

# **Maximising the quality of Australian wild-caught prawns (Quality Assurance)**

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**Project No. 2011/747**



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***This project was conducted by Dr Janet Howieson from the Centre of Excellence for Science, Seafood and Health, Curtin, University.***

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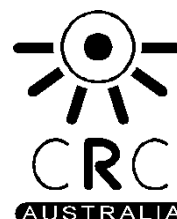
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# Non-Technical Summary

**Project No. 2011/747: Maximising the quality of Australian Wild Caught Prawns (Quality Assurance)**

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## **PROJECT OBJECTIVE:**

The Australian prawn market development strategy is underpinned by supply of a consistent, high quality product to the end user – the consumer.

## **OUTCOMES ACHIEVED**

The wild harvest Australian prawn industry and aligned down chain stakeholders have access to a suite of resources to ensure a consistent, high quality Australian prawn product.

## **LIST OF OUTPUTS PRODUCED**

- A consumer information pamphlets circulated to >400 retail outlets in 2014 and 2015 respectively.
- Retail poster circulated to >400 independent retail outlets.
- Online training resource for crew & skippers developed and piloted.
- An agreed set of parameters describing a “quality” Australian prawn.
- Best practice documentation/guides produced for fishers, wholesalers & distributors, retail and food service, and consumers.
- <15 industry and conference presentations
- Two industry magazine articles

This project, CRC 2011/747, was funded to develop a whole of chain quality assurance program within the prawn industry, focusing on five supply chain stakeholder groups: fishers, processors, wholesalers/distributors, retailers/food service, and finally the consumer. The aim was to increase knowledge and improve best practice skills to maximise prawn quality right through the supply chain. This was considered necessary in light of the “Love Australian Prawns” national marketing strategy.

## **PROJECT PHASES:**

The project phases and outputs are summarised below.

### **Phase 1: Detailed literature review**

A detailed literature review around Australian prawn quality was undertaken. The review included assessment of relevant websites (including FRDC/CRC/ SSA/FZANZ/AQIS/SFM, sector and company specific websites), research reports, company specific documentation and specifications and peer reviewed journal articles

### **Phase 2: What (agreed) parameters define a quality Australian prawn?**

**Output:** Following consultation with industry, a series of generic quality parameters were developed underpinning the prawn Quality Assurance (QA) program. Parameters covered included prawn defects (sensory and appearance), size grading, microbiology, additives and contaminants, carton/packaging, delivery, storage and facility.

### **Phase 3: How do we assess against the (agreed) parameters?**

**Output:** Following consultation with industry and development of parameters, agreed methods to assess against the parameters were developed.

### **Phase 3: How do we achieve these quality parameters? I.e. what are the best practice protocols for each of the stakeholder groups?**

**Output:** All the data and results from previous projects have been summarised, with detailed documents developed that contain best practice guidelines for each stage of the supply chain (fishers, processors, wholesalers/distributors, retailers/food service, and consumers).

### **Phase 4: What training tools and delivery method would adequately and most efficiently inform each of the stakeholder groups about the methods to produce the defined quality parameters? This stage to include pilot trial and evaluation of at least three training tools.**

**Output:** Following the industry extension committee meeting for the project in early Feb 2014, the decision was made to focus aligned "training programs" for the best practice guidelines on three sectors fishers, retailers, consumers. This was because it was considered that processors and wholesalers/distributors had sufficient training and induction processes in place based on other external drivers (e.g. food safety auditors, customers).

### **TRAINING PROGRAMS:**

The following training programs/resources were established for the different sectors of the supply chain:

**Fishers:** An on line training program (broader than quality) was developed with four separate modules:

- At sea operations
- Shipboard safety
- Environment/pollution
- Quality/consistency

The program included separate courses/modules for crew and skippers. Much of the learning was demonstrated with videos and photos. Online assessments were developed for each of the modules and once a pass is achieved, certificates can be printed. A database of participants who have completed the courses can be produced through the software used. It

is noteworthy that the tool is not expected to replace vessel specific inductions as part of the SMS. The tool has been piloted with the Northern Prawn Fishery in March and August 2015 with feedback collated and implemented where possible.

The ultimate aim is for each Australian Prawn Fishery to have access to the training tool, with fishery specific amendments made by each prawn fishery for their own particular situation. To this end the NPF tool has been circulated to representatives from most of the other Australian prawn fisheries to gain feedback and interest in modifying for the other fisheries.

**Retailers:** A retailers “quality prawn” poster was developed and circulated with the 2014 LAP material. Retailer feedback has been collected by Meredith Lawley.

**Food Service:** The prawn quality training to the food service sector has been delivered as part of a separate project: CRC 2010/770 (Australian Seafood Apprentice Chef and Commercial Cookery Online Training Series) in which an 8-minute video was developed covering the prawn supply chain, species, seasonality, quality indicators when received and best practice storage, preparation and finally cooking. The videos have been incorporated into the chef training curriculum and assessment processes developed for use in schools and colleges delivering home economics and chef training.

