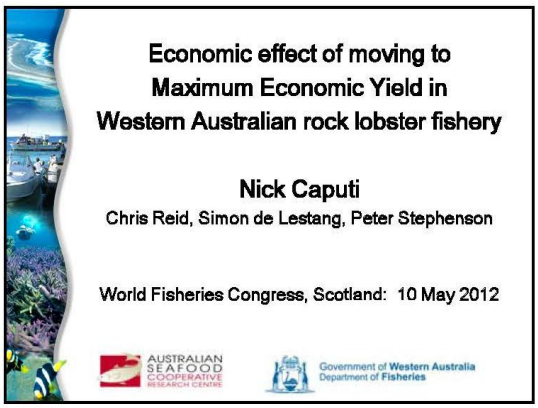
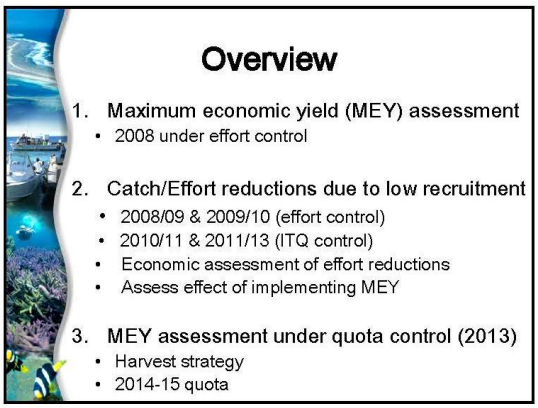
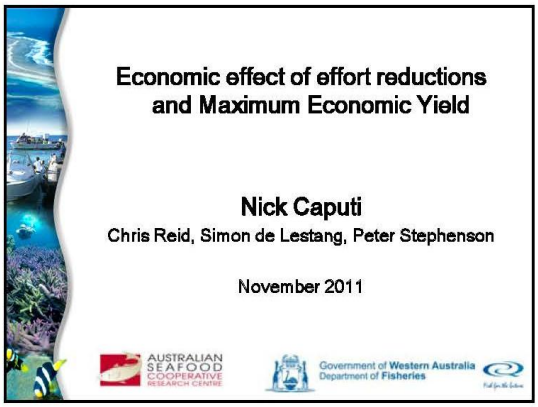
Appendix 2.4. WA Rock Lobster Fishery

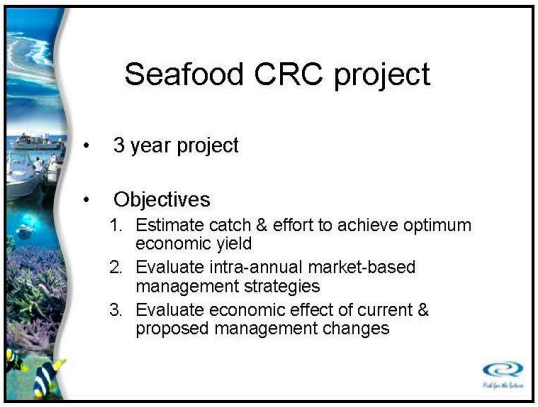


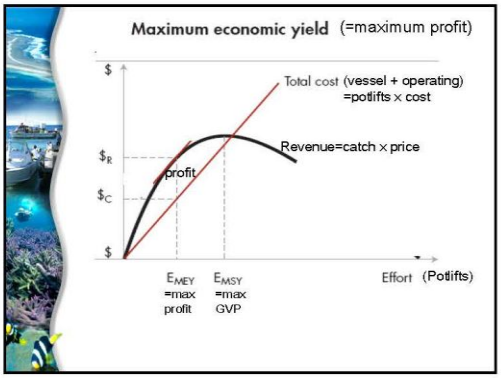












MEY Assessment (2008): step 2

2. Economic assessment
   - Maximise 'profit' over long-term (6 yr)
   - 'Profit' = Catch*price – Fishing costs
   - Predicted profit at different levels of fixed effort
   - Fishing Costs
     - Fixed costs (vessel depreciation)
     - Variable costs (bait, fuel, crew)
   - Assumed costs and prices same over 6 years
   - Future profits discounted 10% pa (net present value)

Maximum Economic Yield (MEY) assessment 2008

- Maximise 'profit' over long-term (6 yr)
- 'Profit' = Revenue – Fishing Costs
- Fishing Costs
  - Fixed costs (vessel depreciation)
  - Variable costs (bait, fuel, crew)

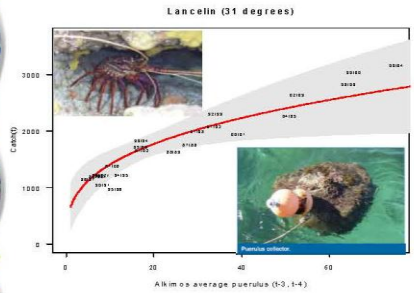
Costs in MEY assessment

- Assessing profits to economy overall not just fishing operators/unit owners
- Cost included:
  - Resources directly producing fishing effort
  - Vessel, bait, fuel, crew
- Assessing level of effort required if you were sole owner of fishery

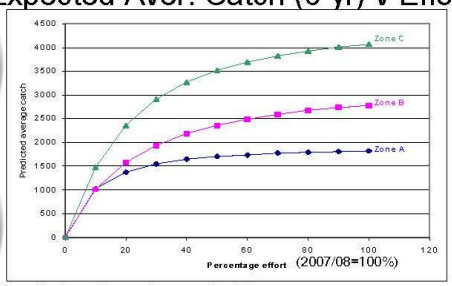
Western rock lobster MEY Assessment (2008): step 1

1. Stock assessment model
   - Puerulus abundance: catch prediction 3-4 yr
   - Predicted future recruitment in model NOT average recruitment
   - Predicted catch (2008/09–2013/14) at different levels of fixed effort

Catch v. puerulus (3-4 years before) (included in stock assessment model)

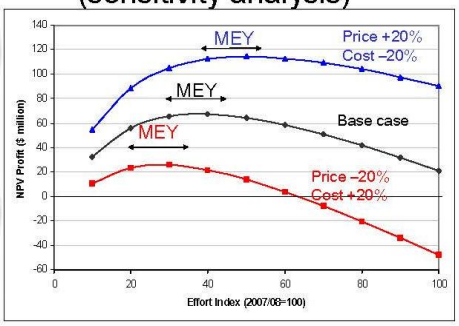


Stock assessment model: Expected Aver. Catch (6 yr) v Effort

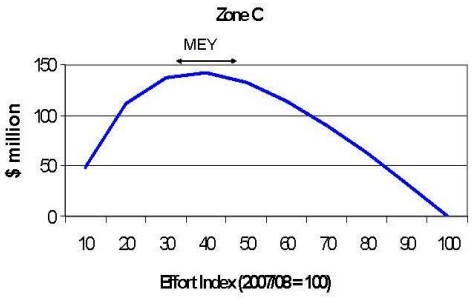


- Prediction of recruitment 4 of 6 years
- Long-term: 50% effort decline = ~10% catch decline

Average NPV Profit v. Effort: (sensitivity analysis)



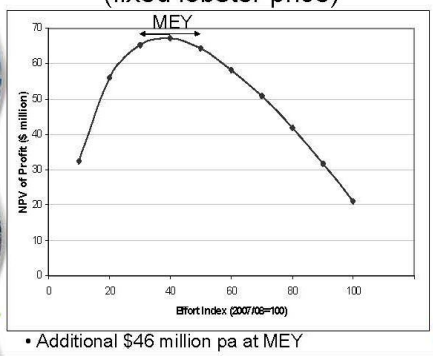
Additional Profit (6 yr) v. Effort



MEY Sensitivity analysis: Prices & cost

- Max Profit (MEY) at 30-50% of 2007/08 effort
- Costs up 20%: MEY effort decreases ~10% (i.e. 20-40% of 2007/08 effort)
- Prices up 20%: MEY effort increases ~10% (i.e. 40-60% of 2007/08 effort)

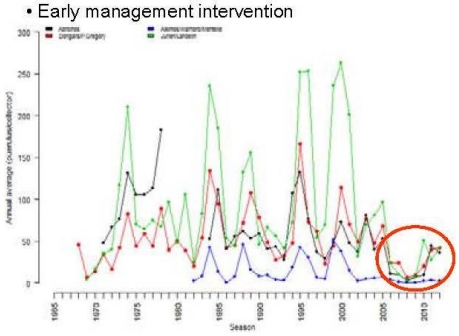
Average NPV Profit v. Effort (fixed lobster price)



- Additional $46 million pa at MEY

Rock lobster Puerulus settlement

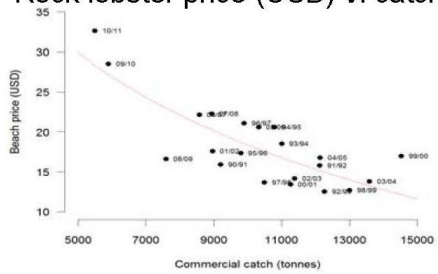
- Catch prediction 3-4 years ahead
- Early management intervention



