Appendix 1. Prawns

Optimising business structures and fisheries management systems for key fisheries

T.M. Ward

Project No. 2009/715

February 2015
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Appendix 1.1. SGPF Workshops 1 and 2: Agenda

DRAFT

Economic Performance and Management Opportunities

Port Lincoln
Monday 27 February 8:30 – 17:30 Port Lincoln Hotel

OR

Adelaide
Tuesday 28 February 8:30 – 17:30 SARDI Conference Room 2 Hamra Ave, West Beach

AGENDA

1. Welcome, introductions & background  Exec/O  8:45
2. Summary of Spencer Gulf Fishery  C. Dixon  9:00
3. “Anderson’s Assessment” of fisheries  T. Ward  9:20
4. Economic analysis – summary of Spencer Gulf prawn fishery  E. Hoshino  9:45

Morning Tea  10:30

5. Property Rights opportunities: national perspective  A. Jarrett  10:50
   Shark Bay and Exmouth experiences  G. Stewart  11:50

Lunch  12:30

6. Property Rights: Case study of Challenger Scallop Enhancement Company  M. Harte  13:00
7. Clarence River: Marketing and promotions experience  D. Adams  13:40
8. Discussion and summary  Chairperson  14:10

Close  16:30
Appendix 1.2. Spencer Gulf Prawn Fishery

Overview
- Biologically sustainable
- Sustained catch history
- Management Plan
- MSC certified
- Bio-economic model

Economically sustainable?

Dr. Cameron Dixon – SARDI Aquatic Sciences

Management controls in the Spencer Gulf Prawn Fishery

<table>
<thead>
<tr>
<th>Management tool</th>
<th>Current restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permitted species</td>
<td>Western blying prawn (Penaeus blythii), western ghost (Penaeus japonensis)</td>
</tr>
<tr>
<td>Landed entry</td>
<td>3333.33 Tonne</td>
</tr>
<tr>
<td>Landing surveillance</td>
<td>Permitted</td>
</tr>
<tr>
<td>Corporate authority</td>
<td>Permitted</td>
</tr>
<tr>
<td>Closed areas</td>
<td>No fishing in waters shallower than 10m</td>
</tr>
<tr>
<td>Method of capture</td>
<td>Trawl, trawl, catch and release</td>
</tr>
<tr>
<td>Trawl mesh size</td>
<td>Not less than 800 microns</td>
</tr>
<tr>
<td>Maximum trawl length</td>
<td>60 m</td>
</tr>
<tr>
<td>Maximum vessel length</td>
<td>54 m</td>
</tr>
<tr>
<td>Maximum vessel area</td>
<td>Not less than 300 square meters</td>
</tr>
<tr>
<td>Catch and effort data</td>
<td>Daily and monthly logbooks submitted monthly</td>
</tr>
<tr>
<td>Landed locations</td>
<td>Landed permitted anywhere in the State</td>
</tr>
<tr>
<td>Landing times</td>
<td>Landed permitted at any time during the season</td>
</tr>
</tbody>
</table>

Surveys & harvest strategies

Fishery independent surveys (Nov, Feb, Apr)
- Collaboration between SARDI & industry
- Stock assessment & other research (by-catch)
- Inform harvest strategy development (closed seasons)

Fishery dependent surveys (Dec, Mar, May, June)
- Industry driven "spot" surveys
- Inform harvest strategy management & adjustment

Spencer Gulf Prawn Fishery Value and Production (1984/85 to 2009/10)
Appendix 1.3. Fishery Performance Indicators

SPENCER GULF PRAWN FISHERY: FISHERY PERFORMANCE INDICATORS

Associate Professor Tim Ward
Science Leader; Fisheries
SARDI Aquatic Sciences
Flinders University of SA, University of Adelaide

Guiding Principles

• COMMERCIAL FISHING is a BUSINESS and should create wealth

• Ecological sustainability is NECESSARY, but NOT SUFFICIENT for commercial fisheries to generate sustainable income and create wealth

• Community sustainability is necessary for sustainable wealth creation.

A wealth-based fishery management system is one that is ecologically sustainable, socially acceptable and generates sustainable resource rents or profits.

Purpose: The Fishery Performance Indicators (FPiS) are designed to evaluate and compare the world’s fisheries management systems based on their ability to generate sustainable wealth.

Greater attention must be focused on governance systems and economic factors

It is not good enough to be just biologically sustainable; fisheries and the communities that dependent on them must generate sustainable wealth.

The creation of a Wealth-Based Fisheries Performance Indicators give stakeholders who rely on fisheries for their livelihood critical information to make the case for better fisheries management based on a broader set of criteria incorporating governance and economic factors.
The Performance Indicators are Designed to Incorporate the Three ‘Sustainability’ Necessary for Wealth Creation

1) Economic Sustainability
2) Ecological Sustainability
3) Community Sustainability

Characteristics of Indicator Components

- Readily Available
- Accurate
- Quantifiable
- Relevant
- Understandable

Two Parts – Outputs and Inputs

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

The Fishery Performance Indicators – Outputs

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

The Fishery Performance Factors: Inputs Enabling Wealth Creation

- 39 components covering 8 dimensions:
  - Macro Factors: Environmental, Economic & Community
  - Access Rights
  - Harvest Rights
  - Collective Action
  - Management Inputs
  - Management Participation
  - Markets and Market Institutions
  - Infrastructure
Appendix 1.4. Economic status

Economic status of the South Australian prawn fisheries
February 27-28, 2012, Port Lincoln & Adelaide

Richard Hinko
Post-doctoral Research Fellow, Institute for Maritime and Antarctic Studies (IMAS), University of Tasmania

SA prawn fisheries
- Caught 3,669 tonnes, worth $31.1 million in 2009/10

Economic importance of the SA prawn fisheries
- 2nd most important fishery product in SA in terms of Gross Value of Production (GVP)

Importance of the fisheries (cont.)
- Direct employment of 475 full-time equivalent jobs, and additional indirect employment of 390 jobs in 2009/10

<table>
<thead>
<tr>
<th>Sector</th>
<th>Full-time</th>
<th>Part-time</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing</td>
<td>266.4</td>
<td>222.5</td>
<td>28.1</td>
<td>19.2</td>
<td>343.9</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>61.7</td>
<td>55.4</td>
<td>10.6</td>
<td>6.3</td>
<td>183.6</td>
</tr>
<tr>
<td>Total</td>
<td>328.1</td>
<td>278.9</td>
<td>38.7</td>
<td>25.5</td>
<td>522.5</td>
</tr>
</tbody>
</table>

- Income of $13.9 million ($44.5 million incl. indirect effects)
- GSP contribution in terms of gross value added = $57.5 million ($57.8 million incl. indirect)

Definition of Terms

Costs
- Explicit costs (direct cash payment)
  - Variable costs (VC) depend on the amount of fishing effort (e.g., fuel, bait, ice, repair & maintenance, payment to crews)
  - Fixed costs (FC) remain fixed (e.g., license fees, insurance, equipment on loan, administration)

- Implicit (non-cash) costs
  - Depreciation of capital: reduction in value of e.g., boat, engine, gear, equipment due to wear & tear
  - Opportunity cost of capital & labour: cost of giving up other money making opportunities

Terms (cont.)
- Total revenue (TR) = quantity sold × price
- Boat gross margin = TR - VC
  - In a short run, boat gross margin should be above zero to stay in business.

- Business (accounting) profit = TR-VC-FC-depreciation
- Economic profit = TR-VC-all costs
  - If zero, you are doing business just fine as with the next best alternative.
Economic indicators: measure of wealth from a fishery

1. Price of the privilege or right to access (e.g., license, lease or quota).
2. (i) Relative to gross earning (5 year average value of annual landings) - asset performance
3. Total revenue (TR) relative to historical high (average of 3 highest TRs over the past 10 years)

<table>
<thead>
<tr>
<th>2001/02 season</th>
<th>GSV</th>
<th>SGWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Aggregated market value of license</td>
<td>835k</td>
<td>859m</td>
</tr>
<tr>
<td>5. (i) annual landing value</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6. TR relative to historic high</td>
<td>44.7%</td>
<td>85.9%</td>
</tr>
</tbody>
</table>

Economic indicators (cont.)

4. Beach price relative to historical high
5. Average boat gross margin
6. Average boat business profit
7. Economic profit (industry as a whole)
   Volatility (eg, price, landing, TR) and more...

<table>
<thead>
<tr>
<th>2001/02 season</th>
<th>GSV</th>
<th>SGWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Beach price relative to historic high</td>
<td>85.7%</td>
<td>85.9%</td>
</tr>
<tr>
<td>5. Average boat gross margin (boon)</td>
<td>$821.6k</td>
<td>$818.6k</td>
</tr>
<tr>
<td>6. Average boat business profit (L)</td>
<td>$229,294</td>
<td>$236,804</td>
</tr>
<tr>
<td>7. Economic profit (million) *</td>
<td>-46,302m</td>
<td>-47,535m</td>
</tr>
</tbody>
</table>

* Source: Our research

Annual catch (t)
Boat gross margin ($)
Annual cash costs ($)
Boat business profit ($)

Beach price has declined...

GSV prawn beach prices
SGWC prawn beach prices

Source: Our research

Factor affecting the profitability

1. Decline in beach prices
2. Fuel cost as % of variable costs more than doubled in 10 years (7-12% to 22-23%)
3. Strong Australian dollar (significant proportion of SA prawn are exported overseas until 2005/06)
4. Increase in prawn import to Australia
5. Increase in global production of farmed prawn.
   - Farmed prawn production in AU almost doubled to 9.8k tonnes in 2004/05
   - Most are sold domestically (Australian Prawn Farmers Association website)

Prawn import to Australia

Quantity of prawn import to AU
Real prices of SA & imported prawns

Source: Our research
Discussions

- Low beach price & higher fuel cost (lesser extent) have lowered the profitability of the SA prawn fisheries.
- Beach price highest in Nov & Dec ($4.5/kg), lowest in April & May ($1.00/kg) in 2009/10
- Strong exchange rate
- Increased in prawn import and expansion of global aquaculture production appear to have had negative impacts on price.
- Boat capital investment has increased, although declining trends in recent years.
- Future uncertainty (e.g. fuel prices, exchange rate)

How about future?

- Fuel price expected to fall by 16% from its peak level over the next 7 years and to remain constant in real terms after 2013 (ABARE 2007).
- The price of tiger prawns increases over the next 7 years in real terms by 13%, owing to a projected softening of the AUD (Punt et al. 2010).

- Short-term effects: Floods in Thailand, disease outbreaks in Vietnam have reduced supply, pushing up prices in 2010 (FAO GlobalFish)
- Global aquaculture production continues to grow?

Crude oil prices

Recommendations

- Continue monitoring of the economic indicators
- Investigate the possible impacts of increased supply of farmed prawn on domestic prices and demand
- Identify harvest strategies that increase the future profits (size, seasons etc.)
- Explore management options (e.g. ITQ, buyback) to improve the profitability of individual operators.
Appendix 1.5. Transferable Fishing Rights

INDIVIDUAL TRANSFERABLE FISHING RIGHTS – A PATHWAY TO $$$$ PROFITABILITY $$$$ 

Annie Jarrett  
Pro-Fish Pty Ltd  
February 2012

Fisheries Management: A Delicate Balancing Act
- Eco-system Based Fisheries Management
- Bycatch Reduction
- Marine Protected Areas
- Environmental Certification
- Resource Stewardship – Community Pressure
- Harvest Strategies
- Fishery reference points – MSY v MEY
- Economic Efficiency

Adjustment
- Globally most fisheries have suffered from over capacity, effort creep & recruitment overfishing
- Most fisheries have required cuts in fishing effort and adjustments in fishing capacity
- Mechanisms for capacity adjustment:
  - buy backs (govt and/ or industry funded eg Qld, NPF, TS)
  - compulsory reductions in TALs
- Capacity adjustment (excluding buy backs) needs basis eg form of individual transferable fishing rights system

But:
ITS HARD TO BE GREEN WHEN YOU’RE IN THE RED
- Unfavourable FX – AUD high & climbing
- Challenging market conditions
- Too much competition (aquaculture & domestic)
- Increasing costs (production, management, research)
- Reducing or static catches
- Too Many Boats??

Australian Prawn Fisheries
Rights Based Management
**Individual Transferable Fishing Rights**

**The Benefits**
- Secure on-going access (property rights) for industry, sound investment base for financiers
- Flexibility for operators – individual decisions to buy, sell or lease are market based, not government driven
- Effective tool to balance fishing effort and biological & economical sustainability
- An equitable tool for adjustment in the fishery when required – (adjustment proportional across the fleet)
- Generally cost effective to manage and enforce
- Have proven effective in QLD, Torres Straits & NPF prawn fisheries

**Types of Individual Transferable Fishing Rights**
- Input controls: gear units; boat units; boat days/time units; effort units; pot units (Individual Transferable Effort Units or ITEs)
- Output controls: Individual Transferable Quotas (ITQs) – issued as kilos of fish/prawns

**ASSUMPTIONS FOR SUCCESS**
- All individual rights fully tradable (sale or lease)
- Retention of limited entry
- Closures for biological/ecological purposes
- Continued use of ECRM/Bycatch mitigation
- Ongoing research, data collection & compliance programs may vary with each system
- Need to consider economics as well as biology

**CRITERIA**
- Equitable: need to identify existing shares & determine translation formula, the “share” of rights held under one system must not be diminished in moving to a new system
- Flexible & Adjustable: operators need flexibility to adapt to changing circumstances & to maximise returns; fishery needs to be adjusted to respond to biological or economic changes
- Responsive – capable of adjusting the fishery on either biological or economic grounds in a timely manner
- Transferable: allows operators maximum flexibility to trade up or down to suit their own operations/market demands
- Economically efficient: relying as few inputs as possible to maximise opportunity for economically efficient exploitation
- Simple & Cost Effective: to manage; easily understood by industry; simple administration & enforcement; legally defensible

**WHO HAS WHAT RIGHTS BASED MANAGEMENT SYSTEMS?**
- Northern Prawn Fishery: limited entry/gear units (ITEs – Investigation ITQs)
- QLD Trawl: limited entry/effort units (ITEs)
- Torres Straits: limited entry/boat days (ITEs)
- South Australia: limited entry/boat licence
- New South Wales: limited entry/boat licence
- Western Australia: (Ettamalong Gulf/Shark Bay): limited entry/boat licence

**Input Controls**
- Boat Days/Time Units; Effort Units; Gear Units; Capacity/HP Controls
  - Generally acceptable to industry – often based on catch history
  - Generally more cost effective
  - Not always effective at controlling effort
  - Imposes economic inefficiencies
  - Flexible and responsive for adjustment but
  - Benefits of individual decisions to increase efficiency dissipated across the fleet
  - Rent dissipation can occur if capacity adjustment doesn’t occur (fishing inefficiently)
**Individual Transferable Quotas - ITQs**

- A Total allowable Catch (TAC) determined by bio (+ economic) model - Individual Transferable Quotas allocated (lbs of prawns) allocated
- Requires robust scientific data / stock assessment (+ economics if managing to MGT & TAC predicting methodology – survey information can assist)
- Best results generally in single, long lived species
- Few short life cycle (less than 6 years) multi species fisheries managed under ITQs (bjo some high volume; high value fisheries eg African anchovy/ sardine, NZ arrow squid & Icelandic capelin fisheries
- No prawn fishery managed under ITQs (Mozambique Shrimp fishery closer to Total Allowable Catch system) – NPF investigating ITQs