**Consumers:** A “quality prawn” pamphlet with information on best practice storage and preparation etc. was circulated with the 2014 LAP material. On advice from industry, a new consumer brochure outlining the wild caught prawn supply chain has also been developed and circulated with the 2015 LAP retailer material.

There have been a series of invited conference and meeting presentations (outlined below) during which the project was described and all resources were distributed.

- Refrigerated Warehouse and Transport Operators Conference (2014)
- Home Economics Institute of Australia conference (2014)
- CRC Seafood Retailers Network meeting (2014)
- Series of Prawn networking events in each state (October- November 2014)
- World Seafood Congress Grimsby 2015
- BIT 4<sup>th</sup> Annual World Congress of Aquaculture and Fisheries Qingdao, China 2015.

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# 1. Introduction

The Australian prawn industry supported industry investment to implement the national prawn market development strategy developed by Brand Council (CRC 2011/736). Hence the “Love Australian Prawns” campaign was launched in 2013 and follow up promotional material has been distributed in 2014 and 2015. However, during the 2012 consultation to harness support for the national campaign, a major aligned industry concern was the inconsistent quality of, in particular, wild caught prawns, and how this inconsistency may have the potential to negatively impact the market development activities. The Australian wild catch prawn industry is widely distributed and characterised by variation in geography, target species, operating/harvest systems, size of vessel and operator capabilities. Additionally, there can be high staff turnover, language and cultural differences and literacy issues. This can lead to inconsistent product harvesting, brining, cooling, preserving, packaging and grading and/or inappropriate processing, which can cause inconsistent product quality. Such quality issues can be exacerbated by poor handling at both retailer and consumer level.

This inconsistent quality impacts the already highly competitive market, meaning that there may be little price reward for a high quality product. While prawn quality standards have previously been created, there has been little integration or acceptance nation-wide. More often, standards have been created at fishery, company and vessel level, or are at the whim of down chain partners/purchasers. With considerable industry investment to both develop and implement the national Australian prawn strategy, there is now a greater incentive for the production of a consistent quality product to underpin the Australian prawn strategy messages/activities and ensure the best possible prawn experience for consumers.

This project was therefore funded to develop a quality assurance program for the Australian wild harvest prawn industry. The program was to be whole of chain, encompassing product handling by fishermen, cold transport and storage operators, processors, retailers, food service and consumers.

## 1.1. Need

There was support for industry investment to implement the “Love Australian Prawns” national campaign developed by Brand Council (CRC 2011/736). However during the consultation in 2012, a major concern raised by industry was the potential impact distribution of poor quality product might have on the market development activities.

Hence, it seemed appropriate that the campaign would be aligned to a whole of chain quality assurance program to ensure distribution of a consistent, high quality wild Australian prawn product.

## 1.2. Objectives

The Australian prawn market development strategy is underpinned by supply of a

consistent, high quality product.

2 To establish, trial, and evaluate the impact of a national, whole of chain, prawn quality program for grading, shelf-life, appearance and provenance of Australian prawns.

## **2. Methods**

This project was developed to take a whole of supply chain approach in meeting consumer expectations for prawn quality in a realistic and deliverable way, utilising the previous and current/ongoing research/best practice results on maintaining quality, and transferring those results into training tools relevant to the target audience. Originally three key audiences were identified: boat level (skippers, crew); customers (wholesalers and retailers); and the consumer. However, later the target groups were separated and extended to include fishers, transport and cold store operators, processors, retailers, food service personnel and consumers.

Value chain analyses undertaken in four Australian wild harvest prawn fisheries (CRC 2008.793.10) identified three priority parameters of prawn quality that were important to customers and consumers in delivering a consistent product to the marketplace. These parameters, size grading; appearance and sensory aspects (shelf life); and provenance, were selected as priority areas for the fishers part of the quality assurance program. Whilst it was recognised that demonstration of sustainable fishing practices is becoming an increasingly important “quality” topic for customers and consumers, this is not specifically dealt with in this project as it was seen as the ‘something extra’ that fisheries or companies can utilise to differentiate and sell their product.

The through supply chain approach aimed at customers is to ensure that the quality prawn product is transported, re-processed, stored, thawed, displayed and/or prepared in the best possible manner.

The methods for the project were separated into five different phases as described below:

### **PHASE 1**

This phase involved undertaking a literature review to summarise research projects/reports/consultation/websites etc. associated with prawn quality in Australia (including fit for purpose, standards/policies etc., sensory tests, consumer research etc.). This review was to include collection and review of existing quality standards materials including those requested by specific end-users e.g. supermarkets, export markets.