Effort reductions: 2008/09 – 2010/11

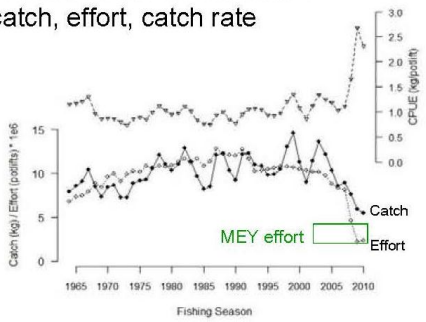
- Effort reduction due to low puerulus settlement
  - Before poor year classes entered fishery
  - Protect future spawning stocks
  - Ensure carryover into poor catch years
- Nominal effort reduction
  - 2008/09: 56% of 2007/08 effort
  - 2009/10: 27% of 2007/08 effort
  - 2010/11: 29% of 2007/08 effort (ITQ)
- MEY effort (30-50% of 2007/08 effort)
- 35-40% reduction in vessels
- Fishers made commercial decisions (sell/lease out or buy/lease in entitlements)
- No government compensation

Rock lobster price (USD) v. catch



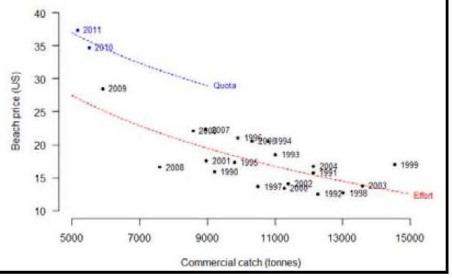
- Higher % catch sold live with lower catch
- MEY assessment assumed fixed price

Effect of effort reduction on: catch, effort, catch rate



Beach Price

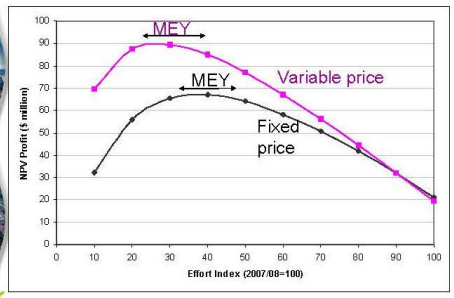
- **AUD price impacted by landings, exchange rates and quota**
- **~$6 premium under quota (product quality, high % live export, reduced peak catches, high grading, extended season)**



Catch, effort changes v. 2007/08 effort

Year	Actual Potlift (1000s)	Vessel No.	Actual Catch (t)	Predicted Catch: 07/08 effort	Catch rate kg/ potlift
07/08	8106	460	8942		1.1
08/09	4576 (-44%)	395 (-14%)	7594 (-24%)	9949	1.7
09/10	2204 (-73%)	294 (-36%)	5899 (-34%)	8923	2.7
10/11 (ITQ)	2360 (-71%)	279 (-39%)	5500 (-26%)	7433	2.3

Average NPV Profit v. Effort



- Additional $70 million pa at MEY for variable price

Change in revenue, costs, 'profits' v. maintaining 2007/08 effort

Year	Revenue decline ($m)	Cost decline ($m)	Change 'Profit' ($m)
2008/09	31	44	+13
2009/10	42	91	+49
2010/11 (ITQ)	<30	>90	>60

- Revenue higher than predicted with fixed price
- Improved economic performance after 1-2 yr

MEY analysis

1. Estimate Catch and effort from a range of LPH values
2. For each LPH scenario
   - Determine Income (Catch x Beach Price[1])
   - Determine Costs — Sensitivity ranges
     - Vessels (# vessels[1] x $ per vessel[2]) – ($85 000, $68,000 – $102,000)
     - Potlifts (# potlifts x $ per potlift[2]) – (~$7, $5.60 – $8.40)
     - Wages (value of catch x wage %[2]) – (30% of income, 24 – 36%)
3. Profit (Income – Costs)
4. Net Present Value (future profits discounted @ 10% year^{-1})
5. MEY = range of LHP scenarios where NPV is the greatest

- Relatively robust against assumptions

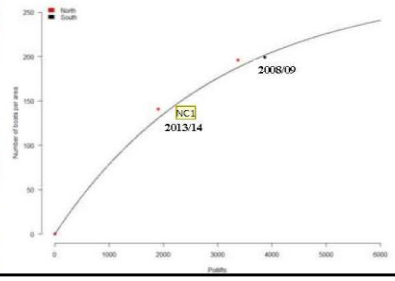
MEY assessment 2013: quota controls

- Harvest rate:
  - Legal proportion harvested (LPH)
  - (Catch/Average legal biomass)
- Assess different levels of LPH (5 years)
- Outputs per year:
  - Catch, effort & catch rate
  - Catch value (GVP)
  - MEY Profit = GVP–Costs (discounting future profits)
  - Egg production

Vessel Numbers per area

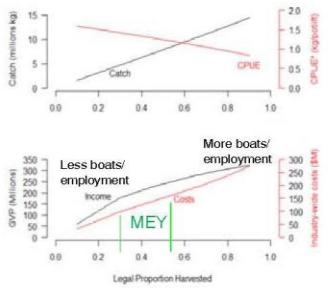
MEY sensitive to assumptions about vessel numbers (sensitivity analysis)

Related to effort levels (potlifts)



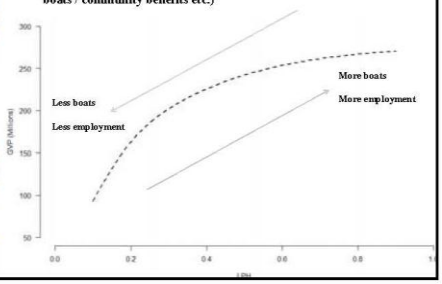
Secondary objective (socio-economic)

- **Tradeoff between catch, effort, CPUE, GVP, costs, employment**

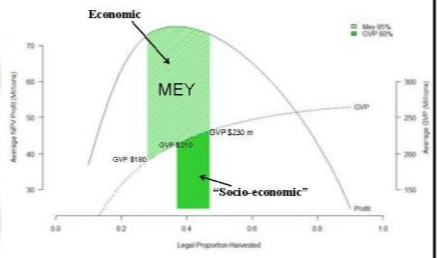


Additional information (Social benefits?)

- **Wide range of catch falls within 'MEY' range**
  - **Significant variation in catch, GVP, vessel numbers**
- **Increasing GVP = social benefits with greater GVP? (more employment boats / community benefits etc.)**



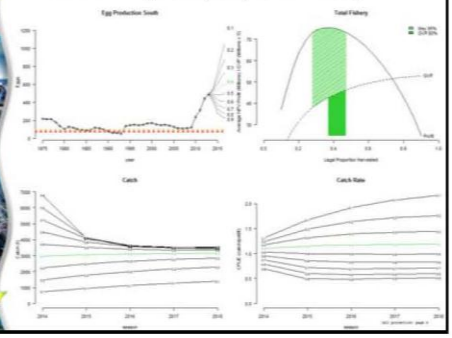
Example of Social/Economic information



1. **Target MEY to maximise Industry's profitability**
2. **Within MEY target larger GVP to maximise benefit to state**

Southern Assessment (example)

Current levels of protection (77 mm, Setose and max size)



Example of Social/Economic information

(Current input controls)

LPH	TACC	MEY	GVP	CPUE*	
0.20	3110	$63.2	$119	1.50	
0.25	3890	$70.4	$148	1.46	
0.30	4680	$74.1	$176	1.42	
0.35	5470	$75.1	$194	1.38	
0.40	6258	$75.1	$211	1.33	**Target region**
0.45	7050	$73.9	$226	1.28	
0.50	7850	$71.8	$240	1.24	
0.55	8650	$68.9	$254	1.20	
0.60	9460	$65.2	$266	1.15	

Target = Where profit (economic) and GVP overlap

2014/15 TACC (using socio-economic target)

(changing input controls)

- **Target maintains a similar TACC range under different controls but keep Tar Spot and Berried Female rules**

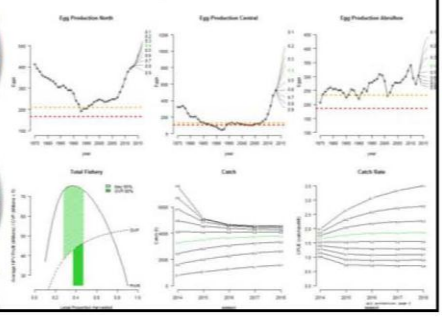
Example using same TACC (6500 t)

- Remove max size **or** setose (cpue increases ~ 8%)
- Change min size (76 mm) (cpue increases ~ 7%)
- Remove max size **&** setose (cpue increases ~ 32%)
- Remove max **&** setose **&** (76 mm) (cpue increases ~ 39%)

- Significant economic benefit to industry ($15 m)
- High grading?
- Whale interactions?