**ITQs CAN PROVIDE MORE EFFICIENCY GAINS THAN INPUT CONTROLS**

- Flexibility to maximise catch for least cost; Economic efficiency; facilitates trade/autonomous adjustment; limits catch
- Economic theory – Most benefits are from quota trading
- Single species nature of NSP may be suitable to quota management, subject to stock assessment
- Potential loss of revenue from high grading/discoarding
- Compliance, research and administration costs higher – can co-management offset?
- Issues of corporatisation and concentration of ownership
- Real time management may allow TAC in-season updates

**ALLOCATION**

- Allocation is the most controversial issue in moving to any new system or in implementing adjustment programs
- Fishers are generally more interested in what they are ‘going to get’ than how a new system would work
- Fishing history (eg: catch, vessel size; HP) financial investment; administrative decision; auction/ tender all mechanisms used in allocations

**The NORTHERN PRAWN FISHERY (NPF) Experience**

1960s: Exploration followed by commercial trawling - open access fishery (no limited entry)
1974: Biggest banana prawn season on record; expansion of commercial fishery
1980: First ‘Management Plan’ for the NPF, 302 licenses
1986: The ‘A unit’ system introduced - individual transferable rights based - combination of hull and horsepower allocated/formula
- Provided secure, legally defensible fishing rights & basis for management could buy back/adjustment
- Industry-initiated buy back scheme; 2 for 1 best replacement policy

**The NPF Experience Cont.**

- A Units ineffective effort control: Operators ‘coped’ horsepower and vessel configuration regs; effort creep and stock depletion
- Ineffective adjustment tool; can only buy or sell under adjustment
- Buy back based on A unit system slow and expensive: $45 million to remove 89 licenses over ten years
- Input restrictions to address stock depletion (twin gear/ closures/ daylight trawl ban) force inefficiencies/ reduce fleet profitability
- Additional 35% compulsory surrender of ‘A’ UNITS in 1993 – fleet reduced to 130 trawlers

2000: Gear units introduced: Allocation proportional to A unit holdings. Transition incorporates 25% reduction in total headrope. 35 boats leave
- 2001: Both species of tiger prawns classified as ‘overfished’
- 2002: Total headrope reduced 15%. Individual reduction proportional to gear unit holdings. 17 boats left the fishery
- 2003: Decreased season length to improve sustainability of brown & grooved tiger prawns
- 2005: Total headrope reduced by 25% to improve economics of the fishery, 11 boats left the fishery
- 16 trawlers removed in 3 years (internal adjustment)
- 4% effort reduction imposed massive Economic Inefficiency – small gear, short seasons, low prices – Economic disaster. 2007 Govt-funded SAP removes 43 boats
GEAR UNITS IN THE NPF

- Total amount of gear and Fishing Season Length / Timing
determined by bio (x economic) model

- Allocation of gear units based on agreed formula (eg catch history)

- Each gear unit entitles operator to % of totable gear eg 1 gear unit = 10 cm

- A gear unit can comprise headrope only or combined headrope & footrope
(NPF has a headrope constraint relative to footrope)

- Under adjustment, total number of gear units remains the same - the value of each gear unit changes

As an example in the NPF where each gear unit equals 10 cm of headrope & 112.8 cm of footrope... after a TAC, reducing each gear unit would equal to
headrope & 10.36 cm of footrope

- System requires net size identification / gear unit register / regular net checks

- Transfer of gear units only during closures to reduce compliance costs

- Headrope (controls swept area) good measure of fishing effort

- Easily measured & enforced - particularly compared to hp

- Enforcement – on shore measuring and net tagging; at sea checks

- System does not impede technical innovation – allows for removal of other inputs eg boat size/ hp restrictions/ gear types

- Operators can trade gear units to suit own operational/market demands

- Flexible tool for adjustment - gives operators option of buying, selling, leasing gear units, amalgamating licenses or fishing with smaller gear

- Potential for effort creep with removal of boat size/ hp restrictions but can be adjusted

- Can result in economic inefficiencies (rent dissipation) if operators tow inefficient gear when adjustment occurs

The NPF Today

- From 362 to 52 trawlers; flexible gear unit system - no limits on gear, twin, quay, tongue nets; feasibility/economic efficient

- Bio-economic model for tiger prawn: escapement policy for banana prawn; Catch trigger limits to determine season lengths (economic triggers)

- Harvest strategy includes Maximum Economic Yield (MEY) target reference point; MVY limit reference point

- Both species of tiger prawn now sustainable; 3 high yield banana prawns seasons (5000 – 7000 t)

- Industry Company; Co-management with AFMA – NPF

- Mapping data; out-認識ing of surveys, crew member observer program; in MSC program

- GVP: $83m (130 Boats - 2004/5); $49 m (52 boats 2010/11)

Catch in banana and tiger fishery (tonnes)
1970 - 2011

NPF CPUE 1970 - 2011

ITQs in NPF

- World class tiger prawn bio-economic model converted to TAC /predicting method but failed in 2011 (overestimation by 60%)

- Model heavily reliant on data from annual recruitment and spawning surveys (annual survey cost $750K)

- No stock assessment and TAC setting method for banana prawns due to high recruitment variability. 2010 under-prediction of 2000 ($20 million) but investigating environmental (rainfall) model

- High grading/dispatching – trails of e-monitoring (cameras) to reduce observer coverage/cost

- Increased compliance & management costs > $500,000 pa

- Will require retention of some inputs in seasonal closures to protect juvenile and spawning stock (Dec – March; June – July)

- Kemp & CBA shows main gains ($50 million over 50 years NPV) from quota trading; predicted on getting TACs right
THE LESSONS

- There is no ‘perfect’ management system

**OUTPUT CONTROLS – INDIVIDUAL TRANSFERABLE QUOTAS (ITQ’s):** responsive & flexible for adjustment BUT generally inappropriate in short life cycle, multi-species fisheries due to annual variation in recruitment & potential for high grading & discarding; expensive to administer and enforce

**INPUT CONTROLS - BOAT SIZE/HORSEPOWER CONTROLS:** Not effective at controlling effort; not totally flexible or responsive for adjustment; impose economic inefficiencies; benefits of individual decisions to increase efficiency dissipated across the fleet

THE LESSONS cont.

- Trade-offs between costs and benefits in all systems
- The balance (competing objectives) changes – subject to complexity of management arrangements and degree of risk
- Closures effective for biological protection (eg seagrass/habitats/sm small prawns) but impose economic impediments on operators
- Reductions in fishing effort MUST be implemented through the primary management tool to avoid increasing economic impediments
- Targets are rarely – if ever – met in time, on time, to achieve objectives: harvest strategy should include clear targets, objectives & decision rules, including economics
- Profit is not a dirty word!
Appendix 1.6. Exmouth Gulf and Shark Bay

Exmouth Gulf and Shark Bay Fisheries

Presentation by Graeme Stewart
Past President: ACPF
Executive Officer: Shark Bay Boat Owners Association
Summary by Tim Ward and Cameron Dixon

Shark Bay

- Shark Bay
- Target MEY
- Input controls legalized
- Don’t adhere to Management Plan
- Try to minimize overheads-resize fleet (5.9% BVP cf. cost recovery 7.9% BVP)
- 18 boats, 7 owners (3-4 active)
- 10 boats NW Seafood
- Try to operate in corporate manner – bulk buy nets, etc (but compete at sea)
- 1992-95 legislation did no support fishery
- Multi-species fishery with permit for prawns
- 570 days per year
- 4 x 5.5 fashion nets (optimal fuel consumption)
- Two buybacks: 1991 Fisheries Adjustment Scheme Act 1987 and 2011
  - 1991: reduced fleet from 35 to 27 vessels ($1.25M per vessel) – government loan
  - 2011: reduced fleet from 27 to 18 vessels ($2.5M per vessel) – government loan

Exmouth Gulf

- Began 1962, effort grew until 1981
- Overfishing led to collapse – no fishing in 1982-3
- Onshore processing (NG Kelis) fashion grade prawn for Japan
- 16 licences (15 Kelis)
- Buy-back bought out last single (non-Kelis) licence
- New one company maximum catch 1200 kg per night (factory capacity)
- Reduced number of vessels
- Electricity costs increased by 28% led to factory closure
- Bought 3 freezer boats
- 16 licences, only 8 boats fishing
- Management Plan not suitable
Appendix 1.7. Self Governance: Challenger Scallops

Overview

- A Recipe for profitability and sustainability
- Importance of strong fishing rights and self governance
- The Challenger Scallop Enhancement Company
- Lessons from the Spencer Gulf & West Coast Prawn Fisheries?

Self-governance

- Self-governance is about internalizing the decisions about fishing and fisheries management – short term and long term – within the industry.
- It is about empowering the industry to take advantage of property rights to increase the value derived from the resource.
- Allows rights holders to have more flexibility to take action to make decisions to optimise revenues and reduce costs.

Recipe for profitability and sustainability

- Small number of participants
- Decent industry governance
- Record of innovation
- Supportive regulator
- Fisheries management costs paid by fisherfolk
- Strong property rights rather than just regulatory rights
- High degree of self governance
- Ability for fishery to collectively operate as a sole owner to maximising revenues and minimising costs

A fishery as a sole operator

- Strong property rights together with self-governance allows a fishery to operate as a sole operator.
- Immediate decisions about risk and future prices to set catch limits to maximise the present value of the available resource.
- Make economically efficient decisions about the nature and extent of research services and compliance.
- Fishermen work together as co-owners to make tough economic decisions and collectively benefit from those decisions.
The Southern Scallops fishery

- The southern scallops fishery is located at the top of NZ's South Island.
- Between 1500 scallop vessels operate in the fishery.
- Relatively small fishery with an annual harvest worth NZ$15-20m.
- Industry self-governance is highly developed.
- It is one of NZ's few fisheries to have industry investment and commitment to self-management.

Management and decision sharing arrangements

- Challenger has a MOU with NZ Ministry of Fisheries.
- Specifies the information required by the Minister of Fisheries to assess performance.
- Provides for the Ministry to approve specifications and standards for research.
- Provides for Challenger to make annual harvest level recommendations.
- Establishes a process of consultation with recreational fishermen, iwi/fisheries, and environmental interests.
- Makes provision for overcoming harvesting conflicts with recreational fishers (have a directorship on Challenger Board).

Challenger Scallop Enhancement Company

- Challenger was created in 1992 to establish an ownership structure for collective capital investments.
- Challenger gives rights holders the ability to "privately" manage the fishery so as:
  - To capture upside benefits of sole ownership management.
  - To increase free-rider.
  - To collectively control the costs of managing the fishery.

Management and decision sharing arrangements

- Challenger carries out its own research and selects its own science provider.
- Produces harvest strategy addressing proposals for:
  - Areas to be closed to commercial fishing under its rotational harvesting strategy.
  - Areas to be closed to commercial fishing to allow for recreational fishing.
  - % of fishing rights to be retained each year (1% is cap and not binding since harvest is less).
  - Daily and weekly catch limits.
- Business plan and harvest strategies approved at AGM by majority vote.

Challenger Company

- Challenger has gone through several major restructuring both internally and externally driven (government and environmental).
- Challenger is not a "sole owner" of the southern scallops fishery.
- Challenger has attempted to capture the benefits of a "sole ownership" management regime by use of tool controls and regulation to overcome free-riders who might not otherwise pay levies for the costs of management.

Management and decision sharing arrangements

- Activities funded under compulsory levy ranging from 15-20% of landed value.
- The management plan is implemented under chief contract among rights owners, vessel operators, and Challenger.
- All sign a contract outlining the harvest rules and agreed damages that must be paid in the event of non-compliance.
- Contract provisions are agreed by consensus at the general meeting of the Company.
Compliance and enforcement

- Two types of sanctions:
  - Sanctions that are applied to individual industry participants (e.g., vessel operators) for non-compliance with rules, whether they be regulations or contract rules.
  - Sanctions that apply to the Challenger for non-performance under its management agreement with the Ministry of Fisheries.

Lessons for Spencer Gulf Prawn?

- Spencer Gulf Prawn fishery has many of the key ingredients for a profitable and sustainable fishery already in place.
- Can you transfer from statutory fishing rights to stronger property rights? This could be voluntary or state sanctioned.
- Can you build on existing co-management structures and look for opportunities for greater self-governance by internating more management responsibilities especially those with major cost saving potential?
- Can you explore potential, benefits and risks for fishery to function like a sole operator through collective management of harvesting operations and value chain activities as well as routine fisheries management and research activities?

Possible model for an integrated Spencer Gulf Prawn industry

- Science
- Harvesting
- Processing
- Marketing

Spencer Gulf Prawn?

1. Conduct scientific advice, data analysis, and ecological modeling
2. Develop management plans
3. Contract harvesting and landing from owners
4. Contract processing and distribution
5. Contract Marketing and sales

The wider influence of the Southern Scallop fishery

- Management arrangements in the southern scallop fishery were a subject for sound ground breaking fisheries reforms that promote devolution and decentralization of fisheries management.
- Challenger offers a genuine alternative to centralised government management.
- The fishery is a blueprint for the wider devolution of fisheries management responsibility, and for effective sub-management by fishery rights holder.

Thank you

wwf.org.au
Appendix 1.8. Clarence River Prawn Fishery

Economic Performance & Management Opportunities
Spencer Gulf Fisheries Conference
Port Lincoln/Adelaide
27th & 28th February 2012

Daniele Adams
General Manager

WHERE HAVE I COME FROM??
- Hired – Sales Manager May 2011, promoted Sept 2011 to GM
- "KISS" business principles
- Graduate from school of hard knocks
- Sales experience from 15 years old
- Automotive & Software background
- International business experience – start-up businesses in China, Thailand, Philippines
- Focus on business feasibility, foundation laying, change management, profitability and bottom line impacts
- People growing rather than people management
- Proactive sales versus reactive headaches

THE CLARENCE RIVER FISHERMEN’S CO-OP (CRFC)
- Incorporated in 1945
- 334 Members (all shareholders) – approx 40 Ocean and 94 Estuary
- Board of 6 – 4 fishers, 2 independants
- Core products – Mullet, School prawns, King prawns, Octopus, Trawl Whiting
- 50 Staff
- 7 hours north Sydney, 3 hours south Brisbane

If you continue to do what you have always done, you will continue to get what you have always gotten!!
The Challenges Faced at the CRFC!