### **PHASE 2**

Following the literature review, define what parameters and attributes are to be included in the quality assurance program, how these can be assessed and what level/degree of assessment is to be obtained. Following the results of previous consumer and value chain analysis research (CRC 2011/736: National Prawn Market Category Planning and CRC 2008.793.10:Optimising prawn quality and value in



domestic prawn value chains) the putative five parameters/attributes to define a “quality” product were around size grading, shelf-life, appearance/sensory, provenance and sustainability. Sustainability was not to be part of this project but its importance is acknowledged. The other four parameters/attributes were studied.

In this phase all prawn chain stakeholders were surveyed for any specification documents/criteria against which their product is measured and assessed. Legislative requirements were also assessed. All the results were collated, and an industry consultative group was formed to assess and validate the chosen parameters and assessment measures.

### **PHASE 3**

Develop best practice guidelines for each of the stakeholder groups to assist them to achieve the specifications/expectations defined in Stage 2. These guidelines would be developed from the existing literature and following industry consultation.

### **PHASE 4**

Develop, implement and evaluate the most appropriate training strategies to deliver the best practice guidelines to at least three of the prawn supply chain stakeholder groups. These strategies are to be developed based on the various characteristics/challenges of the different sectors of the supply chain. Evaluation criteria were developed. This part of the project was overseen by the Training and Extension Industry Committee.

### **PHASE 5**

Undertake project extension activities. Complete project reporting.

## **3. Results**

### **PHASE 1: LITERATURE REVIEW**

A literature search and industry consultation process was conducted in order to access all the previous documentation that had been produced relevant to the development of the quality assurance program. This search encompassed more than 50 websites (including FRDC/CRC/SSA/FZANZ/AQIS/SFM, sector and company specific websites), 10 research reports, 10 company specific documentation and 20 peer reviewed journal articles. These documents and links are summarised in Appendix 1 – “*Literature review*”.



**Figure 1. Researchers Dr Rachel Tonkin and Kerri Choo completing desktop study/literature review**

## **PHASE 2: DEVELOPMENT AND ASSESSEMENT OF AGREED QUALITY PARAMETERS**

Based on the literature search, the draft quality parameters were defined and draft means to assess the parameters developed. An industry workshop breakfast to report on the project was held in Port Lincoln on 25th October 2013 during the Seafood Directions conference. Over 30 people attended and all major Australian wild harvest fisheries were represented. There was general agreement for the quality parameters identified, the means to assess against the parameters and the development of the COP's. A number of comments were received and incorporated into the draft documents. A Review of Sodium metabisulphite alternatives was completed as part of the literature search but further research into metabisulphite alternatives was not supported at the industry meeting.

These parameters and means of assessment were further discussed and endorsed by the Prawn Quality Assurance Program Industry Technical group at a face to face meeting held in Brisbane on Dec 2<sup>nd</sup> 2013. Committee Members included Lisa Thomassen (Food Safety First), Leith Harte (Raptis), Steven Hood (MG Kailis), Steven Murphy (QSIA), Mark Boulter (SFM), Brett Hogan (Focus Fisheries) and Jayne Gallagher (Seafood CRC).

The quality parameters are detailed in Appendix 2. The parameters are described under the broad headings of:

- Defects (sensory and appearance)
- Size Grading
- Microbiology, additives, contaminants
- Carton/Packaging
- Delivery

- Storage
- Facility

In order to facilitate assessment of the prawns, validated generic quality indices (QI) for both green and cooked prawns have been developed as part of the project (see Appendix 3 and 4). The cooked QI scheme was partially developed by a Masters of Food Science student, Carol Low and her detailed thesis can be requested from Dr Howieson. Both cooked and raw QI schemes were validated against all the common wild harvest Australian prawn species. The raw scheme was also validated against common Asian species (*Panaeus vannamei* and *Panaeus monodon*) at an ASEAN seafood cold chain management training workshop, led by Dr Howieson and conducted in Singapore, November 2015.

### **PHASE 3: DEVELOPMENT OF BEST PRACTICE GUIDELINES FOR EACH STAGE OF THE SUPPLY CHAIN**

Using the material sourced from the literature review and other company specific documents, detailed best practice guidelines were established for each stage of the supply chain. The guidelines provided step by step instructions for each stage of the product handling for each of the target groups in the supply chain. These target groups incorporated fishers, cold storage and distributors, processors, retailers and consumers.

As an example the fishers best practice document covered the following activities

- Preparation before harvesting
- Harvesting
- Sorting
- Grading
- Washing Prawns
- Dipping
- Cooking
- Chilling/Storing in chilled water
- Packing and weighing
- Marking cartons
- Freezing and frozen storage
- Unloading
- Product assessment
- Product sampling

The best practice guidelines developed for processors, retailers and consumers covered the activities areas outlined below in Table 1.