Northern Assessment (example)

Current levels of protection (77 mm, Setose and max size)



Summary

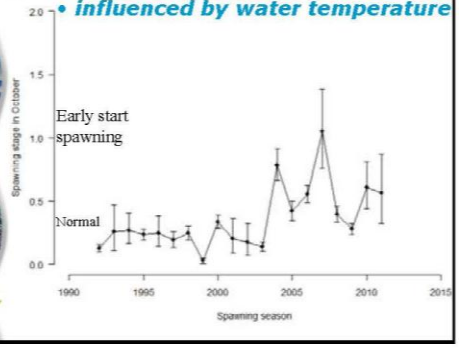
- MEY assessment: economic optimum
  - 30-50% of 2007/08 effort
- Effort reductions due to low puerulus
- Economic effect of effort reductions
  - Fishery 'Profit' increase $10-50m pa
- MEY assessment under catch quotas
  - Harvest rate (LPH ~0.40)
- Socio-economic target considered
- Spawning stock above threshold level
- Reduced ecosystem effect
- Social cost: reduced employment

General issues MEY

- Advantages
  - Lower fishing effort at MEY
  - Lower fishing costs
  - Higher catch rates
  - Higher profits
  - Higher spawning stock
  - Reduced ecosystem effects on bycatch, habitat, protected species, etc
- Disadvantages
  - Social cost
  - Reduced vessel numbers, employment
  - Slightly lower catch

Start Spawning (breeding stock survey

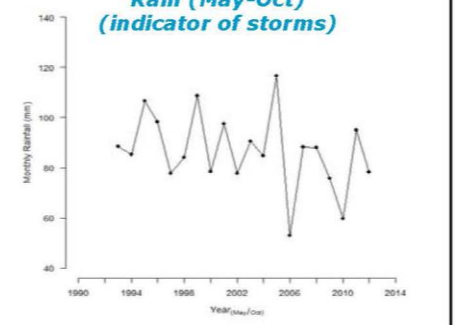
- influenced by water temperature



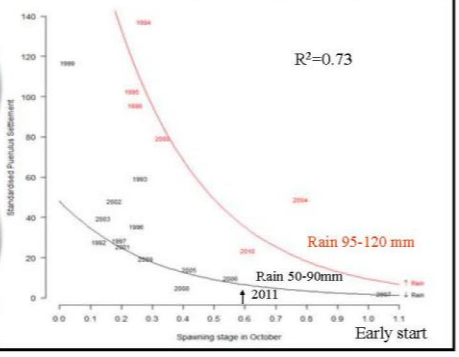
Future research

- Costs 2010/11 (individual catch limits)
  - Effort distribution by month changed
  - Lobster prices, bait & fuel costs changed
- Economic assessment 2010/11
- Assess MEY under catch quota
  - Effect of fixed v. variable quota
- Assess different monthly distributions of catch & effort on MEY
  - Sensitivity analysis ('what if' scenarios)
- Industry input into assessment

Rain (May-Oct) (indicator of storms)



Puerulus v. start spawning, rain (storms)



Appendix 2.5. CRA8 Fishery

THE CRA8 FISHERY

Malcolm Lawson

CRA8 Management Committee Inc.

Representing the Southern New Zealand Rock Lobster Industry

Management of Rock Lobster Fisheries In New Zealand

- Quota Management System (QMS) since 1990
- Eligibility requirements when QMS was introduced
- QMS operates on quota shares and ACE – Annual Catch Entitlement
- 100 million shares are allocated for each quota management area. Quota holdings are expressed in shares
- Quota shares have a weight equivalent
- Quota shares generate ACE. Which is expressed in kilograms

- **New Zealand Situation**
- **Profile of the CRA8 Fishery**
- **Profile of the CRA8 Participants**
- **Management of the CRA8 Fishery**
- **Development of CRA8 Management Strategy**
- **Impact of Management Strategies**
  - **Economic**
  - **Fishing Practices**
- **Decisions for the Future**

Allocation Formula

Total Allowable Catch (TAC)	1053 t
Non-Commercial Allowances	
- Customary	30 t
- Recreational	33 t
- Other fishing related mortality	28 t
Total Allowable Commercial Catch(TACC)	
- Sum of ACE	962 t

NZ Rock Lobster 2007 – 2012

Statistics NZ

Export Value (NZ$ Millions)

2007	2012	% Change
121	223	82

TACC (Tonnes)

2007	2012
2,766	2,810

Export Destinations by Value (NZ$M) All Species

	2007	2012	% Change
China	117	353	+202
Hong Kong	173	118	-32

CRA8 Fishery Facts

- Largest rock lobster Quota Management Area in NZ
- Total Allowable Commercial Catch is largest of all rock lobster QMA's – 34%
- Largest geographically
- Most valuable QMA across all inshore species in NZ
- Market-driven fishery

CRA8 Participants

- Quota Share Owners
  - Fishing
  - Non Fishing
    - Investors
    - Ex Fishermen
- ACE Fishermen
- Processors/Exporters

CRA8 Rules

- Minimum legal size applies
- Females carrying eggs cannot be taken
- Escape gap size in pots applies
- Minimum 3 t ACE required
- Full 12 month season
- No pot limits
- Females can be taken when not carrying eggs
- Males can be taken at all times
- High-grading is allowed

Quota Share Owners - Fishing

- Hold a large secure capital base
- Almost all purchase additional ACE annually
- Commonly enter into "tonne for tonne" deals with processors
- Have negotiating power
- Ability to seek and sell at best prices

CRA8 Profile

- 118 quota share owners
- 67 vessels
- 4 (soon to be 5) processing/export companies
- Current ACE purchase cost: ~ $52K per tonne
- Current quota share purchase cost: ~ $600K per tonne equivalent
- Average beach price: $68K - $75K per tonne
- Sales of quota shares are infrequent
- Operated since 1998 under decision rules (Operational Management Procedures)

Quota Share Owners - Non Fishing

Investors

- Aiming for best Return On Investment (ROI) - 10%
- Capital gain possible through:
  - Increase in TACC (weight value of shares)
  - Increase in ACE price
  - Increase in share trading price

Ex Fishermen

- Some look for maximum ROI
- Others take a benevolent approach:
  - discounted ACE price to new entrants

ACE Fishermen

- Reliant on access to ACE on an annual basis to remain in the fishery
- Subject to market rates for ACE
- Limited capital base
- Little negotiating power
- The most economically exposed sector

The Case for Fishermen to Purchase More Quota Shares

- Current price of quota shares is ~ $600K per tonne equivalent
- Current ACE price ~$52K per tonne
- With contribution of some capital towards the purchase price
  - annual repayments are similar to ACE price
  - ability to use it in "tonne for tonne" deal
- Additional capital asset vs "lease"

Processors/Exporters

- All own quota shares directly or through shareholding companies
- Have large capital base
- Financial ability to secure ACE from non fishing quota share owners
- Large influence on ACE prices
- Ability to substantially increase throughput via "tonne for tonne" deals
- Ability to finance private ACE transactions for fishermen
- Payment/Repayment of ACE recovered from beach price

Bio-Economic Modelling

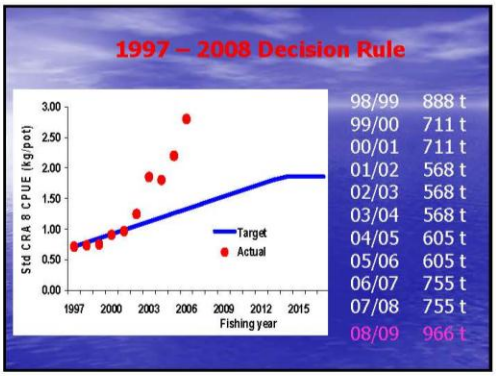
- Carried out in 2005
- During period of rapid rebuild of the fishery
- Biological model projected catches and CPUE but did not project costs or revenues
- Marrying of economic model to biological model enabled evaluation of current management strategy on net industry profitability
- 20 year projections of catch and effort vs revenues and costs

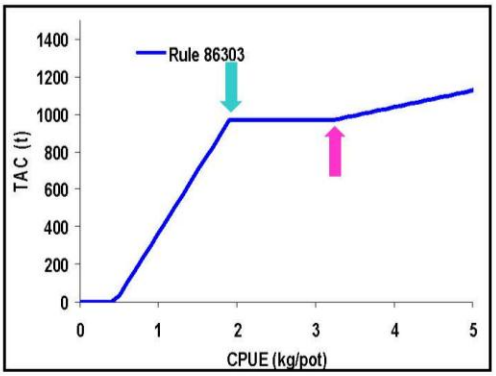
Ngai Tahu Seafoods Development Pool

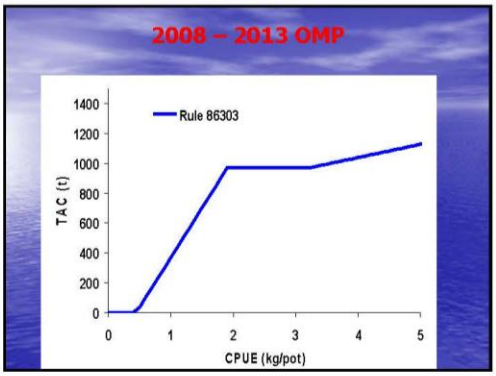
- Quantity of ACE placed into development pool
- Divided amongst participants
- Also provide wet fish ACE to secure year round economically viable portfolio for participants
- 5 year period – subject to conditions – provides certainty for investment in boat/gear
- ACE is at discount rate – 30% of beach price
- Expectations that participants will demonstrate investment in the fishery