- Catch declining
- Decreased financial returns
- Location
- Aging fleet
- Black market selling
- Industry deregulation (keyboards, fish receivers licensing)
- Imports
- Power clients
- 2 aging facilities, old equipment
- Government controls and restrictions
- Costs increasing, wholesale prices remain stable
- Operating like the old days, not taking into account market trends/forecasting demand
- Angry share holders, negative followers
- Very unhappy customers
- Natural disasters - 2 floods, 3 years

In the First 6 Months

- Rebuild internal sales procedures
- Basic sales skills training
- Build relationships with surrounding towns small seafood sellers
- Focus on value adding
- Use shops to push product
- Focus on large buyer relationship from Corporate perspective – work on allocation orders
- Encourage one-on-one relationships with large buyers, location managers

In the First 6 Months

- Rebrand “Yamba Prawn”
- Review and research alternate markets
- Better use of by-products
- Export evaluations
- Encourage new memberships
- Alliances with other Co-ops
- Sales runs – personalise the sales process
- Seafood processing values & costs (wet weight)
- Revise debtors accounts
- Greater visibility of information
**The Next 12 Months**
- Yamba Prawn awareness campaign
- Add attention to undervalued species (Mullet) – point of sale material, value add options, how to cook etc
- Focus on “volume for value” projects
- Extend reach of client base and opportunities
- Industry networking
- New project involvement – more value add opportunities
- Export exposure, research markets
- Funding and capital expenditure investments
- Downsize without impacting operations

**THE NEXT 12 MONTHS**
- Recognise the competition but build your competitive advantage
- Win/win relationships are far more valuable
- Manage cash-flow without just targeting profitability
- Tweak the focus – don’t focus exclusively on increasing sales and revenue - improve sales margins
- Balanced mix of sales opportunities and growth targets – more local sales, new export markets, value adding
- SMS communications with buyers
- SMS to members with targeted products, fixed prices, better returns

**Evaluate Product Direction**

```
Old direction
- Whole
- Cut Slices
- Larger Shrimp
- QD Shrimp

New direction
- Whole
- Cut Slices
- Larger Shrimp
- QD Shrimp
```

**“Coming together is a beginning, keeping together is progress, working together is success”**

**Henry Ford**

**Marketing Focus**
- In shop displays for new clients
- Involvement in Food Festivals/Functions
- Media opportunities
- Buy smarter
- Process faster – new machinery
- Evaluate quick cook/easy serve meals
- Bait market
- Processing for buyers
- Retail shops – no imports, all fresh, mostly local, “homemade, home-grown”

**Thank you for the opportunity to share our company’s challenges, vision and plans**

**Clarence River Fishermen’s Co-operative Ltd**

**Prawn Yamba**
Appendix 1.9. Key findings of initial SGPF Workshops

Options for improving the economic performance of SGPF

Simon Clark and Cameron Dixon

Issues identified
- Prices too low cost too high
- Too many restrictions
- Too inefficient
- Too many boats to be profitable
- How to get boats of the waters
  - government buy back unlikely
  - need to assess economics of industry buyout
  - need transferability

Also need to address prices through marketing

Options for improving the economic performance (Cont)

Options identified
- Consider options for an industry buyout
- Challenger (corporate) model may be too big a step right now
- Investigate buyback options/mergations
- Incorporate economics into stock assessment strategies
- Decision rules to achieve/retain economic efficiency
- Need to work out optimal catch per boat and most efficient way to fish gulf
- Reductions need to large and fast (AJ)
- Industry buyback warrants consideration

- Need to also consider marketing (two pronged attack)
- Levy system for marketing an option
- Marketing always important, this discussion is about increasing efficiency - options are buybacks and/or transferability (AJ)
- Broad recognition of need to introduce transferable systems e.g. quota, gear/effort units, tradable rights - need to consider all options
- Need options paper
Appendix 1.10. SGPF Agenda Workshop 3

Economic Optimisation Workshop II

LOCATION: SARDI Adelaide

09:00 – 17:00  29 & 30 August 2012

FASCILITATOR: - Annie Jarrett

PARTICIPANTS: Spencer Gulf Economic Optimisation Sub-committee, with supporting Officers, Simon Clark, Tim Ward and Erik Hoshino

AGENDA

1. Welcome, introductions & background  Exec/O
2. Outline of the process and rules of engagement
3. Summary of Economic figures and assumptions
4. Establish and agree on primary driver for change
5. Establish targets that the fishery is setting.
6. Review property rights and establish options up for review.
7. Buy backs and buy ups.
8. Tradable rights – gear unit
9. Tradable rights – gear by time effort units
10. Tradable rights - nights
11. Tradable right - quota
12. Self-governance
13. Small improvements – reduce net drag, prop technology etc
14. Economic decision rules
15. Discussion and summary  Chairperson

Close
Appendix 1.11. SGPF Briefing Paper for Workshop 3

Economic Optimisation Sub-Committee
Briefing Paper

Contents
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1. Executive Summary
The profitability of businesses in the Spencer Gulf prawn fishery has been declining. Fisheries in similar situations typically undertake a structural adjustment program. The outcome of a structural adjustment is generally to improve profitability by removing inefficient activities or practices. Structural adjustments are often expensive and implemented when a fishery can least afford the change.

The Economic Optimisation Sub-committee (EOSC) will investigate structural adjustment options to improve the future profitability of the business involved in the fishery.

2. Purpose
The purpose of this paper is to provide preliminary background information for the Association’s EOSC. Information and recommendations developed by the EOSC will be submitted to the Management Committee. The Management Committee will then approach the Association’s membership for further advice and feedback.

3. Introduction
On reviewing Econsearch’s economic evaluations of the Spencer Gulf prawn fishery, in conjunction with regular feedback from membership within the fleet, it has been highlighted to the Association that there are concerns with the future economic viability of the businesses that operate in this fishery. This was reinforced during February’s workshop where members provided broad agreement to evaluate future management options for this fishery to improve economic returns.

The Spencer Gulf prawn fishery has, to date, successfully been managed by input controls and real time management. The ecological sustainability of the fishery is of a high standard, as reflected by the Marine Stewardship Council (MSC) certification. Concern with the fishery has been raised through its future economic viability.

The economic performance of the fishery can be referenced back to the Management Plan for the Spencer Gulf prawn fishery (pg 36) which has several performance indicators. Two of these economic indicators have not been realised:

1. Gross Value of Production <0% change
2. Return on Investment <0% change
This is evidenced in the following extracts from the 2009/10 Economic Indicators for the Spencer Gulf and West Coast Prawn Fisheries report by Econsearch.

**Average gross boat income fluctuated between years but, overall, between 1997/98 and 2009/10 average income decreased by 8 per cent.**

Between 1997/98 and 2009/10 the average cost per kilogram increased by approximately 39 per cent, significantly more than the change in price.

The estimated rate of return to capital peaked at almost 9 per cent in 1999/00 but has followed a declining trend in subsequent years. In 2009/10 the estimated rate of return to capital was just 0.4 per cent. The decrease in rate of return is due to both a decline in profitability in the fishery and an increase in the value of fishing licences.

The Association has also established a set of targets through its annual reports, of which two economic indicators are:

1. Our fishing licence (with boat) is worth more than $4 million.
2. We have made an extra $10 million for the industry through value-adding methods.

The first is difficult to assess as there has not been a licence transfer for over 12 months. However, there have been licences on the market which have resulted in no transaction, indicating that this target is not being realised. The Association has not invested in developing value adding options, except through supporting investigations through the Nuffield Scholarship Candidate, Clinton Scharfe. Fishermen (investors) have worked towards maximising their fishing operations within the boundaries of input controls, creating a race to the prawns. However, as it has been documented, the limitation of input control has driven inefficiencies into this fishery via the introduction of large expensive vessels which are used for short periods. The fishery has suffered from effort creep, i.e. large boats, greater horsepower leading to increased fixed costs etc. It should be noted that there is still potential for future effort creep, which is currently limited due to low returns leading to subsequent reduced investment capital.

### 4. Objectives of the Economic Optimisation Working Group

The objective of the EOSC is to evaluate alternative management options outlined in the February workshop by determining:

1. how a management option may be implemented,
2. associated benefits, negatives, implementation barriers,
3. operational costs (science, management, business, restructure)
4. economic return to the fishery of each option,
5. a priority list for the application of an option.

Following is a summary of points discussed at the February workshop.

- **Property rights:**
  - Quota/TAC
  - Effort units
    - Tradable nights
    - Time units
    - Area trawled
  - Gear units
    - Nets
- Fleet coordination/company structure
- Buy out or buy up licences
- Amalgamations

In order to evaluate options and alternatives, consideration needs to be given to the key driver for change and the new targets set for the fishery. Subsequently, the committee will develop some simple targets. The topics for determination are:
1. Agree on the key driver(s) for change
2. Set targets
3. Analysis of available options

5. Key Driver for Change
The Committee should agree on a primary (and if necessary secondary) driver for the fishery to change. The primary driver for change that has been discussed in this fishery is declining profitability. There are various factors which have driven changes in the fishery, which include:
- variable costs of running the vessels are rising;
- prices are stagnant and reducing in real terms;
- Australian dollar is high decreasing international competitive edge for exports;
- competing with imported and local wild caught and aquaculture prawns;
- competition with employment packages with mining industry combined with a reduction in (real) wages is driving increasing staff turnover, which are:
  - reducing corporate knowledge in this prawn fishery,
  - leads to a risk of poorer quality prawns.
  - less experience crew intrinsically increases OHSW risks.

The majority of these factors are beyond the influence of the Association. However, changes in these factors can be estimated and subsequent plans established to how the fishery will respond, as such should be considered through the economic analysis of any selected structural adjustment.
To gain a global perspective and develop an understanding of the factors that the Association can directly influence with respect to economic improvement of the Spencer Gulf prawns fishery, and to develop a background to other experiences, consider extracts from an FAO report included in Appendix 1.

6. Target
The EOSC needs to set clear targets for this fishery to achieve through any structural adjustment. There are various economic measures which can be identified. The following are examples (taken from Econsearch report):

**Boat Business Profit** is defined as gross operating surplus (GOS) less depreciation less owner-operator and unpaid family labour. Boat Business Profit represents a more complete picture of the actual financial status of an individual firm, compared with GOS, which represents the cash in-cash out situation only.

**Rate of Return to Capital** is calculated as Profit at Full Equity divided by Boat Capital multiplied by 100. This measure is expressed in percentage terms and is calculated for an individual licence holder. It refers to the economic return to the total investment in capital items, and is a useful relative measure of the performance of individual firms. Rate of return to capital is useful to compare the performance of various licence holders, and to compare the performance of other types of operators, and with other industries.

**Profit at Full Equity** is calculated as Boat Business Profit plus rent, interest and lease payments. Profit at Full Equity represents the profitability of an individual licence holder, assuming the licence holder has full equity in the operation, i.e. there is no outstanding debt associated with the investment in boat capital. Profit at Full Equity is a useful absolute measure of the economic performance of fishing firms.
**Economic Rent** is defined as the difference between the price of a good produced using a natural resource and the unit costs of turning that natural resource into the good. In this case the natural resource is the Spencer Gulf and West Coast Prawn fishery and the good produced are the landed Prawns.

7. **Harvest target**
Consideration should be given to the target harvest level and the ability of the management regime to assist in the targets being met. This fishery is currently harvesting at its maximum sustainable yield (Msy).

The alternative is to harvest at maximum economic yield (Mey). Mey sets a harvest strategy which is generally lower than Msy. Importantly, Mey takes into consideration the cost of fishing and price of the product. Bio-economic models provide a tool to assist fisheries in obtaining Mey. The advantages of Mey are that the fished biomass and fishery should be maximising its economic performance and creates a buffer against negative shocks (environmentally and economically).

8. **Previous Concepts**
There have been several submissions to the Management Committee in the past dating back to the mid-1980s. These options have been described in previous documents, which consider implementing:

- Individual Transferable Quotas (based on real time management)
- Voluntarily combine licenses (involves gear modification)
- Setting quota on one of the following attributes - time/nights/area trawled
- Buy-out effort
- Net transfers i.e. nets become a quota
- Purchase the Gulf of St Vincent fishery.

Other concepts are related to individual vessel cost management:

Reducing individual costs on the vessel:

- consider smaller engines with larger gear ratios and latest propeller and shaft technology to reduce fuel cost.
- modify fishing gear to reduce drag and effort, as demonstrated in the T90 trials or quad rigs.
- investigate options of an alternative to otter boards, such as the ‘batty’ wing.

9. **Management Controls**

Broadly there are two management controls: input and output controls.

Input controls – Generally simple to design and administer and allows the effort to adjust to available stock. However there are disadvantages, they don’t necessarily lead to equitable access to resources. The strength of competition between fishers leads to investment into areas of operations that are not controlled by inputs. Structural adjustment is not driven by input controls.

Output controls – Generally output controls still maintain some input measures. These controls reduce competition between fishers, which can reduce capital stuffing. They can maximise operational flexibility and create a more secure access right. They require an economic model which can be expensive to maintain, are vulnerable to data corruption particularly through high grading, increased management costs and can lead to socio-economic changes in the fishery.

10. **Individual Transferable Fishing (ITF) Rights**

ITF rights refer to fishery being divided into units which are distributed to license holders. The effect of dividing up the fishery into units will generally lead to inefficient operations to be absorbed by efficient operations. ITFs traditionally have strengthened access rights to resources. ITFs can either be based on input or output controls.
Assumptions for success of ITFs
1. All individual rights are fully tradable (sale or lease) (transferable)
2. The rights exist for the long term (duration)
3. Retention of limited entry (exclusive)
4. Closures for biological/ecological purposes
5. Continued use of ECBM/By-catch mitigation gear
6. Ongoing research, data collection & compliance programs – may vary with each system
7. Need to consider economics

Criteria
1. **Equitable**: need to identify existing shares & determine translation formula; the ‘share’ of rights held under one system must not be diminished in moving to a new system.
2. **Flexible & Adjustable**: operators need flexibility to adapt to changing circumstances & to maximise returns; fishery needs to be adjusted to respond to biological or economic changes.
3. **Responsive**: capable of adjusting the fishery on either biological or economic grounds in a timely manner.
4. **Transferable**: allows operators maximum flexibility to trade up or down to suit their own operational/market demands.
5. **Economically efficient**: retaining as few inputs as possible to maximise opportunity for economically efficient exploitation.
6. **Simple & Cost Effective to manage**: easily understood by industry; simple administration & enforcement; legally defensible.

The benefits
1. Secure on-going access (property rights) for industry, sound investment base for financiers.
2. Flexibility for operators – individual decisions to buy, sell or lease are market based, not Government driven.
3. Effective tool to balance fishing effort and biological & economical sustainability.
4. An equitable tool for adjustment in the fishery when required (adjustment proportional across the fleet).

Types of Individual Transferable Fishing Rights
1. **Input controls**: gear units; boat units; boat days/time units; effort units; pot units (Individual Transferable Effort Units or ITEs).
2. **Output controls**: Individual Transferable Quotas (ITO’s) – issued as kilos of prawns.

Input Controls
The following represent possible input units, through an ITF system:
- **Boat Days/Time Units**: licences are allocated a set number of nights or a time unit which allow access to the fishery. A time unit would be a percentage of total allowable nights allowed for a season which would be adjusted according to the stock levels. The nights or time units could be traded through either leasing or sale.
- **Effort Units**: can represent gear type by time or swept area or vessel size by time. Similarly to time units, a gear unit would be issued to licences on a unit basis. The number of units would be influenced by the available stock.
- **Gear Units**: represent an allocation of equipment which can be transferred between vessels, such as head line length.

Benefit
- Generally acceptable to industry – often based on catch history,
- Generally more cost effective,
- Flexible and responsive for adjustment,
- Benefits of individual decisions to increase efficiency dissipated across the fleet.