**Table 1. Stages covered in the Best practice guidelines for the different stakeholders**

<b>Cold Storage</b>	<b>Processor</b>	<b>Retailer</b>	<b>Consumer</b>
Receival	Receival	Receival	Handling after purchase
Storage	Processing	Thawing	Thawing
Despatch	Freezing	Storage (chilled/ frozen)	Storage (chilled/ frozen)
	Thawing	Display (chilled/ frozen)	Nutritional info
	Processing	Cleaning/Hygiene/ monitoring	Preparation (peeling/ deveining)
	Packaging		Basic Cooking methods
	Loadout/Dispatch		“fit for purpose”
	Cleaning/sanitation		

The best practice guidelines developed in this phase of the project can be found in the appendices as follows:

- Appendix 5 – “*Guide to best practice for prawns: Fishers*”
- Appendix 6 – “*Guide to best practice for prawns: Wholesalers and Distributors*”
- Appendix 7 – “*Guide to best practice for prawns: Retailers and Food Service*”
- Appendix 8 – “*Guide to best practice for prawns: Consumers*”

#### **PHASE 4: DEVELOP, IMPLEMENT AND EVALUATE TRAINING RESOURCES FOR AT LEAST THREE OF THE PRAWN SUPPLY CHAIN GROUPS**

The next stage of the project was to develop training/extension strategies to deliver the contents of the best practice guidelines to the specific supply chain stakeholders. As such a Prawn QA program communications and extension committee meeting was held in Perth on 4 Feb 2014 to define the best means of training/extension delivery for each stakeholder group, develop strategies for development and delivery of pilot training programs, and define evaluation criteria. The industry extension group committee members included Terry Richardson (SG Co-op), Dylan Skinns (Austral), Clayton Nelson (MG Kailis), Annie Jarrett (NPF), Mark Boulter (SFM) and Emily Mantilla (Seafood CRC). David Carter and Lesley Leyland attended as observers.

Table 2 below summarises the outcomes of the industry extension group meeting.

**Table 2. Strategy and comments from Industry extension group meeting held in Perth, 4 Feb 2014.**

<b>Stakeholder Group</b>	<b>Current Status and Strategy</b>	<b>Comments</b>
<b>Fishers</b>	Collation of best practice guidelines completed.  Delivery of On Line Training program	Easily accessible by iphone, ipad or computer. On-line training program to be text, video footage, photos and voice over), with learning components separated as applicable to the various duties of those on the vessel. Assessment would also be on line.
<b>Processors</b>	Collation of best practice guidelines completed.	No further action as committee considered each processing company would have own stringent processes/protocols/documentation in place.
<b>Transport/wholesalers/ storage</b>	Collation of best practice guidelines completed.  Dr Howieson to discuss with representatives for industry before finalising COP and developing strategy.	Representatives suggest conference presentation at the Refrigerated Warehouse and Transport Association (RWTA) conference in August. Representatives also suggested any recommended protocols align with RWTA COP for Perishable Foods.
<b>Retailers</b>	Collation of best practice guidelines completed.  Undertake further end-user consultation. Develop posters with photos (quality, thawing, display, species and size grades).	Posters as easy way to have information and explanatory photographs, also consider on line training option as per fishers.

<b>Consumers</b>	POS and websites.	<p>Advice was to manage consumer interface through retailers. Use existing websites ensuring information is consistent and liaise with “Love Australian Prawns” national committee re linking with planned Year 2 activity. Several pamphlets suggested on sustainability, species and seasonality, quality and storage/thawing etc., and basic cooking.</p> <p>Refer/links to prawn specific video developed for apprentice chefs (CRC 2010/770).</p>
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Following these discussions, specific training programs were developed for different members of the prawn supply chain. These programs are discussed in detail below.

### **1. Training for Fishing Skippers and Crew**

A generic document summarising on-board best practice handling to manage prawn quality had been completed following compilation of key documents and consultation with the Prawn QA technical and extension committees. It was decided to trial an on-line training program (one that can be completed remotely on computer, iPad or smartphone) for delivery of the protocols associated with the collated information. The Northern Prawn Fishery (NPF) offered to trial the on-line training program, with the intent that the other fisheries around Australia could then make minor specific adjustments (e.g. remove cooking detail if on board cooking did not occur) for implementation in their fishery.

A pilot training program focussing on quality and safety was developed in conjunction with on-line training provider Rapid Induct (comprising modules, assessment questions etc.) and Marianne Barber and was delivered to selected staff at the NPF pre-season (tiger prawn) briefings in late July 2014. Feedback (generally positive) on the on-line training was received from the Fleet and Operations Managers present. However it was decided to investigate development of a much higher quality/more extensive online program, with more modules, different components for different operational duties, quality video footage/photography to underpin the text, detailed assessment questions and investigation of alignment with other existing training qualifications. It was suggested that the training program be extended to cover four separate modules:

- Quality and consistency
- At sea safety
- On Board operations
- Environment and Pollution

It was further suggested that different programs be developed for skippers and crew.