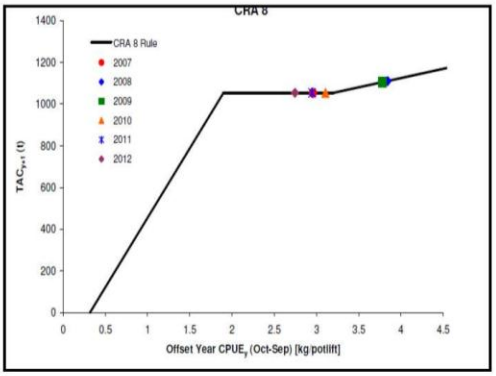
However

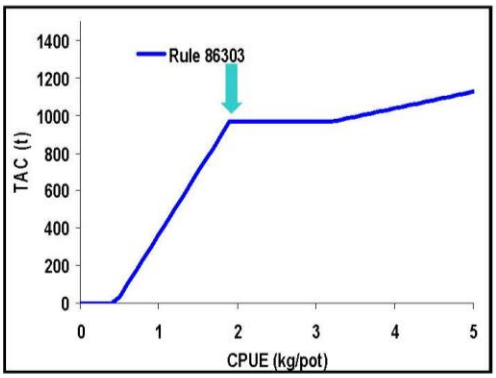
- Results are only valid while the current management strategy is in place
- Any change in indices, parameters, rebuild targets, timeframes etc of the OMP invalidate the bio-economic modelling

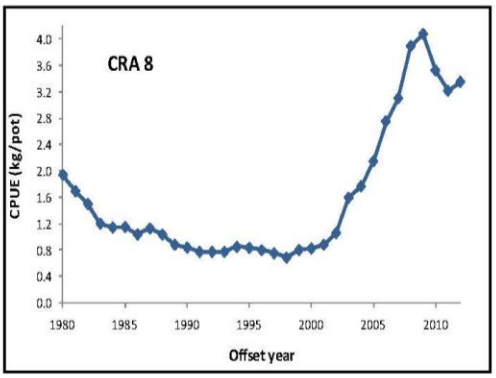

1997 – 2008 Decision Rule
Std CRA 8 CPUE (kg/pot)
Fishing year
Target
Actual
98/99 888 t
99/00 711 t
00/01 711 t
01/02 568 t
02/03 568 t
03/04 568 t
04/05 605 t
05/06 605 t
06/07 755 t
07/08 755 t
08/09 966 t


Rule 86303
TAC (t)
CPUE (kg/pot)


2008 – 2013 OMP
Rule 86303
TAC (t)
CPUE (kg/pot)

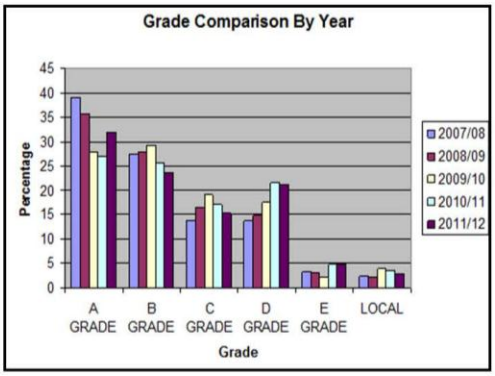

CRA 8
CRA 8 Rule
2007
2008
2009
2010
2011
2012
Offset Year CPUE (Oct-Sep) [kg/potlift]

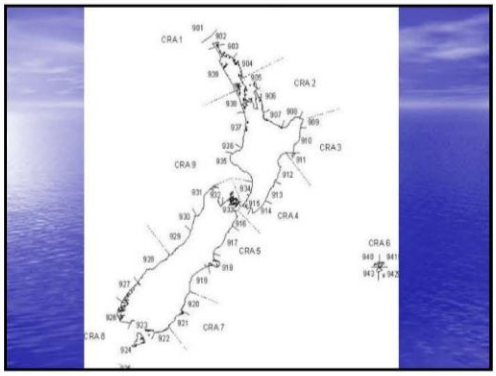

Rule 86303
TAC (t)
CPUE (kg/pot)

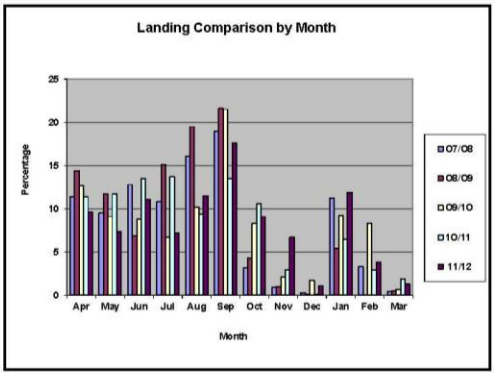

CRA 8
CPUE (kg/pot)
Offset year

What Has Happened? 2002 - 2012

- **CPUE**
  0.94kgs – 2.8kgs (highest 2009: 3.82kgs)
- **TACC**
  568 t – 962 t (highest 2009/10 1019 t)
- **No. of Vessels**
  69 - 65
- **Average Catch Per Boat**
  8.2 t – 14.8 t
- **No. Of Processors**
  8 - 4
- **Quota Trading Price**
  $NZ280K - $NZ540K per tonne
- **ACE Purchase Price**
  $NZ18K - $NZ52K per tonne





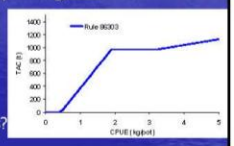


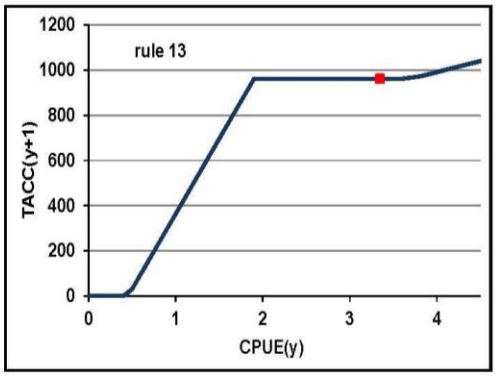
Shift of Effort

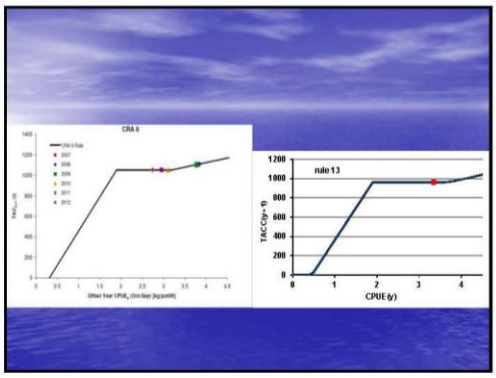
	922	923	924	925	926	927	928
05/06		3	12		46	20	18
06/07		3	13		41	23	18
07/08		3	13	1	37	21	26
08/09	1	0.5	15		29	22	32
09/10	0.6		14		28	21	35
10/11			13		34	25	28
11/12			11		38	24	26

Stock Assessment and Management Procedure Review Considerations

- Has the current MP been successful?
  - provided certainty for the fishery
  - provided certainty for business planning
  - enabled profitability
- Plateau level
- TACC vs CPUE
- Plateau parameters
- Intermediate step: 5% at 2.6kgs?
- Annual operation
- Retention of relativity between CPUE and plateau parameters







It's Not All About Quantity

Abundance Provides The Opportunity To Maximise Financial Returns Through Providing What The Market Wants And When

- Increased returns through targeting size, areas and time of year
- Reduced costs through high CPUE
- Confidence – business planning
- Reinvestment
- Additional benefits – high breeding biomass

Appendix 2.6. Bioeconomic decision support tools for Southern Rock Lobster

Seafood CRC Economics project: "Bioeconomic decision support tools for Southern Rock Lobster"

Project Overview

Presented to RL Workshop

Downtowner, Melbourne
28 May 2013

Goal of the Seafood CRC Bioeconomics Project

- The idea of this Seafood CRC project is to focus on that objective of maximising economic return to the fishery.
- Specifically, the task is to build economic analysis tools to test management ideas for enhancing lobster fishing industry profit.

Two goals of fishery management:

- Sustainability: Making sure, in biological terms, that the lobster population remains healthy. In SA, most management effort has been focused on sustainability.
- Economic return: To make sure, in economic terms, that the fishery achieves the highest possible economic output, as profit, from sustainable exploitation of that resource.

Project Overview

- This Seafood CRC bioeconomics project will involve
  - 2 principal states that harvest SRL (SA & Tas);
  - use economic data on costs and price;
  - combine these with the existing length-based model used for stock assessment.
- Project Goal: To build a tool that can estimate economic outcomes (average profit to fishers), in addition to biological performance indicators, under various management harvest strategies.
- Industry, PIRSA, and scientists, and more specifically, industry bodies and the Research Sub-Committee, can propose specific strategies. The model can be used to test their performance.

South Australian Lobster Fishery Management Plan Objectives:

- The Management Plan states its 3rd objective as follows:

Profitability

- Decision rules that achieve stock recovery produce higher catch rates; and
- Higher catch rates lead to higher profitability.