**Risk**
- Not always effective at controlling effort,
- Can impose economic inefficiencies,
- Rent dissipation can occur if capacity adjustment doesn’t occur (fishing inefficiently).

**Output Controls**
Output controls can be represented by Individual Transferable Quotas (ITQs). The ITQs would be established through a Total allowable Catch (TAC) which relies on research and a proven bio-economic model. ITQs result in an allocation of kg to each licence holder.

**Assumptions for ITQ**
- Requires robust scientific data / stock assessment (+ economics if managing to MEY) & TAC predicting methodology – survey information can assist. The accuracy of predictive models are important as an under prediction results in underutilisation & an over prediction can result in a stock collapse.
- Models are heavily reliant on data, including annual data collection.
- Best results generally in single long lived species.
- Few short life cycle (less than 6 years) multi species fisheries managed under ITQs though some high volume, high value fisheries eg African anchovy/sardine, NZ arrow squid & Icelandic capelin fisheries.
- No prawn fishery currently managed under ITQs (Mozambique Shrimp fishery closer to Total Allowable Catch system).
- NPF investigating ITQs.
- Flexibility to maximise catch for least cost, economic efficiencies, facilitates flexible trade/autonomous adjustments, limits catch.
- Single species fisheries are more suitable to quota management, subject to stock status.
- Potential loss of revenue from high grading and discards.
- Compliance, research and administrative cost are higher. Need to consider how co-management may offset these costs.
- Issues of ‘corporatisation’ and concentration of ownership.

**Allocation**
- Allocation is the controversial issue in moving to any new system or implementing adjustment programs.
- Fisheries are generally more interested in what they are going to get rather than how a new system works.
- Fishing history (catch, vessel size, and horsepower), financial investment; administrative decision; auction/tender are all mechanisms used in allocations.

11. **Company model/self-governance**
The company model is based on the experience of the Challenger Scallop Company. In response to dwindling stock and the establishment of a seeding program, the individual licences in the scallop industry in New Zealand Challenger region combined to establish a company to manage the business of
reseeding areas. Later further steps were taken to manage the fishery, including the science and data collection resulting in the company moved the fishery towards self-management. The following are key points:

- Self-governance or a company model is focused on internalizing the decisions related to fishing and fisheries management – short term and long-term – within the industry.
- It is about empowering the industry to take advantage of property rights to increase the value derived from the resource.
- Allows licence holders to have more flexibility to take action to make decisions to optimise revenues and reduce costs.
- Strong property rights together with self-governance allows a fishery to operate as a sole operator.
- Internalise decisions about risk and future prices to set catches to maximise the present value of the available resource.
- Make economically efficient decisions about the nature and extent of research services and compliance.
- Fishermen work together as co-owners to make tough economic decisions and collectively benefit from those decisions.

12. Buy outs (or buy ups)
An alternative measure is to buy out boats from the fishery. This in effect will allow the removed effort and catch to be distributed between the remaining vessels, potentially increasing revenue for remaining businesses. A buy out at this point in time would not receive direct financial support from the Government, as such, a funding mechanism would need to be developed. A buy out of the fishery would need to consider value of removing effort from the fishery against the costs generated by its removal combined with the additional costs incurred through harvesting greater volumes of prawns. Determining the value of licences would need to be considered, which could potentially influence whether they are compulsorily or voluntarily acquired. A limitation of buy backs is that it does not establish an ongoing mechanism which can adjust to future changes in economic conditions. There are also risks of increases in capital investment which could lead to erosion of improved revenue in the race to catch more prawns.

The option of buying up the Gulf of St Vincent and other fisheries is a consideration, which will allow an expansion of the fishery. Similar issues surround a buy up as with a buy back, i.e. values, debt levels and benefit.

13. Amalgamations
The concept of amalgamating licences is equivalent to implementing a gear unit, such as headline length, then halving it. Consideration in an amalgamation would require an understanding of the value of the amalgamated licences, transfer of costs associated with the remaining vessels etc. Other factors to consider are whether the amalgamations would be considered compulsory or would be constituted as a component of a buy back scheme as implemented in Shark Bay. Amalgamations, similarly to buy backs, share similar advantages and disadvantages.

14. Parameters for consideration
The following is a list of parameters that should be considered in determining any future changes. They may assist in clarifying and weighing up options of particular strategies that may be recommended.

- **MSC Certification** – may improve value of product and ensure that changes fit within the MSC criteria.
- **Real Time Management** – current management strategy to use stock assessment and spot surveys to decide on harvest strategies, creating a sustainable flexible approach to access the biomass.
- **Ecosystem and TEPS impacts** – need to consider any changes of risk or impacts on the ecosystem and TEPS.
- **Stock management** – ensure that prawn biomass is managed.
- **Survey Cost** – the cost of undertaking stock assessment and ecological impact research.
- **Culture of SG prawn fishery** – family owned businesses will influence strategies and ability to adapt to change.
- **Crew maintenance** – maintain product quality and low OHSW risks.
- **Compliance cost** – need to consider the changes in compliance costs with any management changes.
- **Management costs** – need to consider any management cost with any changes in the fishery.
- **Co-management** – consider the involvement and tasks of PIRSA and the Association under a new management regime.
- **Internal adjustment costs** – adjustment of the fishery may result in cost associated with making adjustments.
- **Carbon Tax** – manage future impacts of the tax.
APPENDIX 1.

The following extracts have been included from a FAO report; Gillett, R. Global study of shrimp fisheries. FAO Fisheries Technical Paper. No. 475. Rome, FAO. 2008. 331p.

“The recent world shrimp catch is about 3.4 million tonnes per year, with Asia as the most noteworthy area for shrimp fishing. World production of shrimp, both captured and farmed, is about 6 million tonnes, of which about 60 percent enters the world market. Shrimp is now the most important internationally traded fishery commodity in terms of value. In many tropical developing countries, it is the most valuable fishery export; the employment aspect is also significant.”

Profitability

In examining shrimp fishing in ten countries, one of the main features to emerge is the current low profitability of many commercial shrimp fishing operations. The typical situation consists of rising costs (mainly fuel) and falling revenue from shrimp sales (resulting to a large degree from competition with lower-cost farmed shrimp) in an environment where there is overcapacity. A number of measures to improve the current situation of poor profitability have been implemented or recommended. The most important measures are: increased attention to fuel costs, fleet reduction, market promotion, subsidies and import barriers. The boldest move to improve the profitability of domestic shrimp fishing in recent years has been the initiative in the United States to restrict the import of farmed shrimp on the basis that it has been dumped on the market.

Resource rent

Resource rent can be defined as the difference between the revenue from a fishery resource and the costs of exploiting it, including capital costs. In a broader sense, if non-monetary costs and benefits are taken into account, rent can be considered as the net economic return from a fishery to society. Good management regimes tend to increase rent; others, especially open access, can dissipate it. Unfortunately, information on the amount of resource rent available appears to have been estimated for only a few of the world’s shrimp fisheries.

Prioritizing objectives

It is difficult to prioritize the incongruous and conflicting objectives that are often set for shrimp fisheries. On a practical level, one situation is especially common – attempting to maximize economic yield in an open access regime. An important objective of open access shrimp fisheries, probably more common in the world than restricted access, is often to maximize employment. This is, however, incompatible with the economic efficiency needed to generate maximum economic yield.

Impacts of shrimp farming on shrimp fishing

The main effects of shrimp farming on shrimp fishing are:
- economic impacts in the marketplace;
- the destruction of mangrove forests for shrimp aquaculture operations;
- the capture of shrimp postlarvae and broodstock for farming;
- escapes of cultured shrimp into the wild;
- the “trash fish” issue.

Overall, shrimp farming has had a substantial impact on shrimp fishing activities, from the fishery level to the international level. Interaction in the marketplace seems to have the most effect, at least during the present period of low profitability. The total impact of shrimp farming cannot be quantified, but the net result has been lower prices.

From the mid-1990s to 2005, a major feature in the world shrimp market was generally falling prices. Ward et al. (2004) indicate that from 1997 to 2002 in the United States, ex-vessel prices declined by 27 percent in the Gulf of Mexico and 24 percent in the Southern Atlantic States Shrimp Fishery, as imports increased by 300 percent.
In Japan, there was a general downward trend in prices from the mid-1990s. In the European Union (EU), combined penaeid import prices mostly declined from 2000, but prices for some captured species increased. Cold-water shrimp prices, as judged from Pandalus borealis prices in the United Kingdom, show a downward trend from the mid-1990s. Although increased aquaculture production is the main cause of the fall in prices, Globefish (2003) also notes other causes in the early 2000s.

Demand weakened in key markets, particularly the United States of America, following the events of 11 September. Difficult economic conditions in Japan, as well as the weak yen, meant reduced demand and downward pressure on prices in that market. In the EU, the appreciation of the euro vis-à-vis the dollar effectively reduced import prices for shrimp products normally quoted in dollar terms.

Since late 2005, the shrimp price situation has changed. Because of higher demand and lower expected aquaculture production, especially in Thailand, shrimp prices have been increasing. At least part of the increased demand is from Thailand and China where domestic consumption is rising.

**Important Issues in the Shrimp Trade**

Three important issues in the shrimp trade deserve special attention: the United States trade measures relating to turtle conservation, United States anti-dumping tariffs and ecocertification of shrimp fisheries.

Relative fuel consumption still compares favourably with other animal protein production systems. With an energy used/energy produced ration of 0.095 (about 10 percent), the fuel consumption in 29 North Atlantic fisheries appears to be about five times more efficient than beef production, 4.5 times more than lamb production, three times more than chicken production, 1.5 times more than swine production and much more efficient than most aquaculture systems (Tyedmers, 2004).

**Fuel Saving**

According to the ten countries studied, operational measures used in shrimp fisheries to mitigate fuel cost increases include: using multiple nets (Figure 24); lightening the fishing gear; using sled-type doors for otter trawling; switching from otter trawling to pair trawling; reducing bycatch; using improved netting material; avoiding trawling against tidal currents; basing shrimp vessels closer to fishing grounds; fuelling offshore; smuggling fuel; and remaining in port until the fuel and/or catch situation improves.

**Improving Profitability**

A number of measures to improve the current situation of poor profitability have been implemented or suggested. The most important are increased attention to fuel costs (discussed in Chapter 7), fleet reduction, market promotion, subsidies and import barriers.

Considerable optimism is shown by both fishery managers and commercial operators in many parts of the world that reducing the number of vessels participating in a fishery will increase the profitability of the remaining vessels. This is often expressed in general terms but, in Nigeria and the United States, there has been some quantitative work.

- Economic revival (of the shrimp fisheries in Nigeria) will depend upon either prices rising or catch rates improving, as there is little scope to reduce costs. If prices don’t rebound, then the principal option facing the industry must be to reduce overall capacity to allow unit catch rates to increase for the remaining vessels, a situation that may be faced by much of the world’s shrimp fisheries. This is already happening with the Nigerian fleet – and an indication of the eventual impact on the fleet if prices remain at current levels can be estimated as follows: to restore profitability, catch rates would need to increase by 50 percent (i.e. from 60 to 90 tonnes per boat per year). This would imply a fleet reduction of at least 35 percent, or reducing the fleet to around 100–110 boats (Chemonics, 2002).
Ward et al. (2004) examined the economics of the Gulf of Mexico and Southern Atlantic States Shrimp Fishery. Simulation analysis found that with low shrimp prices, economic profits are negative and, at the end of 2004, a reduction of 30 percent of permits/licences of the large vessels would be needed to yield positive economic profits in 2005. For small vessels, positive economic profits can be achieved only for the 50 percent fleet reduction.

Reductions in shrimp fleet sizes to improve profitability have been undertaken in several locations, including Australia and the industrial fisheries in Madagascar. On the other hand, small-scale shrimp fisheries are often unprofitable, but there are few cases, if any, where management has reduced small-scale shrimp fishing fleets to improve economic performance.

Reduction in fleet size or capacity (e.g. through vessel numbers or gear restrictions) will not necessarily increase profitability in the long term. In input-controlled fisheries, which cover most shrimp fisheries, the incentive remains to innovate and rearrange inputs to become relatively more effective. Each operator introducing an innovation (e.g. a new net or otter board design) will enjoy a short-term benefit, but this will diminish as others adopt the new technology and effort creeps forwards, eroding profitability as fishing capacity increases and CPUE falls or seasons shorten.

Market promotion exercises have been carried out in several countries to improve profitability. The Mexican Shrimp Council (Consejo Mexicano del Camarón) and Ocean Garden Products of San Diego, the largest Mexican shrimp importer in the United States, launched a marketing campaign in March 2004 to promote the flavour and texture of shrimp from Mexico. The campaign, touted as “The Naked Truth About Shrimp”, is designed to give farmed and wild Mexican shrimp the brand recognition that products such as Colombian coffee and Mexican tequila already enjoy.

Market promotion exercises have been carried out in several countries to improve profitability. The Norwegian Seafood Export Council has also carried out some effective publicity work for cold-water shrimp (Figure 25).

Some market promotion exercises are quick to take advantage of new opportunities. In September 2007, the marketing group Wild American Shrimp (WASI, affiliated with the Southern Shrimp Alliance [United States anti-dumping action]) launched a marketing campaign and fund-raising activities associated with new concern in the United States over the safety of Chinese seafood products. WASI feels that this is creating a new selling opportunity for shrimp caught in the United States. To take advantage of this situation, WASI indicates that it needs additional funds to the US$10 million in federal grants received over the last four years for the marketing campaign (IntraFish, 2007).

When profits collapsed in the United States shrimp fishing industry, several measures were proposed by NMFS, including a major marketing programme. Analysis of this proposal (Ward et al. 2004) showed that market promotion efforts would have to result in a 15 percent increase in ex-vessel price to eliminate the negative economic profits for smaller vessels. A 5 percent increase in ex-vessel price would increase revenues by 2.25 percent and employment by 2.24 percent. Significantly, the analysis concluded that market promotion and other attempts to improve prices would not be successful unless the number of vessels participating in the shrimp fisheries is limited.

Subsidies are another mechanism that has been used to improve the profitability of shrimp fishing. Most of the obvious subsidies are related to fuel costs (Chapter 7), but others are granted on a per vessel basis, or consist of measures such as tax waivers, low interest loans or provision of infrastructure. Many, but not all, subsidies are harmful (Box 19). Several types of subsidy interventions have been used for shrimp fishing, including those to reduce costs of shipbuilding (Australia), to import vessels (India) and...
to fit out vessels (Nigeria). In general, the fully or overexploited nature of many shrimp fisheries has tended to reduce government enthusiasm for subsidies, while shocks such as fuel prices and competition with farmed shrimp have resulted in more pressure on governments to grant subsidies. Subsidies to shrimp fisheries are especially sensitive. Kura et al. (2004) make a strong case that government fishing subsidies are a leading factor in the excess capacity of the world’s fleets. It is well known that many, if not most, of the world’s shrimp fisheries suffer from overcapacity. It is therefore ironic that many of these fisheries continue to receive various types of subsidies.