A tender document was prepared and discussed with four training providers,

subsequently Steve Hall was appointed as the project manager to deliver the on line training in association with Rapid Induct.

The modules contained agreed text, appropriate videos/photographs to explain the text, and multiple choice assessment questions. If questions were not answered correctly then the reader was automatically returned to the relevant text page. The material was developed in line with existing training requirements/certifications noting the on-line training was never intended to replace the on-board induction requirements as part of the individual vessel Safety Management System. Advice was received on the appropriate length of the training modules. This was set at approximately 25 minutes per module for crew and 35 minutes per module for skippers.

One module was finalised for trials at the April 2015 pre-season briefings. Subsequently all four training modules were developed and a small NPF committee was formed by Annie Jarrett (NPF), members of this committee variously completed the modules and provided feedback. The modules are currently housed on the Rapid Induct website with hard copies saved to password protected computers and portable discs. Access to the Rapid Induct system was granted by the creation of 500 passwords and circulation of those passwords to relevant industry personnel. Ownership of the content of the modules remains with FRDC and ACPF.

Feedback was received from the committee members and also from Barbara Bell, Austral Fisheries. Some of the comments received during the trials of the on-line training module are recorded below, and, within reason, modifications were made in response to the feedback.

*“I appreciate there needs to be a balance between the detail and who the target audience is and unfortunately it can range considerably. This is where I believe our skippers and mates come in to reinforce the message if we feel someone needs further assistance. These online tools are only part of a process and skippers can't just forego their responsibilities. In any case they are required to do follow up toolbox talks and vessel inductions to establish the understanding. This should be no different if we were running our own inductions with similar content.”*

*“One issue I had when doing the inductions is the timing out on particular modules. This may only be an issue here but it was a bit frustrating having to continually come back in. It is positive that it takes you back to the slide you were last on especially the questions/answers.”*

- Ashley Tidy, Austral Fisheries

*“That lot took me over 2 hours – granted I was making notes but I simply cannot see crew sitting through all that lot. Still have the skippers stuff to look through but a lot of this is more appropriate for them. Is there no way it can be made more interesting and abridged? The concept is good but the presentation way too arduous.”*

- Barbara Bell, Austral Fisheries

*“We put all our skippers, mates and engineers though and couple of deckies. All thought it was good except the question below they did not like correct which had drinking in it.”*

- Mike O’Brien, NPF Fleet Manager

Following the modifications resulting from the feedback, the modules were made available for the August 2015 NPF pre-season briefings at which the training was trialled with >30 staff. Prior to the trial the modules were given a final proofing by Barbara Bell, Austral Fisheries. Figure 2 shows the front page of the on-line training module.

Welcome to your training homepage

Please action the following outstanding task(s) below:

- Courses - 4 to complete.

**Courses** | **Resources**

The following courses are scheduled for you. Please select a course by clicking on the "Course Name".

NOTE: Courses with Priority 1 status must be completed before Priority 2 courses etc. If no priority status exists the course may be completed at any stage.

After completing the course(s), click on the icon in the 'Result' column to view/print the certificate for that course.

Induction Courses

Priority	Status	Name	Active (From ~ To)	Start Date	Date Completed	Re-Induct	Result
-	Active	<a href="#">Module #4 Vessel Operations (Skippers)</a>	23/06/2015~20/12/2015	-	-	1 Year	
-	Active	<a href="#">Module #4 Vessel Operations (Crew)</a>	23/06/2015~20/12/2015	-	-	1 Year	
-	Active	<a href="#">Module #3 Shipboard Safety (Skippers)</a>	23/06/2015~20/12/2015	-	-	1 Year	
-	Active	<a href="#">Module #3 Shipboard Safety (Crew)</a>	23/06/2015~20/12/2015	-	-	1 Year	
-	Expired	<a href="#">Module #2 Environment &amp; Legislation (Skippers)</a>	18/03/2015~26/11/2015	-	-	1 Year	
-	Expired	<a href="#">Module #2 Environment &amp; Legislation (Crew)</a>	18/03/2015~26/11/2015	-	-	1 Year	
-	Expired	<a href="#">Module #1 Quality &amp; Consistency</a>	18/03/2015~26/11/2015	-	-	1 Year	

Figure 2. Online homepage for training modules developed for skippers and crew working on trawlers



In addition to the online access, all four training modules were converted into PDF files, which could be saved onto CD's or thumb drives, such that crew can go through the modules even when internet connection is not available. These PDFs are attached in Appendix 7 – *“Online training for skippers and crew”*.