Use LenMod

- The project will use a well-developed fishery modelling tool we currently deploy for yearly stock assessment. This models the lobster population and the fishery harvest.
- This length-based model ('ROCK'), written by Andre Punt and further developed and maintained by SARDI and UTas, is used in all 3 states for stock assessment.
- This assessment model describes the fishery population dynamics, which is the hardest part of the bioeconomic modelling task.

Extending fishery model to account for economics

- To extend the population model to evaluate different harvest strategies, with higher profit as a principal objective, two economic submodels are added:
  - price per kg landed:
  - costs of harvesting that product.
- Gross revenues from landed seafood product are computed directly as catch (by month and lobster size) times price;
- Profit is gross revenues minus fishing costs.

Fishing Costs

- In SA, we are fortunate to have an extensive high-quality data set of fishing costs, from EconSearch interviews with the fishing industry.
- Based on 3-yearly surveys of fishers, these are updated yearly in annual economic reports on the two fisheries (SZ and NZ RL).
- EconSearch reports break costs down between fixed and variable;
  - only variable costs are reduced when fewer pot lifts are set in a given season.
- An EconSearch economic survey was also carried out in Tasmania this year.

Price Data

- Price data, from processors, are gathered and reported by SARDI statistics as a monthly mean price.
- Monthly price data allow the analysis of harvest strategies to account for
  - monthly variations in when catch is taken, and
  - time closures.
- Price is broken down by different lobster size grades, using fisher-suggested price splits.

Harvest Strategy Evaluation

- A range of harvest strategies can be tested using this decision-support tool.
- Strategies that can be evaluated include:
  - different decision rules for setting the yearly TACC,
  - seasonal closures (or lack thereof).
- Scenarios can also be tested for
  - What if lower price comes out of China?
  - What if recruitment stays lower than average for a while?
  - What if fuel costs rise?
- In those scenarios, how can we get the best economic return?

Price by size

- Data are not gathered regularly about size-dependence of price.
- Analysis of Tasmanian processor price data by Eriko Hoshino also show a price split at 2kg.
- We use the monthly average price from processors, and modify it to incorporate the price split.
- Under one scenario for price split, it is assumed:
  - In SZ, 25% lower price for lobsters > 2 kg
  - In NZ, 20% lower price for lobsters > 2 kg.

How long-term average profit is calculated

- For each strategy, we compute the long-term profit over the next 20 years.
- Profits from years farther into the future are given less weight (they're 'discounted') in the 20-year sum of profits.
- This overall discounted profit sum ('net present value' or NPV) is the principal measure of profit that we will report back to the steering committee for each strategy tested.

Current project status

- This lobster fishery economic modelling project started in July 2011.
- Final report is due at the end of 2013.

4 Policies

- We first put the model through its paces by testing broadly different approaches to managing a fish stock.
- This compares the performance of different methods or (call them) policies for managing this lobster population:
  - size policies, min and max size limits
  - constant quotas
  - quotas that vary so as to mimic constant exploitation rates.

Projection Model Verification

- To verify that the projection model is in full agreement with the assessment model, we made sure that the projections give the same outputs as the historical estimates if we
  - plug in the same Recruitment time series,
  - assume the same catches.
- This verified that the projection model recreates the past going forward if the same inputs are used in the future as in the past.

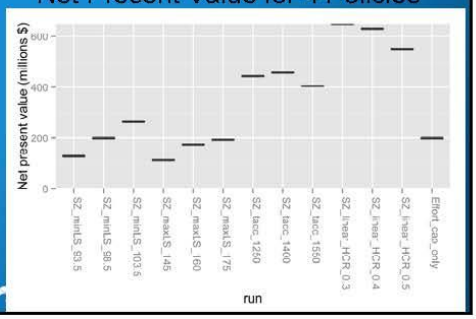
4 Policies: Size limits

- For the size strategies, we assume no catch or or effort controls other than a yearly maximum number of potlifts:
  - SZ yearly effort max = 1,875,929 potlifts
  - NZ yearly effort max = 587,322 potlifts.
- The 'default' run for the 4 policy comparison uses this maximum potlift numbers per season with the current min size of 98.5 mm CL.
- The default strategy is used in the scatterplots and elsewhere as the basis for comparison.

Overview of Results in this Talk

- We consider 3 sets of strategies in what follows:
  - Comparing 4 broadly different ways ('policies') to manage a fish stock,
  - Comparing the harvest control rule adopted in the SZ management plan with the best performing of the 4 policies above,
  - 98.5 minimum size in the NZ.

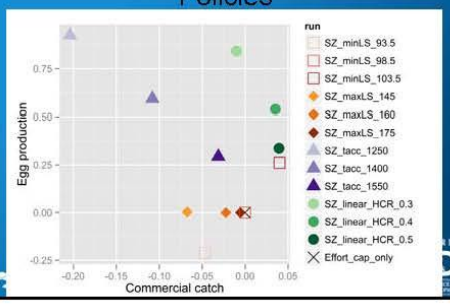
Net Present Value for 4 Policies



Results for size policies: Min limit

- A 5 mm increase in the minimum size limit to 103.5 gave generally positive outcomes:
  - increase egg production by 25%
  - increase long-term average catches a bit, ~4%.
    - This is a yield-per-recruit benefit.
  - A quite substantial increase in NPV over baseline of about 20%.
- The substantial increase in NPV results from small increases in revenue (or small reductions in costs), giving a bigger change in their difference, which is profit.

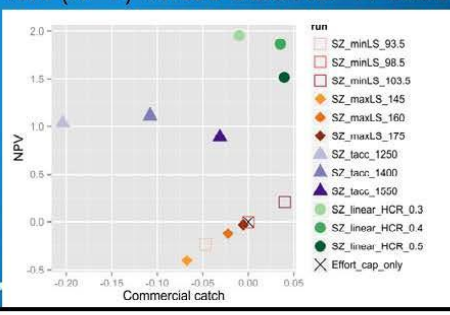
Egg production versus Catch for 4 Policies



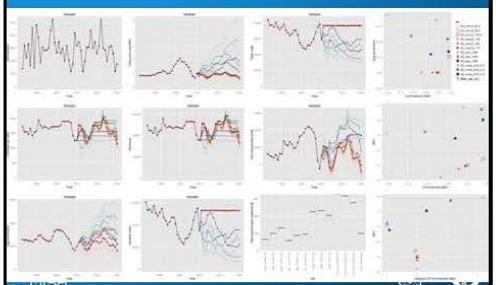
Why do size policies have relatively modest impact?

- Effort maxes out at the upper limit.
- So variable costs also reach high levels.
- But CPUE/biomass has no chance to recover; total catches stay quite ordinary.
- So yearly profits are generally a lot lower than for strategies which lower exploitation rates because costs remain high.
- Also, the benefit as stock recovery is relatively modest.

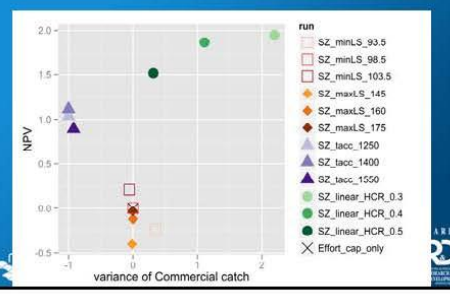
Profit (NPV) versus Catch for 4 Policies



4 Policies: Size policies do less well



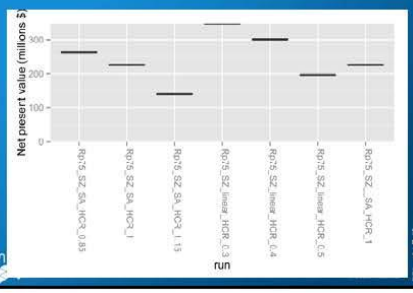
Profit (NPV) versus Variation in Yearly Catch for 4 Policies



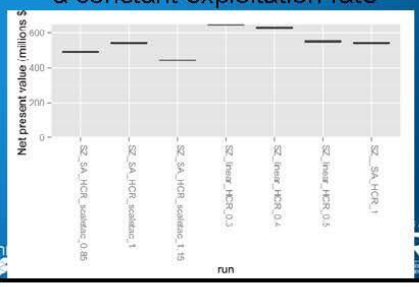
Summary for 2 Policies: Comparing constant TACC w an HCR that seeks a constant exploitation rate

- Policies that vary quota to mimic constant exploitation rate have higher financial return.
- They also give higher catches overall. This occurs with model stock biomass steadily rising at these (lower) levels of exploitation.
- But these policies which vary yearly quota in proportion to abundance have high yearly variation.

NPV with 25% lower R



Net Present Value: Comparing current SZ HCR w a linear HCR both seeking a constant exploitation rate



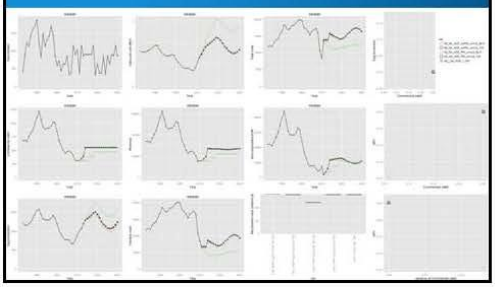
Lowering Size Limit in NZ to 98.5

- NZ representatives on the Res Sub Comm requested that we test a lower size limit.
- 98.5 is the minimum size in the SZ.