The boldest move to improve profitability of shrimp fishing in recent years has probably been the initiative in the United States to restrict the import of farmed shrimp on the basis that it has been dumped on the market. In December 2003, the Southern Shrimp Alliance (SSA), a lobbying organization formed by shrimp fishers and processors in eight southern states, filed an anti-dumping petition with the United States Department of Commerce against shrimp farms in Brazil, China, Ecuador, India, Thailand and Vietnam. In July 2004, the Department imposed duties varying up to 113 percent on these countries. SSA claimed it was seeking protection from an unfair trade practice, but some commentators saw it as a form of unfair protection from foreign competition. The United States shrimp industry is likely to have profited in three ways from the tariff: from reducing the quantity of imported product on the United States market; from a United States law (the “Byrd Amendment”), which gives the duties collected to the aggrieved United States party (some US$150 million); and from a deal between SSA and foreign producers (worth several million) to avoid reappraisal of the dumping duties (The Economist, 2006).

Although SSA efforts were initially successful, subsequent analysis shows that foreign entrepreneurs reacted creatively to thwart the United States restrictions. Shrimp buyers in the United States switched to new suppliers of frozen shrimp, and foreign producers subject to the tariff switched production to shrimp products exempt from the tariff. The amount of shrimp imported into the United States actually increased — including that from many countries subject to the anti-dumping measures. Action by the United States Government also reduced the impact: in February 2007, the “Byrd Amendment”, was repealed and in August 2007, Ecuador was removed from the list of countries subject to the extra duty (Mathews and Dunaeva, 2007).

Resource Rent

Resource rent can be defined as the difference between the revenue from a fishery resource and the total costs of exploiting the resource. In a broader sense, if nonmonetary costs and benefits are considered, rent can be considered as the net economic return from a fishery to society. In limited access fisheries, resource rent can be kept by fishers (as super profits) or collected by management authorities (and returned to the public) through licence fees.

Good management regimes tend to increase rent; others, especially open access, can dissipate it. Accordingly, changes in rent can be an indicator of the economic performance of a fisheries management agency. For example, the performance of the AFMA in managing several shrimp fisheries under its jurisdiction is to some extent determined by changes in resource rent levels of these fisheries.

Resource rent has not been determined for many shrimp fisheries in tropical countries. The situation in Indonesia seems typical where, according to the Director of the Centre for Marine and Fisheries Socio-Economic Research, there have been few rent studies on any of the fisheries (A. Purnomo, personal communication, December 2005). Elsewhere, many fishery managers encountered during the present study are only vaguely aware of the concepts related to resource rent. Few managers appear to use the amount of rent when managing shrimp fisheries. Chapter 4 indicates that in many countries, the gross value of the shrimp catch is often used by fisheries managers for making decisions, such as trade-offs between fisheries, simply because the numbers are available and comparable. This is unfortunate, because resource rent is in many respects a better indicator of the value of a fishery to society.

Information on resource rent is readily available for several shrimp fisheries in developed countries.
• Galeano et al. (2004) give the rent in the NPF ($A33 million of resource rent in the 2001/01 season), the Torres Strait Prawn Fishery ($A2.8 million in the 2001/01 season), and the Southeast Trawl Fishery ($A2 million average for several years).

• Ward (2006) determines the resource rent level for the Gulf of Mexico shrimp fishery in the United States at US$2.11 billion. By introducing optimal yield management strategies and property rights into the fishery, a rent of US$4.19 billion could be obtained.

• Christensen and Vestergaard (1993) state that in 1991 the rent in the Greenland Shrimp Fishery in the Davis Strait was between US$33.8 million and US$104.8 million.

Limiting access is often difficult but, if implemented in the early stages of a fishery, the transition can be less expensive and more effective. Two examples illustrate the difference. In 1967, commercial prawn fishing began in South Australia's Gulf of St Vincent. Limited entry was introduced in 1968 and participation in the fishery was further reduced in 1987. Indicators show that the management objectives of “optimizing economic returns to stakeholders” are being achieved (Zacharin, 1997).

In Texas, United States, shrimp fishing developed rapidly after 1920 and in the 1930s a closed season and gear restrictions were implemented, but increased participation in the fishery created economic problems for the shrimp fleets. To improve the economic performance of the shrimp fishing, in 1995 the Texas Legislature enacted the first bay and bait shrimp vessel licence limited entry programme. Since the implementation of the licence buy-back programme, the Texas State Government has purchased and retired 815 commercial shrimp boat licences (422 bay and 393 bait) at a cost of approximately US$4.3 million. This represents 25 percent of the 3,231 licences of 1995.

Since the buy-back programme was not entirely successful at restoring profitability, additional management measures were implemented in 2002 (TPWD, 2002).

**Economic Impacts in the Marketplace**

The best studied example of economic interaction between shrimp fishing and shrimp farming occurred a few years ago, when large amounts of cheap imported farmed shrimp came on the market in the United States. In simplistic terms, the supply of shrimp on the world market soared mainly as a result of farming operations; prices decreased; imports into the United States increased; and prices paid to domestic fishers fell, causing a demise of warm-water shrimp fishing in the country. According to Ward et al. (2004), major impacts are the following.

• Since 1980, much of the growth in world shrimp production has been the result of successful farming activities throughout the world, particularly in Asia and, to a lesser extent, in South and Central America. World production of farmed shrimp in 1980 was about 160 million pounds19 (live weight), which accounted for approximately 5 percent of total world production at the time. By 2001, farmed production had advanced to 2.8 billion live-weight pounds, or more than 35 percent of total world warm-water shrimp output.

• There was an 11 percent increase in world farmed shrimp production from 2000 to 2001, representing an additional 280 million pounds of shrimp (live weight) on the world market.

• From 1997 to 2001, import prices (in constant United States dollars) declined from US$5.20 to US$4.25; shrimp imports into the United States increased by about 50 percent; and prices paid to domestic fishers declined from US$2.13 to US$1.73.

• Analysis shows that the ex-vessel shrimp price should decline 84 cents per pound for every hundred million pounds of shrimp imported into the United States.

• Although farmed shrimp imports were responsible for much of the price decrease, other factors could have contributed, including the varying conditions of national economies, tariff structures and tolerance levels for banned chemical substances.
Shrimp price declines, at least partially a result of the increased availability of low cost farmed shrimp, were not confined to the United States. From the mid-1990s to 2005, a major feature in the shrimp markets was that prices were generally falling. In Japan, there has been a general downward trend in prices from the mid-1990s. In the EU, combined penaeid import prices mostly declined from 2000 to 2005.

Since late 2005, the shrimp price situation has changed, with farmed shrimp once again responsible to some degree. Lower than expected aquaculture production, especially in Thailand, together with increased Asian domestic consumption, have been causing shrimp prices to increase.

Globally, the effects of cheap farmed shrimp are felt in most shrimp fishing fleets, especially those that target the major international markets. The resultant income declines are a major component of the current worldwide shrimp fishing “profit squeeze”. The typical current situation for shrimp vessels is rising costs (mainly fuel) and falling revenue from shrimp sales (competition with lower-cost farmed shrimp being a major component) in an environment where there is overcapacity.

Several measures are being discussed or implemented to mitigate the adverse economic effects of shrimp farming on shrimp fishing. At the level of the individual vessel, low shrimp prices (from whatever cause) reduce profitability and, consequently, the means to increase revenue (e.g. higher catch rates) or lower expenses (e.g. fuel efficiencies) are pursued. At the fleet level, capacity reduction is often attempted in restricted access fisheries. At the national level, subsidies, trade promotion and trade restrictions are used.

The boldest example of such a trade restriction was the initiative in the United States to restrict the import of farmed shrimp, on the basis that it had been dumped on the market (Chapter 5, section Important issues in the shrimp trade). In December 2003, the Southern Shrimp Alliance, a lobbying organization formed by shrimp fishers and processors in eight southern states, filed an anti-dumping petition with the United States Department of Commerce against shrimp farms in Brazil, China, Ecuador, India, Thailand and Viet Nam. In July 2004, the Department imposed duties varying up to 113 percent on farmed shrimp from these countries.
Appendix 1.12. Economic Indicators for SGPF

Economic Indicators for the Spencer Gulf & West Coast Prawn Fishery

Economic Optimisation Workshop
7-8 September 2012
Julian Morison
EconSearch Pty Ltd

Overview

- Economic Indicators
- Spencer Gulf & West Coast Prawn Fisheries

Economic Indicators

- Catch, gross value of production and prices
- Cost of management
- Boat level financial performance indicators
  - average income
  - operating costs
  - cost-price squeeze
  - profitability
  - return on investment

Economic Indicators

- Economic impacts
  - Output
  - GSP
  - household income
  - employment
  - Economic rent
  - Other indicators

Catch in the Spencer Gulf & West Coast Prawn Fisheries

Catch and GVP in the Spencer Gulf & West Coast Prawn Fisheries

GVP, Price and Catch Indices SGWC Prawn Fisheries (1997/98=100)

Price Indices SGWC Prawn Fisheries (1997/98 = 100)
SGWC, GSV and Imported Prawn Prices

Cost Shares, SGWC Prawn Fisheries

Costs of Management, SG Prawn Fishery

Cost-Price Squeeze, SGWC Prawn Fisheries

Fee per Licence Holder & Fee as a % of GVP, SG Prawn Fishery

Income and Profit, SGWC Prawn Fisheries

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

Return on Investment, SGWC Prawn Fisheries
**Economic Impact of the SGWC Prawns Fisheries in SA, 2010/11**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Output (m$)</th>
<th>Employment (jobs)</th>
<th>Household Income (m$)</th>
<th>Contribution to GDP (m$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing</td>
<td>22.0</td>
<td>155</td>
<td>12.8</td>
<td>22.1</td>
</tr>
<tr>
<td>Processing</td>
<td>30.0</td>
<td>235</td>
<td>9.0</td>
<td>13.6</td>
</tr>
<tr>
<td>Prawn processing</td>
<td>57.5</td>
<td>345</td>
<td>20.5</td>
<td>35.2</td>
</tr>
<tr>
<td>Total</td>
<td>150.1</td>
<td>740</td>
<td>40.3</td>
<td>73.9</td>
</tr>
<tr>
<td>Total Direct</td>
<td>2.3</td>
<td>14</td>
<td>3.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Total Taxes</td>
<td>567,100</td>
<td>0.3</td>
<td>1,965</td>
<td>524,665</td>
</tr>
</tbody>
</table>

**Prawn Imports to SA by Country of Origin, 2000/01 to 2010/11**

[Graph of prawn imports by country of origin]

**Prawn Exports from SA by Destination Country, 1997/98 to 2010/11**

[Graph of prawn exports by destination country]

**Economic Rent in the SGWC Prawn Fisheries, 1997/98 to 2010/11 ($’000)**

[Graph of economic rent]

**Exchange rates and SGWC Prawn prices, 1997/98 to 2010/11**

[Graph of exchange rates and prawn prices]

**Other Indicators**

- Prawn imports to South Australia
- Prawn exports from South Australia
- Exchange rates
Appendix 1.13. Spencer Gulf Prawn Fishery Economic Model

The model is in a relatively basic form (early stage of development) but suitable for looking at scenarios that involve variations to one or more of the following:

- Annual catch
- Prices
- Effort creep
- No. of boats leaving the fishery annually (assumed to be leaving via a buy-back funded by the remaining boats)

Values for each of these variables can be entered in the first sheet of the model ‘Base Assumptions’. Cells that can be changed are coloured green and all others are locked.

The model allows for three scenarios to be calculated at one time (S1, S2, S3).

The model generates outputs over a 10-year period so input assumptions are required over that period as well.

- For the annual catch variable, the last 7 years is taken to be an average of catch in the base year and first 3 years.
- For the price variable, the user inputs a value that will be used for each of the last 7 years.
- Similarly for the effort creep variable, the user inputs a value that will be used for each of the last 7 years.
- For the number of boats leaving the fishery, the user can input the number of boats leaving in each of the 10 years.

Also on the ‘Base Assumptions’ sheet the user can input:
- The start year for the analysis – currently set at 2012 which means the first year is the 2012/13 season.
- The number of boats in the fishery in the start year – currently set at 39
- The opportunity cost of capital – currently set at 5%. This value is used only in the calculation of economic rent for the industry/fishery level analysis.
- The Licence value/GVP response – this determines how average licence values change when the GVP per boat (gross income) changes. Currently set at 0.4 (or 40%) which means if the GVP per boat increase by 10%, the estimated licence value will increase by 4%.
- Average cost of buyback debt – currently set at 8%. This is used to calculate interest payments for the boats remaining in the fishery.

The only other places for user input are in the:
- ‘Boat Costs’ sheet, row 43 - Adjustment to Baseline Licence Value, currently set at 20%. This variable allows the user to modify the baseline licence value (=3.2m), which is likely to be above the current market value. In the model the licence value will determine the cost of the buy back and hence the level of interest payments.
- ‘Base Year Data’ sheet, cell AM3 – Skipper & Crew share, currently set at 35%. Adjustments to this variable will directly affect the labour cost. This assumption applies to all scenarios, i.e. can’t be varied between scenarios.

The boat level data are linked to the baseline data and can’t be edited at this stage. The data are identical for scenarios 1, 2 and 3. The objective is to have the option of editing the boat level data or having one of the boats as the fishery average and the others as high catch and low catch or even the user specifying the costs, catch, CPUE, etc. for their own boat, so they could see the implications for them and compare to the fishery average. However, it will take some further development to build that functionality into the model.

The other sheets in the model are either outputs (results), data or calculation sheets, as follows:
• ‘S1 Boat’, ‘S2 Boat’ and ‘S3 Boat’ – detailed results over 10 years for the average boat in the fishery for each of the three scenarios
• ‘S1 Summary’, ‘S2 Summary’ and ‘S3 Summary’ – summary results over 10 years for the average boat in the fishery and for the fishery as a whole for each of the three scenarios
• ‘S1 Licence & Debt’, ‘S2 Licence & Debt’ and ‘S3 Licence & Debt’ – summarise over 10 years the number of boats, GVP, level of debt, repayments, licence fees per boat, etc.
• ‘Mthly catch by grade’, ‘Mthly price by grade’ and ‘Mthly GVP by grade’ – sheets calculating catch, price & GVP according to base data and inputs in ‘Base Assumptions’ sheet.
• ‘3yr catch by grade by month’ and ‘20 yr catch & CPUE’ – baseline catch and CPUE data from SARDI.

Please keep in mind that the model was developed to this point just to consider some scenarios at the economic optimisation workshop (West Beach, 6-7 September 2012), so it is quite basic. However, it could be extended to look at other structural change scenarios.

Notes prepared by:
Julian Morison
EconSearch Pty Ltd
Appendix 1.14. SGPF Draft Outcomes for Workshop 3

Economic Optimisation Workshop preliminary draft outcomes

Provided a summary of the fisheries economic statistics. **Agreed** the costs of running the prawn boats business are increasing. There is a large difference between business value of license and owners expected value. **Agreed** that the bottom line is getting smaller; payment of crew is a large issue, costs of operating continually creep up. Need to include forward projections of fuel, Australian dollar, labour and other data that effect operational costs or prices. **Agreed** that the major external factors are:

<table>
<thead>
<tr>
<th>Rate influence</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prices</td>
<td>Low influence. High investment of marketing costs with no guarantee for a return.</td>
</tr>
<tr>
<td>Australian Dollar</td>
<td>No influence Market forces, predicted that parity in the norm for the medium term.</td>
</tr>
<tr>
<td>Imports</td>
<td>Very low likelihood of impacting on any direct changes o imports, Difficult to influence Cwth trade policy to introduce “tariffs”. Not influence production levels.</td>
</tr>
<tr>
<td>Employment competition</td>
<td>No influence. Mining will continue to offer high wages.</td>
</tr>
<tr>
<td>Operational costs:</td>
<td>No influence individual business. Ability to reduce costs on a fleet wide basis through a reduction in the number of operational vessels.</td>
</tr>
<tr>
<td>Labour/Fuel/insurance</td>
<td></td>
</tr>
</tbody>
</table>

Note that land base businesses are driven to rationalise through high unserviceable debt. – Noted that this is not the current situation for the prawn fishery.