Following the NPF trial in August/September 2015, password access to the training modules was supplied to executive officers and representatives of all the other prawn fisheries in Australia to gauge interest and collect feedback in line with developing modified versions targeted at the different fisheries.

A business plan was to be developed at the ACPF Board meeting in February 2016 to facilitate the transfer of the management of the on-line training resource from Curtin University to ACPF, however this did not eventuate due to some further concerns with the training package. Hence further evaluation of the training resource and discussion of the future home for the package is still being undertaken by the NPF.

It is noteworthy that the scope/framework of the on-line training resource has also been of interest to other sectors including the rock lobster industry.

## **2. Training for Transport/Cold storage Operators**

Collation of best practice protocols has been completed and further development will be aligned with the existing Refrigerated Warehouse and Transport Operators (RWTO) COP. Dr Janet Howieson delivered an invited presentation to RWTO conference in August 2014 about the National Prawn QA program.

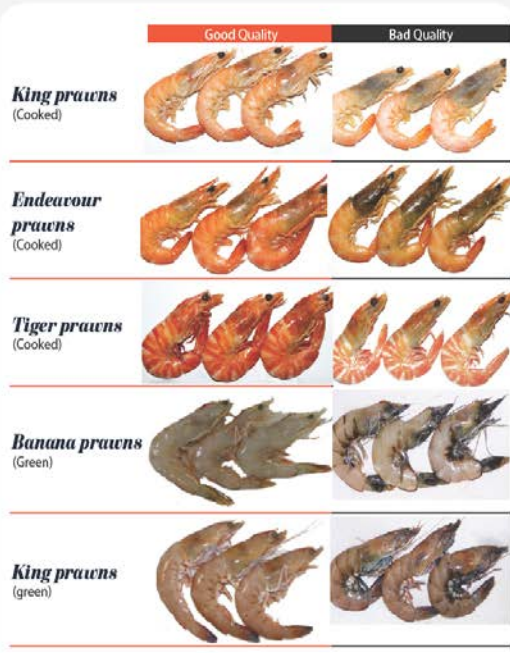
## **3. Training for Processors**

Collation of best practice protocols have been developed, however it is considered that most processors have sufficient company specific documentation/protocols to meet food safety, handling and quality requirements.

## **4. Retailers**

Based on feedback and consultation, a best practice retailer poster (see Figure 3 below) was developed at CESSH, then reviewed by members of the Prawn QA Industry Extension Committee, before being printed and launched at the Perth prawn research and networking event held in September 2014. Following feedback and review there was further extension of the poster at the Brisbane and Adelaide prawn research and networking events in October/November 2014 and at the Seafood CRC Retailer network meeting in November 2014. The poster was also distributed with the Love Australian Prawn packs to >400 retailers in October 2014.

# Retailer's Guide to Good Quality Australian Prawns



Size	Prawns/lb	Prawns/kg	Weight range(g) per prawn	Supermarket grading
Extra large/ Jumbo	U8	18	55	Jumbo-U10
	6/8	14	55-75	Extra large- 10/15
	U10	12/22	>45/46	
Large	10/20	22-44	22/23-44	
	10/15	22-33	30-44	10/20
	9/12	20	38-54	
	U15	13/33	30/32/33	
Medium	U20	14/44	22	30/30
	13/15		30-37	
	16/20	34-44	23-29	
Small	21/30	45-66	15-22	
	U25	55	18	30/40
	U30	66	20/22	
	31/40	U67-88	<15	
Extra Small	30+	66+	15, 14/16-18/20	
	31/50 or U50	67-110	10-14	

## Storage:

FRESH SEAFOOD MUST BE STORED BETWEEN -1.5° AND 5°C.

Storage temperatures closer to 0°C for fresh product (between -1.5°C and 2°C) will give a longer shelf life as they minimise the activity of enzymes and the growth of bacteria.

SEAFOOD SHOULD NEVER BE AT ROOM TEMPERATURE.

SEAFOOD CANNOT BE SOLD AS 'FRESH' IF ITS TEMPERATURE HAS GONE BELOW -1.5°C

storage temperatures between -2°C and -5°C will cause the disruption of cell membranes and speed up enzyme activity.

SEAFOOD CAN BE STORED SAFELY:

- in ice,
- in a chiller, cool room, refrigerator or freezer, or
- in a refrigerated display cabinet.

## Thawing:

Frozen seafood should be thawed in the refrigerator, which may take some time so plan ahead, and remember to:

- cover the seafood to protect it from contamination and dehydration,
- drain liquid from the thawing seafood, check regularly, and
- cook as soon as possible.

Do not thaw seafood at room temperature as the outer layers of the flesh may rapidly deteriorate while the inner layers remain frozen, resulting in the development of 'off' smells and flavours. Seafood thawed in running water may become waterlogged and there may be some flavour loss.