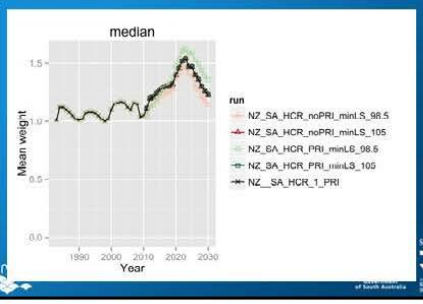
Summary: SZ HCR and a linear HCR, both seeking constant exploitation rate

- The model expects CPUE to generally rise under both Current HCR and a purely linear rule.
- Current HCR (the current management plan) has the advantage of lower yearly variation in TACC.
- Overall, the current HCR performed well. The levels of exploitation seem about right for these model-sampled historical (1983-2010) levels of recruitment.

Lowering Size Limit in NZ to 98.5



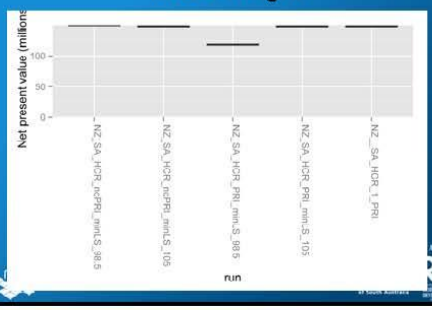
Lowering Size Limit in NZ to 98.5: NPV



Future Work

- The SA rock lobster fishery management plans are scheduled for review in 2014.
- This project could potentially be extended for use during that review.
- It fulfills stated objectives of the Management Plans, profitability with sustainability, as noted earlier.
- It also falls within Objective 2 of SRL Ltd's Strategic Plan:

Lowering Size Limit in NZ to 98.5: Mean weight



Acknowledgments

We thank SRL Ltd, the Seafood CRC, Caleb Gardner, Andre Punt, SARLAC, SEPFA, NZRLFA, lobster fishermen in Tasmania and South Australia, and by the 2010/11 SZ and NZ management working groups.

Lowering Size Limit in NZ to 98.5: Outcome summary

- In the SZ, changing size limits did have a measurable effect.
- In the NZ, lowering size has minimal impact.
- Possible reasons:
  - exploitation rates are lower,
  - NZ length selectivity is slightly (~10-15%) lower at those smaller sizes 98.5 than 105, and
  - taking a few more smaller lobsters means slightly higher price, but a slightly lower catch in weight.

Proposal for Extension of Project

- Industry may wish to support this potential continued use of this modelling tool to find strategies that can enhance fishery-wide profitability.
- If so, we will submit a pre-proposal to the SRL RD&E committee who will review proposals in July.
- Q: Thoughts?
  - On this work, and
  - the idea of its extension.

What industry can do to participate

- This project is designed to involve industry at several stages.
- One possible contribution would be to help us obtain more detailed information about the price split(s).
- A second important role is to suggest management strategies for testing.
  - Do you have any ideas for ways to manage these fisheries in such a way as to enhance industry profitability?

SA Steering Committee

- Originally the SA Rock Lobster Steering Committees were the old management working groups.
- The SA project seeks a new Steering Committee currently.
- Discussions will be held with SRL in the near future, and will include consultation with the new SA RL MACC, to decide on a new form for the SA Steering Committee of this project.

What industry can do to (cont.)

- Economic survey: fishing costs.
- An important input to these models are the estimates of fishing costs.
- EconSearch is currently undertaking their survey of fishers (done every 3 years).
  - More participants improve economic information, about costs and profitability, that go into the models.

Current project status (cont)

- You may wish to begin developing ideas for harvest strategies to test.
- Some strategies that these modelling tools can test, and compare, for how much long-term revenue they generate, include
  - different fixed levels of TACC
  - different versions of the existing industry-proposed harvest control rule, now implemented in both zones.

Acknowledgments

We thank SRL Ltd, the Seafood CRC, Caleb Gardner, SEPFA, NZRLFA, and lobster fishermen in Tasmania and South Australia.

This project was unanimously supported in both NZ and SZ management working groups.

Future Work

- SRL Ltd's Objective 2 states:

Objective 2: Optimize fisheries production

Priority issues to be addressed under this Objective will be:

- 1. Harvest strategies to optimize returns through improved management.
- The first key Deliverable under this Objective is
- 1. Bio-economic modeling to identify harvest strategies that maximize profitability within sustainability limits.

Results for size policies: Max limit

- A max size limit (145, 160 & 175 mm CL), above which lobsters are returned to the water, was the worst performing policy.
- It gave:
  - Nearly identical egg production as the baseline since females never reach these maximum sizes.
  - Lower catch from throwing back large males.
  - Thus lower profit (as lower NPV).
    - (Nearly 50% lower for a maximum size limit of 145 mm)

Steering Committee

- The selection of which strategies to evaluate lies with the project Steering Committee.
- The Steering Committee will receive the results and pass those back along to fishers.
- The Tasmanian Steering Committee has been serving in that role for several years now.
- The new SA RL MAC Research Sub-Committee will serve as the project Steering Committee.

Appendix 2.7. New Zealand Perspective

Catches used in 5 year projections – based on current TACC and current estimates of removals

				Unreported	
	commercial	recreational	illegal	illegal	customary
Scenario #1	350	156	3	49	10
Scenario #2	350	112	3	49	10

TAC	467 t.
Customary	40 t.
Amateur	40 t.
Illegal	37 t.
COMMERCIAL	350 t.

2012-13 Season Review

Catch - Current vs Last Year-to-date - April Stocks

From 1-Apr-2011 to 31-Mar-2012 and
From 1-Apr-2012 to 31-Mar-2013

Date of Report 19-Apr-2013

Fishstock	TACC	Last Year	This Year
CRA1	131,062	130,447	130,915
CRA2	236,083	228,986	232,996
CRA3	193,300	163,918	192,159
CRA4	466,900	466,248	466,049
CRA5	350,000	349,951	349,959
CRA6	360,000	359,478	349,394
CRA7	63,900	45,663	53,806
CRA8	962,000	961,199	957,246
CRA9	47,008	46,968	47,003

Quota Shares Traded

Quota Share Transfer Prices Year-to-date - April Stocks

From 1-Apr-2012 to 31-Mar-2013

Fishstock	Quantity Traded (shares)	Total Number Transfers	Low per share	Average per share	High per share	Calculation Number	Average $ per tonne
CRA1	6,950,908	2					
CRA2	657,396	1					
CRA3	9,425,687	15	$ 0.05	$ 0.98	$ 1.01	14	$508,432.49
CRA4	12,923,247	28	$ 1.03	$ 1.70	$ 3.04	24	$363,246.95
CRA5	1,468,286	2					
CRA6	6,559,074	4	$ 0.45	$ 0.65	$ 1.19	4	$181,083.33
CRA7	2,714,872	3					
CRA8	2,281,648	17	$ 4.23	$ 5.14	$ 5.96	15	$534,729.73

Annual Catch Entitlements Traded

ACE Transfer Prices Year-to-date - April Stocks

From 1-Apr-2012 to 31-Mar-2013

Fishstock	Quantity Traded (kg)	Total Number Transfers	Low (per tonne)	Average (per tonne)	High (per tonne)
CRA1	229,074	104	$28,490.20	$35,828.40	$79,024.30
CRA2	358,535	189	$23,400.00	$26,144.90	$35,000.00
CRA3	335,292	112	$28,169.00	$42,742.60	$52,000.00
CRA4	770,712	252	$29,629.60	$46,166.90	$70,609.00
CRA5	453,351	139	$22,030.00	$43,687.10	$55,500.00
CRA6	627,516	354	$22,000.00	$27,760.20	$56,000.00
CRA7	126,978	65			
CRA8	1,163,731	391	$22,015.00	$47,026.50	$55,000.00
CRA9	76,058	88	$23,025.30	$42,470.90	$55,000.00

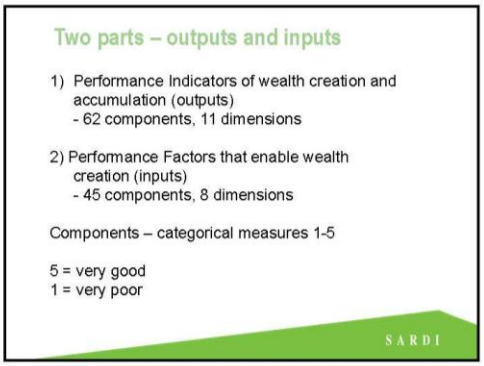
AREA CLOSURES

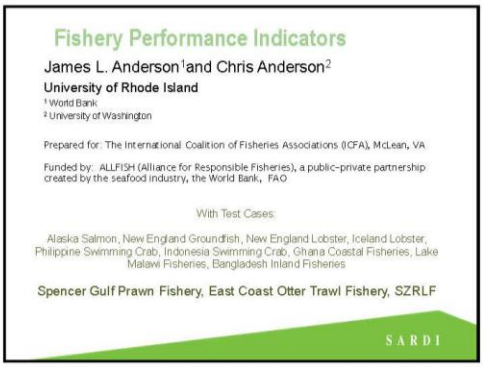
Impacts on commercial rock lobster fishing 'buffered' by high levels of stock abundance