Harvest Strategy

There was discussion around the fact that there is possibly some ‘fat’ in the harvest strategy and there is potential to push the effort up slightly. It was noted that the fishery had become relatively stable, however to increase effort will increase risks of reduced stock stability, hence business certainty. **ACTION:** Investigate the option of pushing up effort in the Nov/Dec harvest strategy to test the current strategies. Management plan is under review. **ACTION:** Management Committee to follow up a review data to push boundary of current fishing volumes. Evaluate the harvest strategy to determine if the current strategies are not being too conservative.

Short discussion with regard to improved efficiency of gear. Quad rigs are considered to improve fuel use and maintain catches, generating a small saving to the fishery. **ACTION:** Literature review of net configuration efficiencies. It is recommended that the Management Committee to investigate gear trials. **ACTION:** It was recommended that marketing and promotion is should be treated as a work in progress. **Target for establishing sustainable catches**

Management Plan should potentially change focus to economic + biological to move towards sustainable profitability, maintaining underlying stock sustainability. **ACTION:** It was recommended that the Association improve the understanding and application of Mey. **Indicators**

Life style was considered an important aspect in remaining and operating in the fishery. Are there Life style indicators? **Action:** Remove GVP as an economic indicator. Use “Whole of fishery profit” ( aka economic rent) as an indicator (what value or change to provide trigger??) **Restructure through buy backs**

Lengthy discussion on Buy-backs – presentation of model. A large challenge is to manage licence value through buy back.
Discussion resulted in more questions. What is license's value? What is economic affordability? What are the new efficiencies?

**Two groups reviewed options discussed.**

**Group 1 review of tradable management options:**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Nights</th>
<th>Gear Units</th>
<th>Gear x Time</th>
<th>ITQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equitable</td>
<td>2.5</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Flexible / Adjustable</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>3</td>
<td>2</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>Transferable</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Economically efficient</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Simplicity / Cost effective</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Legally defensible</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Allocation complexity</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>22.5</strong></td>
<td><strong>20</strong></td>
<td><strong>21</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>
**Additional comments**

<table>
<thead>
<tr>
<th>Management Implication</th>
<th>Night Units</th>
<th>Gear Units</th>
<th>Gear by Time units</th>
<th>Individual Transferable Quotas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Can vary value of a night on temporal / seasonal considerations. Low cost administratively simple.</strong></td>
<td>Low cost administratively simple once you define the nature of the unit (head rope length).</td>
<td>Can be complex compared to other systems. Need to define the nature of the units. How to monitor against target limits for nightly catches twin v triple?</td>
<td>Can be adjusted up or down to suit sustainability. Can be costly for monitoring. Can lead to greater efficiency and limited effort creep in NPF. Higher level of compliance monitoring required.</td>
<td>What process / values would be used to allocate catch, entitlement, effort? Management systems – TACC setting, reporting, quota, integrity. Could create allocation based on temporal values x Real Time Management information. Is high grading an issue – manage size by other gear or technologies?</td>
</tr>
<tr>
<td><strong>Can create need to fish sub optimally to meet available nights. Fleet has a level playing field on fishing nights now – is a night equal across the season? Can be adjusted.</strong></td>
<td>Can be adjusted up or down to suit sustainability. Can be costly for monitoring. Can lead to greater efficiency and limited effort creep in NPF. Higher level of compliance monitoring required.</td>
<td>Can add costs for implementation, management and monitoring.</td>
<td>Initial set up of system for monitoring (a register). Low cost options compared to ITQ, but more costly to evaluate all input values.</td>
<td>Initial set up and ongoing costs are high compared to other systems – research, modelling, reporting, monitoring, compliance. How to ensure integrity of systems? To be developed.</td>
</tr>
<tr>
<td><strong>Initial set up of system for monitoring (a register). Low cost options compared to ITQ. Need to maintain current systems and costs</strong></td>
<td>Initial set up of system for monitoring (a register). Low cost options compared to ITQ.</td>
<td>Initial set up of system for monitoring (a register). Low cost options compared to ITQ.</td>
<td>Initial set up and ongoing costs are high compared to other systems – research, modelling, reporting, monitoring, compliance. How to ensure integrity of systems?</td>
<td>To be developed.</td>
</tr>
<tr>
<td>Economic return</td>
<td>To be developed</td>
<td>To be developed.</td>
<td>To be developed.</td>
<td>To be developed.</td>
</tr>
</tbody>
</table>

The group reflected that the scoring did not reflect the “gut feeling” of the groups as to the preferred option.
<table>
<thead>
<tr>
<th>Group 2 Feedback on evaluation of options:</th>
<th>Equitable/secure investment</th>
<th>Flexible/Adjustable</th>
<th>Responsive</th>
<th>Transferable</th>
<th>Economic Efficiencies</th>
<th>Simple &amp; cost effective</th>
<th>Legally defensible</th>
<th>Allocation complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quota</strong></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td>• ✓</td>
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<td></td>
<td></td>
<td></td>
<td>High degree of difficulty.</td>
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<tr>
<td></td>
<td>• More permanent</td>
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</tr>
<tr>
<td></td>
<td>• Banks favour</td>
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</tr>
<tr>
<td></td>
<td>• Good access right</td>
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<tr>
<td></td>
<td>• Poor harvest right</td>
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</tr>
<tr>
<td></td>
<td>• Flexible if market available.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Set Annually</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>• Pre and post Christmas quotas</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Market trading, driven by relationship between partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Knowledge of availability.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Remove inputs</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Depends on level of trading.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Simple to set up</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Science?</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Compliance is the biggest issue, high grading.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Grades/size structure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Variability of change – gear selectivity.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Temporal variability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Effort creep risks with inputs controls remaining.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Less so than catch quota.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Need to maintain input control.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Nights and gear are relatively simple.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Gear by time units could be relatively complex.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

| ** Tradable rights – Gear unit/Nights/Unit x time** | | | | | | | | |
**Ranking for group 2:**
1. Tradable gear units,
2. Quota (TAC),
3. Tradable nights/effort units.

**Additional discussion points**

**Quota:**
1. Higher research and compliance costs, high grading, psychological aspects of deck cameras, loss of flexible access and reward for good fishing.
2. Look at alternative markets (live export etc).

**Gear:**
1. Changes are expensive, complex formula to set up gear unit over time, maintain real time management implicit in thinking.
2. Headline length as a unit.
3. Require capping, increase costs over time.
4. Mid season- mid run difficult to change.
5. Trigger to close fishery could related to kg/headline length.
**Risks and information gaps**
The following table summarises the risks and information gaps relating to the alternative management options discussed.

<table>
<thead>
<tr>
<th>Risks</th>
<th>Who</th>
<th>Time-line</th>
<th>Information GAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quota (kg)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td>PIRSA Manager</td>
<td></td>
<td>Identify compliance (on shore/at sea) (PIRSA), research costs (SARDI), administration costs (PIRSA)</td>
</tr>
<tr>
<td>discarding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of finance¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>** Tradable rights – Gear/Nights/Effort unit**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>PIRSA Manager</td>
<td></td>
<td>Identify compliance (on shore/at sea) (PIRSA), research costs (SARDI), administration costs (PIRSA)</td>
</tr>
<tr>
<td>Establishment cost</td>
<td>Research Sub-committee</td>
<td></td>
<td>Gear trials and research establishment and research design. Convert to new gear and trigger limit, universalising trigger limit. (Consult Jack Davis on quad gear).</td>
</tr>
<tr>
<td>Effort creep</td>
<td>Executive Office</td>
<td></td>
<td>Controls and management, modelling acceptable change. Dave Stirling fishing power model (with CSIRO). Developing the gear unit.</td>
</tr>
<tr>
<td>Nights/effort unit</td>
<td>PIRSA/PIRSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nights/effort unit additional</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort creep</td>
<td>SARDI</td>
<td></td>
<td>Understanding temporal variation – run in bio model. Going to be looked through model. Concern raised that the most efficient nights already fished, which will reduce tradability or value of nights if traded, greatly reducing the effectiveness of this tool to improve economic profitability.</td>
</tr>
<tr>
<td>Nights</td>
<td>SARDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value and tradability of</td>
<td>SARDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nights</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management Options

Recommendation: Investigate 4 options: Quote, Gear, Nights, Effort Units. Report covers off on all options, majority of investment should be guided into gear and quota.

Recommendation: The EOSC does not support the compulsorily implementation of amalgamations or compulsory buy backs that forces people out of the industry.

Recommendation: It was agreed that the corporate/self-governance model is economically the most profitable option, however this option is not achievable in the next two years given the fisheries culture. Consider incorporating into strategic plan.


Restructure

The option of an immediate restructure was discussed. It was highlighted that the only funding option available would be through the members investing into the buy back. Given current different gap expected license value by owners, against investment value for buyers, it is unlikely that there will be strong support for the buy back.

Resolution: It was considered that a buy back would need to be self-funded.

Recommendation: It was recommended that the members were approached to ascertain their interest in entering debt and request tenders for the sale of their licenses.

Resolution: Amalgamations were considered highly unlikely to be achieved in the short and medium term, given the fact that it would require the formation of partnerships which do not currently naturally exist.
Appendix 1.15. Agenda Industry Workshop 11 June 2014

Spencer Gulf and West Coast Prawn Fishermen’ Association

**ECONOMIC OPTIMISATION PROGRAM:** Does the fishery’s management require a change, and if so what type of change?

**OBJECTIVE:** Consider the development of changes to the fishery’s management to allow for greater flexibility, profitability and sustainability.

Key questions:
- Do current management arrangements allow the fishery and individual businesses to adjust so as to continue to produce a profit as economic and biological changes occur?
- If not, does the fishery require management change & why?
- What is/are the preferred management change(s) and their costs and benefits?
- Will these changes make the fishery resilient to factors outside of the fishery’s control?
- Where should responsibility lie for driving any changes in the fishery?

**Workshop outline**
Welcome by the Chair.
Exec/O provide a brief overview of process to date.

**Session I:** Is there currently a problem or given economic conditions change will there be a problem?

**Purpose:** To evaluate if there is agreement for change now or in the future.

a. International prawn trends – what do you see in the future?
b. Domestic/ Spencer Gulf prawn trends – what is happening now?
c. Costs of fishing – what is happening to the gap between income and expenditure?

Members should consider the future of the prawn industry from a broad international perspective, such as demand patterns through to trends in factors that effect profitability such as fuel prices and the value of the Australian dollar.

**Session II:** How do we make a change?

**Purpose:** To establish a structured and agreed process on how and when any changes may be made, i.e. a process of decision making to achieve change including ground rules and triggers, additional to those already in the constitution.

To discuss the drivers that may influence when a change will be required: i.e. develop triggers, in addition to who should drive any changes and how the members make the decision.

**Session III:** The preferred alternative management option for the future.

**Purpose:** To generate consensus on the preferred future management model.
Exec/O will provide a presentation on the options suggested.
Members to work on the alternative options – pros/cons and solutions.

**Session IV:** Finalise future options and where to from here.

**Purpose:** Identify any gaps in information and members vote on their preferred options.

The outcome from session IV will ideally be that there is one option from which a strategy can be developed.

Spencer Gulf and West Coast Prawn Fishermen’s Association
General Meeting

10:00 – 15:00 11 June 2014

Port Lincoln Hotel, 1 Lincoln Hwy, Port Lincoln

Agenda

Consider the development of changes to the fishery’s management to allow for greater flexibility, profitability and sustainability.

Arrive (tea and coffee.) 9:45 - 10:00

1. Welcome and Introductions  Chair  10:00 – 10:10
2. Purpose and background  Executive Officer  10:10 – 10:30
3. Workshop  Ian Cartwright  10:30 – 12:30
   Lunch  12:30 - 13:15
4. Workshop  Ian Cartwright  13:15 – 14:30
5. Other business  Chair  14:30 – 15:00
Appendix 1.16. East Coast Trawl Fishery Agenda Northern Workshops

East Coast Otter Trawl Fishery Economic Performance and Management Opportunities Workshop

Wednesday 25th July 2012 – Cairns

Time: 8:30 – 16:30
Location: Admiralty Room
Cruising Yacht Squadron
42-48 Tingira St Portsmouth

Thursday 26th July 2012 - Townsville

Time: 8:30 – 16:30
Location: Burdekin Room
Mercure Hotel
Woolcock St Townsville

AGENDA

1. Welcome, introductions & Objectives 8:45
2. Summary of East Coast Otter trawl Fishery E. Jebreen 9:00
3. “Anderson’s Assessment” of fisheries T. Ward 9:20
4. Economic analysis – summary of East Coast Otter Trawl fishery E. Hoshino 9:40
5. Discussion - do you agree with the assessment? Group 10:10

Morning Tea 10:30

6. Austral Fisheries - Northern Prawn Fishery experiences David Carter 10:50

7. Discussion - what are the key drivers for getting into the current situation? Group 12:10

Lunch 12:30

8. Spencer Gulf Experiences SA Industry Reps 13:00
9. Discussion and summary Group 14:00

Afternoon Tea 15:00

Discussion - does the Qld fishery need to be reformed to resolve the current situation and if so how should this be done?

Close 16:30
Appendix 1.17. East Coast Trawl Fishery Agenda Southern Workshops

East Coast Otter Trawl Fishery
Economic Performance and Management Opportunities Workshop

Wednesday 1 August 2012 – Mooloolaba

Time: 8:30 – 16:30
Location: The Yacht Club
33-45 Parkyn Pde
The Spit

Thursday 2 August 2012 – Hervey Bay

Time: 8:30 – 16:30
Location: Charlton Room
Peppers Pier Resort
The Esplanade, Urangan

AGENDA

1. Welcome, introductions & Objectives 8:45

2. Summary of East Coast Otter trawl Fishery E Jebreen 9:00


4. Economic analysis – summary of East Coast Otter Trawl fishery E. Hoshino 9:40

5. Discussion - do you agree with the assessment? Group 10:10

Morning Tea 10:30

6. Individual Transferable Fishing Rights Annie Jarrett 10:50
   - A Pathway to Profitability??

7. Discussion - what are the key drivers for getting into the current situation? Group 12:10

Lunch 12:30

8. Spencer Gulf Experiences SA Industry Reps 13:00

9. Discussion and summary Group 14:00

Afternoon Tea 15:00

Discussion - does the Qld fishery need to be reformed to resolve the current situation and if so how should this be done?