ONCE THAWED, IT IS RECOMMENDED THAT RAW PRAWNS BE CONSUMED WITHIN 1-2 DAYS AND COOKED PRAWNS WITHIN 2-3 DAYS.

BEST PRACTICE: SELL WITHIN 24 HOURS OF THAWING, CONSUMERS EAT WITHIN 24 HOURS OF PURCHASE.

## Temperature Control:

Temperature Control of the Display Cabinet

- Never leave seafood at room temperature
- Prepare small amounts at a time
- Cabinets should be fully enclosed to maintain constant air temperature and prevent contamination. If open display is used, protect with sneeze guards, have a 10-20cm deep bed of ice, and add an 8cm-high ridge along the back edge of the case.
- Not over-stocking the display cabinet as this will reduce units effectiveness
- Loading display cabinets with pre-chilled seafood (display cabinets are designed to temporarily hold temperatures but not to reduce temperatures)
- Spraying seafood with an ice water mist approximately every hour, or as needed, will prevent dehydration and keeps the seafood looking moist
- Avoid leaving the doors on the display cabinet open. Ensure it is closed after getting product to maintain the temperature.

To graph below demonstrates the temperature fluctuations experienced when the display cabinets are kept open for periods of time. The temperature inside the cabinet rose to 15°C.

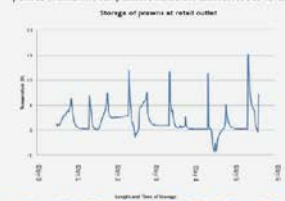


Figure 3. Poster developed for retail training “Retailer’s Guide to Good Quality Australian Prawns

An evaluation of the poster was undertaken by Prof Meredith Lawley, University of the Sunshine Coast. The evaluation results are summarised in Table 3 below.

**Table 3. Feedback evaluation of retail Prawn Quality poster**

	<b>Feedback</b>
<b>Positives (n = 30)</b>	Allowed staff to recognize good prawns and justify price 'Favourite – loved it' Got it hanging near freezer for quality control Laminated and in office
<b>Neutral/Other (n = 20)</b>	Didn't get it (n = 38), but would have liked to (n = 3) Interesting but do not stock those varieties Nothing I did not already know
<b>Did not use (n = 7)</b>	'Exmouth prawn feeds on weed and has a dark head even when fresh' 'Endeavour prawns have a black head when eating weeds'; 'Black head not always bad – just type of prawn'; 'Negative impact confused natural black with lack of freshness'; and 'Confusing, dark headed prawns are not bad – endeavour prawns have a dark head' 'Could include school prawns' Sizing guide is out of sync with what we use

Summarising the above:

- 20% of respondents had not received the poster
- The impact of the Prawn Quality poster was polarised with 59% of those respondents receiving the poster reporting no or very little impact and 41% reporting some to significant impact

There was also some discussion around developing an on-line training program for retailers, using a similar model to the fishers training. The following response was received from Costco Supermarkets.

*"I think this is a great initiative and would be more than willing to assist where we can to rollout the project. The more knowledge and information that we can pass onto our team members / consumer to ensure the best eating experience then the bigger and better the industry will become".*

- Costco Supermarket representative

The below plan for the potential on-line retail training program was developed with a single supermarket representative. Other supermarket personnel could not be engaged at this stage.

The retail training tool would ideally be 20-25 mins in length and cover the following:

1.	Common species of prawns and basic knowledge about the Australian prawn supply chains (farmed and wild harvest)
2.	How to recognise a good/poor quality prawn:  What processes deliver a good prawn & what are causes to a poor quality prawn?
3.	Size grading of prawns
4.	How best to deliver prawns as a meal:  May include preparation/cook methods (see chef training videos)
5.	Best practice thawing of prawns:  Explanation around the benefits/potential issues of frozen product
6.	Best practice display of prawns: ice, managing temperature:  Best practice on how thawed product (cooked & raw) should be stored/handled at end of retail trade until next day's trade
7.	Common impacts of poor handling and display (drip loss and shorter shelf-life):  Loss Sales/increase in waste / product margins

There is still potential to deliver an on-line training tool for retailers in the future. This aspect of the project did not go ahead due to time constraints and difficulties in engaging supermarket training personnel.

## 5. Food service

A specific video covering the prawn supply chain, species, seasonality, quality parameters, best practice storage, preparation and cooking was produced as part of Seafood CRC project 2010/770. The video and accompanying assessment tools have now been introduced into the curriculum for apprentice chef training. In addition, the video has been made available to Home Economics teachers across the country through the Australian Home Economics Institute. For more information on

development, implementation and evaluation of this training resource see the Final Report for 2010/770: Australian Seafood Apprentice Chef and Commercial Cookery Online Training Series.

Although this video was not produced as part of project 2011/747, it is referred to as the most appropriate aligned resource for food service when the program is introduced to supply chain stakeholders.