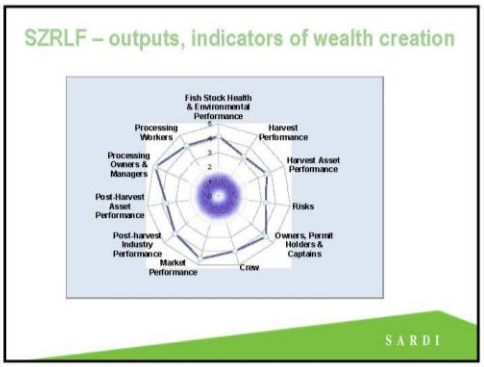
"Good thing/bad thing"

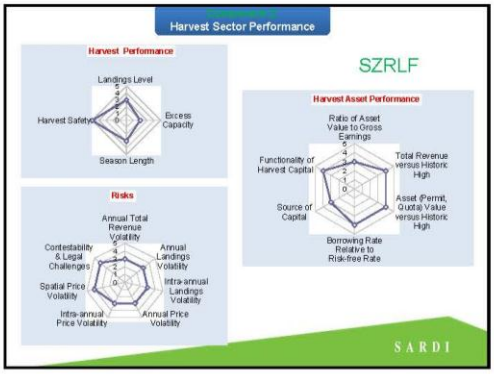
Partnerships and Commitments

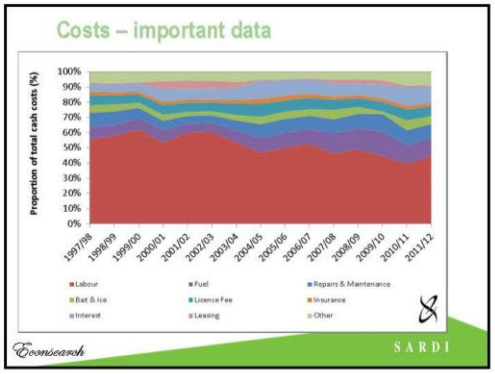
Appendix 2.8. Improving economic performance: findings of an Australian Seafood CRC study











SZRLF - FPIs

- FPIs capture issues in SZRLF quite well

Performance
- Stock OK?
- Harvesting flexibility limited (season, gear)
- Excess capacity is high
- ROI (Asset/earnings)?

Constraints
- low harvest organisation influence on business and marketing
- limited transparency of landings pricing system
- limited vertical integration
- highly dependent on a single market

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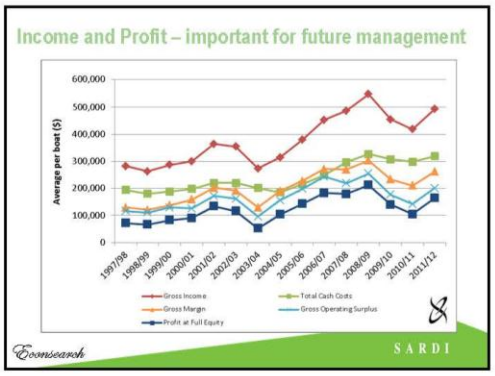

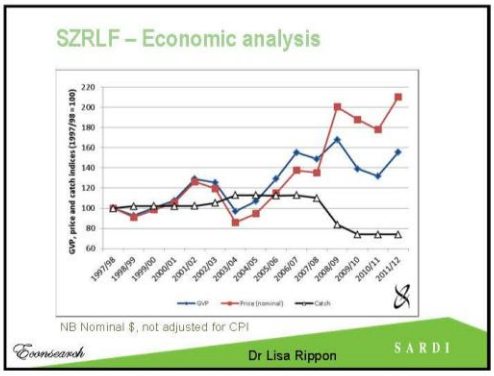

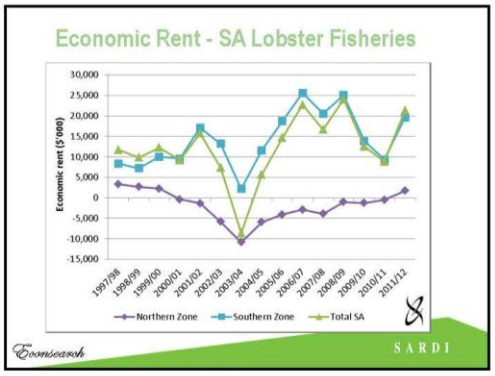

NZ CRA8 FISHERY

Largest NZ lobster fishery (34%)

Rules

- Quota since 1990
- Minimum legal size
- Females carrying eggs cannot be taken
- Escape gaps in pots
- Full 12 month season
- No pot limits
- Females taken when not carrying eggs
- Males can be taken at all times
- High-grading is allowed

CRA8 Management Committee Inc

Malcolm Lawson

SARDI

Take home message from CRA8

It's Not All About Quantity

Abundance Provides The Opportunity To Maximise Financial Returns Through Providing What The Market Wants And When

- Increased returns through targeting size, areas and time of year
- Reduced costs through high CPUE
- Confidence – business planning
- Reinvestment
- Additional benefits – high breeding biomass

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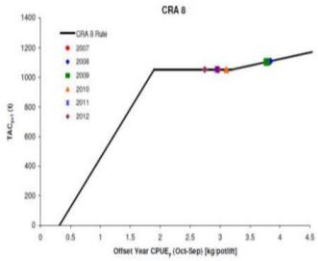
Conservative Decision Rules after 1997



Decision rules refined over time

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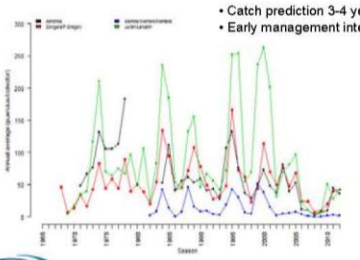
WA Rock Lobster - Puerulus settlement

- Catch prediction 3-4 years ahead
- Early management intervention

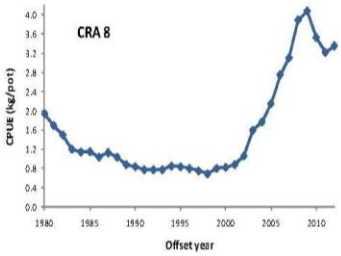


Fish for the future

Dr Nic Caputi

SARDI

Highly successful rebuilding strategy



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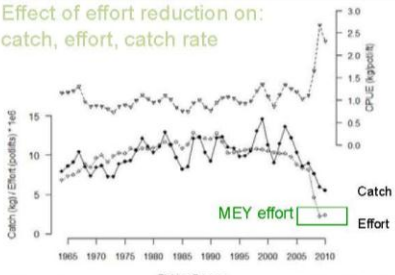
Effect of effort reduction on: catch, effort, catch rate



- 35-40% reduction in vessels
- Fishers made commercial decisions (sell/buy/lease)
- No government compensation
- MEY effort (30-50% of 2007/08)
- ITQ in 10/11

>50% increase in profit

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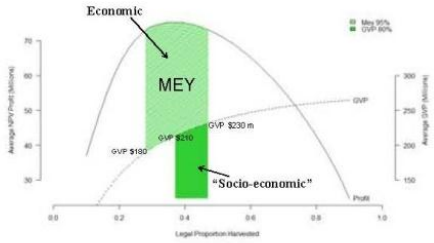
Example of using socio-economic information



1. **Target MEY to maximise Industry's profitability**
2. **Within MEY target larger GVP to maximise benefit to state**

Fish for the future

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Workshop Conclusions

Exploitation rate of about 0.3 seems to be a good target for lobster fisheries

Current exploitation rates too high in several Australian fisheries

Lower catches can mean higher profit

Trade-off between profitability (industry benefit) and GVP (community benefit)

Economic data is critical to optimizing fishery performance – most Australian fisheries have poor economic data.

Bio-economic models are a valuable tool but need good data

Model structure and inputs need to be tailored to specific circumstances

Models should be re-run regularly to assess changing situation

Harvest Strategies should include socio-economic PIs

Appendix 2.9. Using data in bioeconomic models to identify profitable harvest strategies

SOUTH AUSTRALIAN RESEARCH & DEVELOPMENT INSTITUTE
PIRSA

Using Data in Bioeconomic Models to Identify Profitable Harvest Strategies

Rick McGarvey
SARDI Aquatic Sciences

PREMIUM FOOD AND WINE FROM OUR CLEAN ENVIRONMENT

SOUTH AUSTRALIA

Government of South Australia

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How to achieve reliable management decision making

- So here's the question: How to best manage these lobster fisheries?
  - It's a question that matters—some management policies work a lot better than others.
- We use tools to find fishery management strategies that enhance net financial return to the fishing industry.
- Also to enhance
  - egg production, and
  - total catch.

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Increasing industry profit

- The goal of this work is to find ways to make the *Jasus edwardsii* fisheries in Southern Australia (SA & Tas) more profitable.
- The task of the project is to develop modelling tools to achieve that objective.
- This is not about individual fishing businesses. It's about fishery management overall—size limits, and how to set quota.