Close 16:30
Appendix 1.18. East Coast Trawl Fishery Workshop 1

Workshop Program
- Introductions...
- Objectives...
- Fisheries assessment process...
- Economic analysis...
- Group discussions...
- Transferable fishing rights...
- Northern prawn fishery experiences...
- Group discussions...
- Spencer Gulf prawn fishery experiences...
- Group discussions...

Workshop Guidelines
- Mobile phones...
- Listen to and respect other opinions...
- Focus on the issue...
- One person at a time...
- Avoid side conversations...
- Keep discussion constructive...
- ...

Question for discussion...
- What parts of the assessment are correct and which ones do you disagree with and why...?

Question for discussion...
- What are the key drivers that have led the fishery to its current situation...?

Question for discussion...
- How does the Qld fishery enhance the positive drivers and reduce the negative drivers to improve the current situation...?
Appendix 1.19. East Coast Trawl Fishery Workshop 2

East Coast Otter Trawl Fishery

Queensland East Coast Trawl Fishery

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Active in 2011</th>
<th>Endorsed (31/1/2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>298</td>
<td>397</td>
</tr>
<tr>
<td>T2</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>M1</td>
<td>n/a</td>
<td>47</td>
</tr>
<tr>
<td>M2</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>T5</td>
<td>34</td>
<td>39</td>
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<tr>
<td>T6</td>
<td>4</td>
<td>11</td>
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<td>T7</td>
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<td>6</td>
</tr>
<tr>
<td>T8</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>T9</td>
<td>4</td>
<td>23</td>
</tr>
</tbody>
</table>

East Coast Otter Trawl (includes 11km EU usage)

East Coast Otter Trawl (includes 11km EU usage)
Tiger Prawn

- Harvests ~ half of long term
- Effort ~ 30% of long term
- CPUE
  - Generally upward since 2000 and
  - 70% higher
- Low harvest, effort and high CPUE are evidence of low fishing mortality; recruitment overfishing unlikely

Endeavour Prawn

- Harvests ~ half of long term
- Effort ~ 31% of long term
- CPUE
  - Generally upward since 1997 and
  - 52% higher
- Low harvest, effort and high CPUE are evidence of low fishing mortality; recruitment overfishing unlikely
Appendix 1.20. East Coast Trawl Fishery Workshop, Economic Performance

Overview

Biologically sustainable
- Sustained catch history
- Management Plan
- MSC certified
- Bio-economic model

Ecologically sustainable
- MSC certified target plan
- Several current projects

Economically sustainable?

Management Goals

Management Plan established in 2007
1. Maintain ecologically sustainable prawn biomass
2. Sufficient economic returns to allow<br>sustained catch history
3. Scientific information and decision rules
4. Stock assessment and exploitable
5. Stock assessment and exploitable
6. Stock assessment and exploitable
7. Stock assessment and exploitable
8. Stock assessment and exploitable
9. Stock assessment and exploitable
10. Stock assessment and exploitable
11. Stock assessment and exploitable
12. Stock assessment and exploitable

Management controls in the Spencer Gulf Prawn Fishery

- Management controls and report information
- Compliance with management requirements
- Catch and effort information analysis

Target species and location

Fishery type and catches
Sustainability


trends & harvest strategies
Fishery-independent surveys (Nov, Feb, Apr)
- Collaboration between SARD & industry
- Stock assessment & other research by-natch
- Inform harvest strategy development (biomass)

Fishery-dependent surveys (Dec, Mar, May, June)
- Industry driven spot surveys
- Inform harvest strategy management & adjustment

Guiding Principles

- COMMERCIAL FISHING is a BUSINESS and should create wealth
- Ecological sustainability is NECESSARY, but NOT SUFFICIENT, for commercial fisheries to generate sustainable income and create wealth
- Community sustainability is necessary for sustainable wealth creation

Fishery Performance Indicators

James L. Anderson & Chris Anderson
WB & UW

A wealth-based fishery management system is one that is ecologically sustainable, socially acceptable and generates sustainable resource rents or profits.

Purpose: The Fishery Performance Indicators (FPIs) are designed to evaluate and compare the world’s fisheries management systems based on their ability to generate sustainable wealth.

Greater attention must be focused on government systems and economic factors

It is not good enough to be just biologically sustainable; fisheries and the communities that depend on them must generate sustainable wealth.
The creation of a Wealth-Based Fisheries Performance Indicators give critical information to make the case for better fisheries management based on a broader set of criteria incorporating governance and economic factors.

The Performance Indicators are Designed to Incorporate the Three ‘Sustainabilities’ Necessary for Wealth Creation:
1) Economic Sustainability
2) Ecological Sustainability
3) Community Sustainability

Characteristics of Indicator Components:
- Readily Available
- Accurate
- Quantifiable
- Relevant
- Understandable

Two Parts – Outputs and Inputs:
1) Performance Indicators of wealth creation and accumulation (outputs)
2) Performance Factors that enable wealth creation (inputs)

The Fishery Performance Indicators - Outputs:
- 54 components covering 11 dimensions:
  - Fish stock health & Environmental Performance
  - Harvest Performance
  - Harassment
  - Risk
  - Owners, Permit Holders & Capitains
  - Chain
  - Market Performance
  - Processing & Support Industry Performance
  - Fishing vessels
  - Processing Owners & Managers
  - Processing Workers

The Fishery Performance Factors: Inputs Enabling Wealth Creation:
- 39 components covering 8 dimensions:
  - Macro Factors-Environmental, Economic & Community
  - Access Rights
  - Harassment
  - Collection Action
  - Management Inputs
  - Management Participation
  - Markets and Market Institutions
  - Infrastructure
SPENCER GULF PRAWN FISHERY: FISHERY PERFORMANCE INDICATORS

- Poor capture issues in SGPF gill-net
- Poor systems for managing harvest and marketing catch
- Poor harvest and harvest asset performance

- Issues in fishery are
  - High marketing cost inefficiency
  - Too many licences/leases
  - Very short season
  - Cannot compete with farmers to reduce costs
  - Falling prices
  - Competition from aquaculture farms
  - Low product differentiation
  - Poor marketing

Need to redesign operational procedures, enhance management arrangements & restructure business structure
EAST COAST OTTER TRAWL FISHERY: FISHERY PERFORMANCE INDICATORS

- Excessive capture pressure on SQM.
- Poor harvest effort and vessel performance.
- High post-harvest and processing performance.

Issues in fishery development:
- Input controls cause inefficiency.
- Low value added vessels.
- Poor vessel utilisation.
- High vessels.
- Falling prices.
- Competition for aquaculture grounds.
- Low product differentiation.
- Poor marketing systems.

Potential to redesign operational procedures, fisheries management arrangements & restructuring business structures.
Appendix 1.21. East Coast Trawl Fishery Workshop, Economic analysis

Economic Indicators for the East Coast Otter Trawl Fishery

Overview
- Economic Indicators
- Spencer Gulf & West Coast Prawn Fisheries
- East Coast Otter Trawl Fishery
- Further Research

Economic Indicators
- Catch, gross value of production and prices
- Cost of management
- Boat level financial performance indicators
  - average income
  - operating costs
  - cost-price relationship
  - profitability
  - return on investment

Economic Indicators
- Economic impacts
  - Output
  - GDP
  - household income
  - employment
  - Economic rent
  - Other Indicators

Spencer Gulf & West Coast Prawn Fisheries

Catch in the Spencer Gulf & West Coast Prawn Fisheries
Economic Impact of the SGWC Prawns Fisheries in SA, 2010/11

Economic Rent in the SGWC Prawn Fisheries, 1997/98 to 2010/11 ($'000)

Other Indicators
- Prawn imports to South Australia
- Prawn exports from South Australia
- Exchange rates

Prawn Imports to SA by Country of Origin, 2000/01 to 2010/11

Prawn Exports from SA by Destination Country, 1997/96 to 2010/11

Exchange rates and SGWC Prawn prices, 1997/98 to 2010/11
### East Coast Otter Trawl Fishery – Cost Shares

<table>
<thead>
<tr>
<th>Category</th>
<th>DC expensive</th>
<th>DC fish</th>
<th>DC total</th>
<th>DC total incl. TACs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>101,118</td>
<td>437,588</td>
<td>538,697</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>180,599</td>
<td>455,961</td>
<td>636,560</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7,987</td>
<td>2,024</td>
<td>10,011</td>
<td></td>
</tr>
<tr>
<td>Total DC</td>
<td>390,704</td>
<td>955,573</td>
<td>1,346,277</td>
<td></td>
</tr>
</tbody>
</table>

### East Coast Otter Trawl Fishery – ECOT and SOWC Prawn Fishery

### East Coast Otter Trawl Fishery – Income, Profit & Return on Investment

### East Coast Otter Trawl Fishery – ECOT Fishery, M2 & T1/M2

### Economic Indicators for the East Coast Otter Trawl Fishery

- Economic Performance and Management Opportunities Workshop
- 3 August 2012 Wagga Wagga
- 30 July 2012 Harvey Bay
- Jon Apan
- EcoSearch Pty Ltd

### East Coast Otter Trawl Fishery – Further Research
- Last survey 2008/09
- Need a survey every 3-4 years
- Collect from all regions and fishery sectors
- Time series
- Prepare economic indicators based on targets in the management plan
- Consider economic impacts
- Direct and flow-on
- Others?
Appendix 1.22. East Coast Trawl Fishery Workshop, Experiences in the Northern Prawn Fishery

INDIVIDUAL TRANSFERABLE FISHING RIGHTS – A PATHWAY TO PROFITABILITY?

Annie Jarrett
Pro-Fish Pty Ltd
February 2012

Fisheries Management: A Delicate Balancing Act

- Ecosystem-based Fisheries Management
- Bycatch Reduction
- Marine Protected Areas
- Environmental Certification
- Resource Stewardship – Community Pressure
- Harvest Strategies
- Fishing reference points – MSY v NMY
- Economic Efficiency

But:

ITS HARD TO BE GREEN WHEN YOU’RE IN THE RED

- Unfavourable FX – AUD high & climbing
- Challenging market conditions
- Too much competition (aquaculture & domestic)
- Increasing costs (production, management, research)
- Reducing or static catches
- Too Many Boats??

Adjustment

- Globally, most fisheries have suffered from over-capacity, effort creep & recruitment overfishing
- Most fisheries have required rates in by-catch, effort and adjustments in fishing capacity
- Mechanisms for capacity adjustment:
  - Buy-backs (govt and/or industry funded e.g. QML, NPF, TFS)
  - Compulsory reductions in TAFs/ TACs
- Capacity adjustment (excluding buy-backs) needs basis e.g. form of individual transferable fishing rights system

Australian Prawn Fisheries

Rights Based Management

Individual Transferable Fishing Rights

The Benefits

- Secure ongoing access (property rights) for industry; sound investment base for financiers
- Flexibility for operators – individual decisions to buy, sell or lease are market-based, not government-driven
- Effective tool to balance fishing effort and biological & economical sustainability
- An equitable tool for adjustment in the fishery when required – (adjustment proportional across the fleet)
- Generally cost effective to manage and enforce
- Have proven effective in QLD, Torres Straits & NPF prawn fisheries

ASSUMPTIONS FOR SUCCESS

- All individual rights fully transferable (sell or lease)
- Retention of limited entry
- Closures for biological/ecological purposes
- Continued use of fishery bycatch mitigation
- Ongoing research, data collection & compliance programs – may vary with each system
- Need to consider economics as well as biology
Northern Prawn Fishery

A case study
David Carter
CEO Austral Fisheries
NORMAC Member

Northern Prawn

• Australia’s most valuable Commonwealth Fishery; GVP of $88 million
• 770,000 square kilometres; >8% fished; 6 - 7 months
• 52 trawlers; 19 owners
• Banana & Tiger Prawn Fisheries (endeavour/ king)

Northern Prawn

• 2011 – 7000 t banana; 800 t tiger
• Globally recognised as ‘best practise’ management; world class stock assessment; excellent environmental performance
• Marine Stewardship Council Certification underway
• Strong partnerships; co-management approach

The (NPF) Experience Cont.

1969: Exploration followed by commercial/trading, open access fishery (no limited entry)
1974: Biggest banana prawn season on record; expansion of commercial fishery
1986: First ‘Management Plan’ for the NPF, 382 licences
1988: The ‘target’ system introduced - individual transferable rights based on combination of under deck volume (UDV) and horsepower (HP) basis
Provided secure, legally defensible fishing rights & basis for management control over UDV adjustment
1998: Aquaculture licensing, buy back scheme; 3 for 1 boat replacement policy to address over-capacity/effort
1998: 25% reduction in season length; twin gear; daylight trawl ban

A Units - First efforts at control

• ‘A Unit’ ineffective effort control; Operators ‘tapped’ horsepower and vessel configuration; regis Effort creep and stock depletion
• Inflexible adjustment tool: can only buy or sell under adjustment, not individually transferable
• Buy back based on A Unit system slow and expensive: $45 million to remove 10 boats (over ten years)
• Input restrictions to address stock depletion (twin gear; closures; daylight trawl ban) force inefficiencies/reduce fleet profitability
• Additional 30% compulsory surrender of ‘A UNITs’ in 1993 – best practice in world standards

2000: Gear Units introduced; Allocation proportional to A UNIT holdings. Transition incorporates 30% reduction in total headrope. 4119 Gear Units
• 2001: Both species of tiger prawns classified as ‘overfished’
• 2002: Total headrope reduced by 15%; Individual transferable proportional to gear unit holdings. 17 boats left the fishery
• 2002: Decreased season length to improve sustainability of Banana & Ground Tiger Prawns
• 2003: Total headrope reduced by 35% to improve economics of the fishery; 11 boats left the fishery
• 2004: Total headrope further reduced by 50% – internal adjustments
• 4% effort reduction imposed massive economic inefficiency; small gear, short seasons, low prices – economic disaster
• Comparables study determines optimal boat numbers: 3907 going forward; funded GAP removes 123 boats

Gear Units in the NPF

• Total amount of gear and fishing Season Length - Timing determined by bio-economic model
• Allocation of gear units based on agreed formula (reg catch history)
• Each gear unit entitled operator to 5 % of tangential gear per gear unit – 10 cm
• A gear unit can consist headrope only or combined headrope & footrope (for has a headrope component relative to footrope)
• Under adjustment, total number of gear units remains the same – the value of each gear unit changes
• 20% per cent of the gear must achieve 50 cm of tangential & 50 cm of footrope after a buy back. Under adjustment, gear unit would equal value of footprint
• System requires net size identification / gear unit register/regular net checks
• Transfer of gear units only during closures to reduce compliance costs
Gear Units (cont)
- Headrope (controls swept area) good measure of fishing effort
- Easily measured & enforced - particularly compared to hp
- Enforcement – on-shore measuring and net tagging, at sea checks
- System does not impede technical innovation – allows for removal of other inputs (e.g. boat size) / hp restrictions / gear types
- Operators can trade gear units to suit own operational / market demands

Gear units (cont)
- Flexible tool for adjustment - gives operators option of buying, selling, leasing gear units, unquantifying licensing or fishing with multiple gear
- Potential for effort to increase with removal of boat size / hp restrictions but can be adjusted
- Can result in economic inefficiencies (rent dissipation) if operators lose diversified gear when adjustment occurs

The NPF Today
- From 302 to 52 trawlers/19 owners, flexible gear unit system by increasing gear units, gear, vessel sizes, boat sizes, economically efficient
- Bio-economic model for tiger prawn: escapement policy for banning prawns, Catch Trials limits to determine season lengths (economic trigger)
- Harvest strategy includes Maximum Economic Yield (MEY); Target Reference Point (TRP) and Reference Point
- Both species of tiger prawns may sustainable, 4 high yield banana prawns season (Q4: 2000 – Q2: 2001)
- Industry Company: Co-management with AFMA – NPF manages data, collection of surveys, crew member observer program, MSC program, promotion
- GVP: $635m (330 Boats - 2004/5); $89m (52 boats 2010/11)

Fishing Seasons

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<tr>
<td>duration</td>
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<td>72 days</td>
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</table>

Catch in banana and tiger fishery (tonnes) 1970 - 2011

NPF CPUE 1970 - 2011

Northern Prawn Fishery: GVP 2010–11

THE LESSONS
- There is no ‘perfect’ management system
  OUTPUT CONTROLS - INDIVIDUAL TRANSFERABLE QUOTAS (ITQs) - responsive & flexible for adjustment but generally inappropriate
  in short life cycle, multi-species fisheries due to annual variation in recruitment & potential for
  high grading & discarding, expensive to administrate and enforce
  INPUT CONTROLS - BOAT SIZE / HORSEPOWER / GEAR CONTROLS:
  Not effective at controlling effort; not totally flexible or responsive for adjustment; impose economic inefficiencies; benefits of individual decisions to increase efficiency dissipated across the fleet
THE LESSONS cont.