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South Australian Lobster Fishery Management Plan Objectives:

- The Management Plan states its 3rd objective as follows:

Profitability

- Decision rules that achieve stock recovery produce higher catch rates; and
- Higher catch rates lead to higher profitability.

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How to achieve reliable management decision making

- So here's the question: How to best manage these lobster fisheries?
  - It's a question that matters—some management policies work a lot better than others.
- We use tools to find fishery management strategies that enhance net financial return to the fishing industry.
- Also to enhance
  - egg production, and
  - total catch.

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Cold Hard Fact: That's how to base the most reliable management decision making

- Ideally, we want to make those management decisions based on cold hard fact—if possible.
- In the case of these lobster fisheries, the cold hard facts come in the form of data.

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Data on the South Australian lobster fisheries

- Here are data sources available for the SA lobster fisheries:
  - Catch total (in weight, monthly, from logbooks)
  - CPUE (by month, from logbooks)
  - Catch in number landed (by month, from logbooks)
  - Sex ratios (pot sampling)
  - Length frequencies (pot sampling)
  - Tag-recaptures (for growth)
  - Beach price
  - Fishing costs, fixed and variable.
- The puerulus index is not yet used in modelling.

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South Australian Lobster Fishery Management Plan Objectives:

- The Management Plan states its 3rd objective as follows:

Profitability

- Decision rules that achieve stock recovery produce higher catch rates; and
- Higher catch rates lead to higher profitability.

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Price Data

- Lobster beach price data, reported by processors, are summarised by SARDI Statistics branch as a monthly mean price.
- Monthly prices allow the analysis of harvest strategies to account for
  - monthly variations in when catch is taken, and
  - time closures.
- Price is broken down into two lobster size grades, larger lobsters bringing a lower price.

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What questions can a model like this answer?

- How much might catch rates rise if a quota is reduced?
  - (Or decline if it is increased?)
- If catch rates go up, how many fewer pot lifts are needed to take a given catch?
- What cost savings can be gained by setting fewer potlifts?
- How much would profits rise?
- But how much would landings revenue be reduced, in the short term, before catch rates rise?

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Fishing Costs

- South Australian fisheries are fortunate to have an extensive high-quality data set of fishing costs, from EconSearch interviews with the fishing industry.
- Based on 3-yearly surveys of active fishers.
- These data permit us to break costs down between fixed and variable;
  - only variable costs are reduced when fewer pot lifts are set in a given season.
- An EconSearch economic survey was also carried out in Tasmania this year.

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4 Policies

- These are four widely-used policies for managing a fishery.
- Specifically, we present results for the South Australian, Southern Zone lobster population:
- The 4 policies tested are:
  - size limit policies, minimum and maximum size;
  - constant quotas;
  - quotas that vary so as to approximate a constant exploitation rate.

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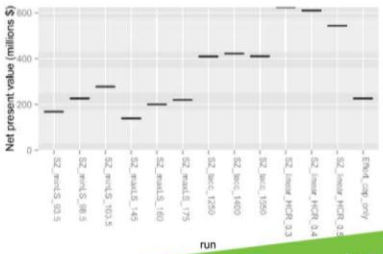
Average profit (net present value) for 4 lobster fishery management policies



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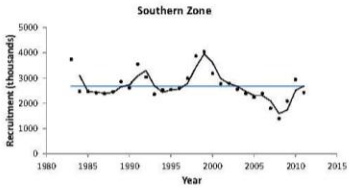
Recruitment since 1983: SA Southern Zone



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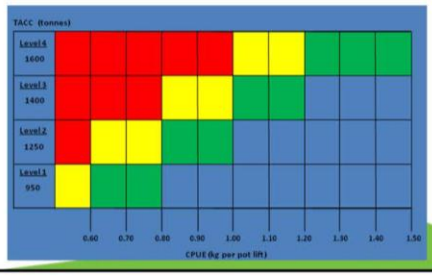
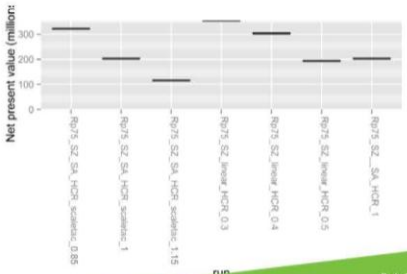
Current Southern Zone Harvest Control Rule which approximately seeks a constant harvest fraction



NPV with 25% lower R



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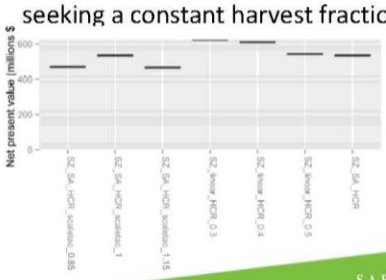
Average profit: Comparing current SZ HCR with a linear harvest control rule: both seeking a constant harvest fraction



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Lowering Size Limit in NZ to 98.5

- NZ representatives on the Research Sub-Committee requested that we test a lower size limit.
- 98.5 is the minimum size in the SZ.

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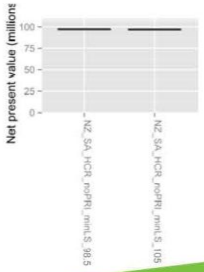
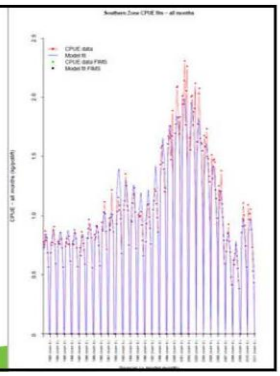
Lowering Size Limit in NZ to 98.5: NPV



SARDI

Model fit to data: CPUE

- This shows the Southern Zone fit of model biomass to monthly logbook CPUE.



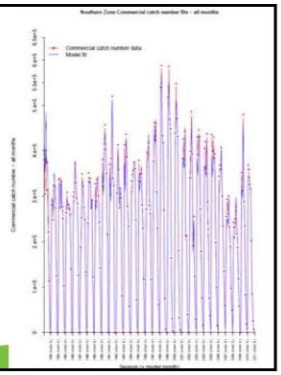
Summary

- So model results are showing that size limits are not a major factor in managing these lobster stocks.
- The model is basically saying that what really matters in managing this lobster stock, is how hard you fish it.
  - One way to quantify that is by the harvest fraction, the amount of the available biomass harvested per year.
- So for lobster fisheries, that basically comes down to how many pot lifts get set every year.
- And when quotas are set yearly, in such a way as to try and keep the harvest fraction roughly constant, the best economic outcomes are achieved.
- When recruitment is lower, higher profit is obtained by fishing at a lower exploitation rate.

SARDI

Model fit to data: Catch in number landed

- This shows the Southern Zone fit of model catch in number to monthly data from logbooks.



Acknowledgments

We thank SRL Ltd, the Australian Seafood CRC, Caleb Gardner, Andre Punt, SEPFA, NZRLFA, and lobster fishermen in Tasmania and South Australia.

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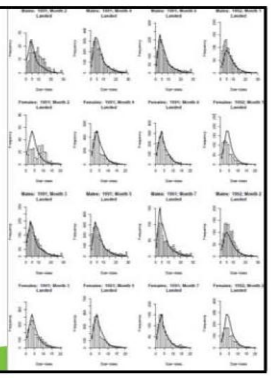
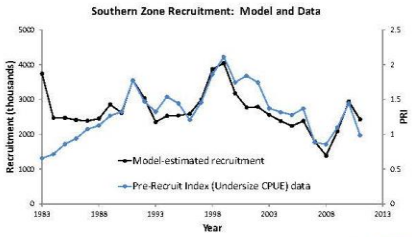
Model fit to data: length frequencies

- Southern Zone fit of model length frequency proportions to pot sample data.



Testing the Model: Comparing model recruitment with (independent) undersize PRI data



S A R D I

Extending fishery model to account for economics

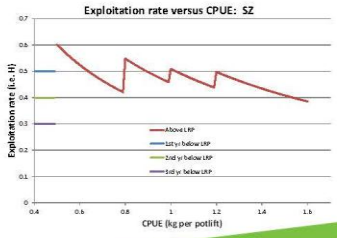
- To extend the population model to evaluate different harvest strategies, with higher profit as a principal objective, two economic submodels are added:
  - price per kg landed:
  - costs of harvesting that product.
- Gross revenues from landed seafood product are computed directly as catch (by month and lobster size) times price;
- Profit is gross revenues minus fishing costs.

Two goals of fishery management:

- Sustainability: Assuring that the lobster population remains healthy; enhancing egg production. In many fisheries, management focus has been on sustainability.
- Economic return: To target strategies that achieve the highest possible economic output, as profit, from sustainable exploitation of that seafood resource.
- Both objectives are important.
- And sometimes, both are achieved by the same management strategies

S A R D I

Current SZ HCR which approximately seeks a constant exploitation rate



S A R D I

Goal of bioeconomic modelling project

- To build a modelling tool that can estimate economic outcomes (average profit to fishers), under various management harvest strategies.
- Biological performance indicators are also estimated.

S A R D I