- Trade-offs between costs and benefits in all systems
- The balance (competing objectives) changes – subject to complexity of management arrangements and degree of risk
- Closures effective for biological protection (eg seagrass/habitats/small prawn) but impose economic impediments on operators
- Reductions in fishing effort MUST be implemented through the primary management tool to avoid increasing economic impediments
- Targets are rarely – if ever – met in time, on time. To achieve, objectives, harvester strategy should include clear targets, objectives, & decision rules, including economics

“The choice is clear – it’s either SMART fishing or NO fishing!” – Tony Lang, WWF

“Profit is not a dirty word” – Billy Thorpe

Lessons

- There is no right and wrong
  - Decide where you want to go and get on with it.
  - Fisheries management is more about people than fish
  - You can have the right people with the wrong system and you will have a winner.
  - What keeps you awake at night?
    - Fuel cost
    - Availability of good crew
    - Being able to sell your business when the time comes?
    - A succession plan?
    - The price of prawns?
    - Can differentiate from the imports?
    - Regulators????
    - Profitability
    - Climate change?
Appendix 1.23. Spencer Gulf Prawn Fishery

Real-Time Management

- Yearly and quarterly data
- Comprehensive fishery data
- Real-Time Management of fishery
- Partnership with PIRSA

Benefits of Research

- Increased fishery yields
- Improved catch rates
- Reduced effort

Evolution of Co-Management

- 1976: Spencer Gulf and West Coast Prawn Fisheries
- 1978: Two zones created
- 1979: Option for mixed fishing permit
- 1981: Two zones merged

Early Beginnings

- 1967: First prawn trawler
- 1969: First prawn trawler permit issued
- 1971: Increased prawn trawler permit sales
- 1973: Catch dropped to 1200 t
- 1976: Catch increased to 2100 t

Appendix 1.23. Spencer Gulf Prawn Fishery

- Greg Palmer
- Co-management - Joint Steering Committee Workshop
- 6th April 2009
Evolution of Co-Management

- Industry takes on more responsibility in 2004
- Surveys coordinated by government and industry
- Harvest strategies jointly managed by industry, PIRSA and SARDI
- Data collected and reporting is managed by SARDI

The Future of Co-Management

- Develop an alternative co-management model that meets requirements
- Understand work involved for stakeholders
- Implement model 'slowly' to ensure we get it right
- Gain the support of all stakeholders

Questions?

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Member, Management Committee
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Appendix 1.24. East Coast Trawl Fishery Workshop, Outcomes

Discussion summary: Hervey Bay (Jebreen)

Drivers
- Stock sustainability;
- Economics/ profitability: inability to adapt to changing trends/ market trend/ regulatory imposts/ increasing operational costs

Challenges
- Individual profitability Vs fleet profitability
- Lack of understanding/acceptance of stock assessment
- Business structures – family/corporate/ succession planning
- Numbers of boats – more difficult for single boat owners
- Age of operators – ability to change careers
- Leadership (or lack there-of) to drive change

Are there any problems? If so, what are they?
- Lack of Profitability
- Over-allocation of effort (latent/unused + operational)
- Industry Voice
- Efficiency/costs
- Investment in the industry (vessels, people,
- Marketing/prices
- Structure of the fishery

Considerations
- Need for/ Mechanisms for adjustment:
  - Compulsory reductions: effective at achieving hard targets/ non-discriminatory/ controversial – will result in immediate benefits
  - Buy backs: Government/Industry funded
    - Voluntary – less controversial, slow, ineffective subject to $$$
    - Compulsory component – effective at achieving hard targets/ non-discriminatory/ controversial but immediate benefits
    - Limited (if any) government funding
    - Difficult to get industry agreement to funding – needs to include hard targets to achieve profitability for those remaining – low interest rates offer opportunities
Over-allocation of effort/licences (latent/unused + operational)

- Agreed that there is excessive effort/licences in the fishery (majority suggest it is the priority)
- The first issue that needs to be addressed
- Separate latent/unused effort and operational effort
- Whatever approach, make sure that there is a reduction in the number of participants
- Too many boats at the fleet level (EJ)
- No management controls at the stock level (EJ)
- Need to keep enough capacity for potential increases (EJ)

How to fix it?

- Combination of industry/government strategy/contribution (agreed)
- Industry need a co-ordinated approach to government (happened?)
- Dave Sterling – tender process
- **Example only**- 20% voluntary 40% government purchase
- Still need to make sure you remove licences.
- EJ – might be more costly to voluntarily forgo effort, cheaper to buy it up front on tender (government financed)
- Other investors

Industry Voice- a co-ordinated industry

- Need leadership and organisation
- Difficult to be an active fisher as well as attending meetings/ think of issues
- Already discussed the establishment of a peak body, fully cost recovered and based on GVP across all fisheries (Steve)
- A lot of industry that don’t want to remain in the fishery still have a big say
- Add the costs to licence fees (EJ unsure, but convince the Minister it’s a good idea and your nearly there)
- Very diverse ideas on what individuals need/want from or for the fishery
- Need a clearer policy direction for the objectives of the fishery, with reference points etc

Efficiency/costs

- Need to be profitable to keep crews
- Fishing smarter, greater co-management, after effort has been removed.
- EJ- ideally after sustainability issues are removed, can reduce operational limitations ie gear restrictions
• Difficult without output controls
• Need smarter approaches to fish for scallops, structured rotational harvests

Marketing/prices
• Import competition (tough to fix)
• Product differentiation
• Dollar influences import price/competitiveness
• Collaboration/co-ordination between fishers/industries.
• Differentiation by species (ie kings)?
• Timing and volume of catches on the market influence domestic price
• Lack of vertical integration
• Issues with storage, cash flow, etc
• Challenges are there in the post-harvest sector as well

Structure of the fishery
• This is something that can occur more effectively down the track once effort is removed
• Is the current arrangements appropriate?
• Better to break it down to component fisheries?
• Example scallops.
• Dave Sterling – need to have a better understanding of when and where to fish EKP
• Most people like the flexibility to be able to change between species
• EJ- Can still be one fishery, but managed as discrete stocks eg real time management measures of commercial catch rate

Investment in the capacity of the fishery (capitol and people)
• Hard to stay ahead of the game without profitability
• As an example, one company chose to strategically invest in capitol, people up front
• Or, after rationalisation there needs to be investment back into the fishery up front to get it kick started again

Ensure you are geared up to handle the extra piece of the pie.
Appendix 1.25. East Coast Trawl Fishery Workshop, Outcomes 3: Synthesis of regional meetings

Background
The East Coast Otter Trawl Fishery (ECOTF) is a multi-species fishery that operates throughout the waters of Queensland from Cape York to the Queensland/New South Wales border. The fishery has approximately 422 licenses of which 350 are active vessels fishing a total of 37,000 nights per year landing approximately 8,000 t of seafood, directly employing more than 1500 people and has a Gross Value Production of approximately $100M per annum. The main target species have all been recently assessed as sustainably fished with effort at or below MSY levels.

Over the past 20 years the trawl industry has reduced effort, increased efficiency and adopted better fishing practices such as turtle excluder and by-catch reduction devices. These changes have significantly reduced ecological risks presented by the fishery. Some challenges remain for the fishery such as excess fishing capacity, a few high ecological risks for some species and habitats, and low profitability. These remaining problems put pressure on fishing businesses and regional communities.

The fishery experienced a period of improved profitability between 2000 and 2004 following a previous structural adjustment and the introduction of the Trawl Management Plan. Short periods of profitability are commonly experienced after structural adjustments where remaining fishers enjoy reduced competition and a larger share of fishery resources. Post structural adjustment improvements in profitability are rarely maintained in the long term, and this is especially true for fisheries with inadequate management rules to constrain catch (output) or effort (input) to profitable levels. A high Australian dollar combined with increasing input costs, such as fuel, has reduced the profitability and competitiveness of the Queensland East Coast Otter Trawl Fishery.

Recently the opportunity has been taken to review the fishery’s management framework and address specific issues that have been identified by industry since the development of the management plan. These issues include:

1. Excess of effort units in the Fishery;
2. Constraints on technical efficiency;
3. The appropriateness of current bycatch mitigation requirements;
4. Spatial management arrangement not covering all relevant areas;
5. Improving the effectiveness of the current seasonal closures;
6. Ensuring the greatest benefit is derived from the scallop replenishment areas;

7. The appropriateness of the current fishing gear restrictions; and

8. Regulatory driven discarding of certain species.

Through the review process stakeholder advisory groups have identified a need for a reduction in real effort in the fishery to reduce competition between fishers. This would lead to improved average catch rates, increased fishing opportunities throughout the fleet, reduced risk to the marine environment through lower bycatch volume and reduced habitat interactions, and would allow for increases in fishing efficiency through regulatory reform. The advisory groups have also identified the need for an adaptive co-management strategy to establish stock specific management controls, to ensure prawns and scallops taken by the fishery are of a valuable size and stocks are not fished below ecologically sustainable levels. This strategy would serve to reduce operating costs, increasing operator flexibility and industry resilience to changing social, economic and environmental pressures on the fishery. As with any change there is a range of challenges that are faced. These challenges include a diversity of operations and business structures, lack of understanding or acceptance of stock assessment processes and a lack of leadership willing to drive change in the industry.
Stakeholder Meetings

A series of regional stakeholder workshops were scheduled as part of the CRC project looking to identify opportunities for improving the economic performance of the East Coast Otter Trawl Fishery.

The project was looking to measure and compare the economic performance of selected prawn fisheries (Spencer Gulf, Gulf St Vincent and ECOTF) as well as rock lobster and abalone fisheries. The aim was to assess the effectiveness of factors that enable wealth creation within the specific fisheries using wealth-based fishery performance indicators. Key speakers from the Spencer Gulf and Northern Prawn Fishery provided attendees with some unique perspectives on common problems faced by all fisheries at some time or another and innovative solutions that have delivered economic improvements in these particular fisheries.

Through identifying innovative operational procedures, business structures and management systems in other fisheries potential options were discussed to improve the economic performance of the ECOTF. At the workshops stakeholders were asked to consider the ideas and experiences presented and discuss these in the context of the issues facing the East Coast Otter Trawl Fishery identifying the benefits, problems, adaptability of the fleet to change and the economic impacts relevant to the fishery.

The meetings were held in Cairns, Townsville, Hervey Bay and Mooloolaba. A total of ~30 industry participants attended across the four meetings with a range of interests represented including fishers, fleet managers, business owners, processors and marketers. Participants engaged in the meetings whole heartedly and provided valuable input into discussions about options to address key issues facing the fishery.

Key Issues Identified
- Over-allocation of effort (unused + active)
- Lack of Profitability
- Efficiency constraints
- Structure of the fishery
- Industry Voice
- Investment in the industry (vessels and people)
- Marketing/prices

Meeting Discussion

Overcapacity

Participants agreed that there is excessive effort/licences in the fishery with the majority suggesting it is the priority issue to be addressed.
Surplus effort stymies any attempts to increase profitability because as profit improves, effort increases and this drives down the profit again.

There is a need to separate latent/unused effort and operational effort in any approach to effort reduction.

Whatever approach, make sure that there is a reduction in the number of participants/boats.

Too many boats at the fleet level dilute profits.

Need to keep enough capacity for potential increases in effort or efficiency.

Participants discussed the potential for a staged effort unit reduction but the situation requires that efficiency is improved now, not in a piecemeal process over time.

How to fix it?
- Combination of industry/government strategy/contribution
- Industry need a co-ordinated approach to government
- tender process
- Still need to make sure you remove licences.
- might be more costly to voluntarily forego effort, cheaper to buy it up front on tender (government financed)
- Other investors

**Economics/Profitability**

The size of the slice of the pie is critical despite the size of the pie going up and down.

It's not good enough to "just" be biologically sustainable, the fishery needs to be financially viable enough to self fund the required regulatory reform.

Economic survey data required every 3-4 yrs to inform management framework.

The aim should be to get a return on investment to counter opportunity costs.

Operation needs to be profitable to keep crews.

**Fishing efficiency**

Fishers find it hard to stay ahead of the game without profitability in the industry.

Fishing smarter, greater co-management, after effort has been removed is required.

Ideally after sustainability issues are removed the government can reduce operational limitations ie gear restrictions.

After rationalisation of the effort/fleet there needs to be investment back into the fishery up front to get it kick started again.

Individuals need to ensure they are geared up to handle the extra piece of the pie.

Efficiency increases are difficult to manage without output controls.

Need smarter approaches to fish for scallops, structured rotational harvests.

**Regulatory reform**
This is something that can occur more effectively down the track once effort is removed. Need a clearer policy direction for the objectives of the fishery, with reference points. No current management controls at the stock level. Are the current arrangements appropriate? Better to break it down to component fisheries? Most people like the flexibility to be able to change between species. Can still be one fishery, but managed as discrete stocks eg real time management measures of commercial catch rate.

**Stakeholder Engagement**

The fishing industry needs leadership and organisation. Industry need to develop answers to the issues through a key industry leadership group. It is difficult to be an active fisher as well as attend meetings/ think of issues. The world is run by those that attend. Industry needs to value representation. Discussed the establishment of a peak body, fully cost recovered and based on GVP across all fisheries and add the costs to licence fees. A lot of industry that don't want to remain in the fishery still have a big say. Very diverse ideas on what individuals need/want from or for the fishery.

**Markets/Pricing**

Import competition impacts prices (tough to fix) Product differentiation needs to be developed. Industry heavily controlled by markets, dollar influences import price/competitiveness. More collaboration/co-ordination between fishers/industries. Differentiation of product by species (ie kings)? Timing and volume of catches on the market influence domestic price, this needs to be better managed to optimise prices. Lack of vertical integration Issues with storage, cash flow, etc Challenges are there in the post-harvest sector as well.