Figure 4. Chef Training videos – Prawns

## 6. Consumers

Following consultation it was decided that best practice information for consumers would be delivered by producing pamphlets to be made available at point of sale. Two consumer pamphlets were produced and approved by the industry extension committee.

The first, produced in August 2014 and shown in Figure 5 included best practice information on purchase, storing thawing, preparing etc. 250 copies of each brochure were included in each LAP 2014 pack circulated to >400 retailers in October 2014. The resource was also distributed at Perth, Brisbane and Adelaide prawn research and networking events (September to November 2014), Seafood CRC Retailer network meeting (November 2014), National Home Economics Institute of Australia (HEIA) conference (September 2014), and at various primary and secondary teacher



development fora, for both science teachers and Home Economics teachers.

Feedback from the pamphlet by the retailers was not formally evaluated but was informally very positive.

The second brochure, produced in December 2015 and shown in Figure 6, outlined in some detail the wild caught prawn supply chain. 250 copies of each brochure were included in each LAP 2015 pack circulated to >400 retailers in December 2015. This brochure will be evaluated as part of the 2015 LAP evaluation.

### PREPARING PRAWNS

#### Shelling Prawns

Peeling prawns is quick and easy. It is slightly easier to peel a cooked prawn rather than a "green" or uncooked prawn, but if you follow these simple steps, it should be fast and fun.

- 1** Remove the head. Grab the body of the prawn just below where the head joins the first part of the body. Twist the head off.
- 2** Remove the main shell. Hold the body firmly and use your thumb grip the legs. "Unwrap" the legs and shell around the body of the prawn, removing one or two of the body sections.
- 3** Pop the tail. When there are only one or two sections of the prawn left before the tail, you can squeeze the tail section and the rest of the prawn should pop out of the tail section.



#### Butterflying Prawns

Butterflying prawns is a way to make a smaller prawn look larger and more impressive. First, peel the prawn but leave the tail section intact. Cut the prawn along its entire length, and almost all the way through. This can be done along the stomach, which is the traditional method. Alternatively, you can cut along the back of the prawn to give it a circular shape and larger appearance.

#### Deveining prawns

Please follow this video from Curtis Stone on how to devein a prawn.  
<https://www.youtube.com/watch?v=uGrajJ5ZYo>



## Enjoy your prawns

A handy guide how to prepare, thaw, store and enjoy your prawns safely



[www.australianprawns.com.au](http://www.australianprawns.com.au)  
[www.fishfiles.com.au/](http://www.fishfiles.com.au/)  
[www.sydneyfishmarket.com.au/FISHline/tabid/60/Default.aspx](http://www.sydneyfishmarket.com.au/FISHline/tabid/60/Default.aspx)

### HOW TO RECOGNISE A QUALITY PRAWN

Prawns are highly perishable in their raw state and so are often frozen or boiled at sea as soon as they are caught. If cooking with prawns buy green (raw) prawns, as cooked prawns will toughen when reheated. Whether looking for cooked or raw prawns look for:

- 1** Firmly attached heads and tight firm shells with a good sheen
- 2** Pleasant 'fresh sea' smell
- 3** There should be no signs of blackening around the head or legs.



### THAWING PRAWNS

Seafood should never be thawed at room temperature. The best way to thaw seafood is in a colander with a shallow tray or bowl underneath to collect the water it gives off, cover and place in the refrigerator for several hours or overnight. Thawing at a low temperature also helps maintain quality.

Prawns may also be added to wet dishes such as soups or curries without being thawed as the heat of the cooking will thaw them and any juices they give off will add to the flavour of the finished dish.

To thaw the prawns in a short amount of time, prawns can be put in a sealed waterproof bag and into a basin of water.

Once thawed, frozen prawns should not be refrozen.

### STORING PRAWNS

Leave prawns in their shells until just before using them and store them in an airtight container in the refrigerator. It is always best to buy seafood as close as possible to use.

Fresh prawns, cooked or raw, should be kept refrigerated for up to 3 days.

Frozen prawns should be kept for up to 6-8 months below -15°C.

### Refrigeration

One of the biggest mistakes people make is purchasing fresh seafood and not handling it correctly for the journey home. If you are not going to use/eat the seafood immediately then you must make sure the product is kept at the correct temperature for the journey home. Bring an esky or chiller bag and ask for a little ice to chill the product for the trip. Alternatively ask staff to double bag the product and put a little ice in the bag.

Don't leave your seafood in the car whilst you do the rest of your shopping!

Ideally prawns should be kept chilled between -1.5°C - +5°C to avoid spoilage and maximise the shelf life.

The best technique for storing fresh chilled seafood is to cover it with plastic wrap on a plate or tray or in a covered container in the coldest part of the fridge.

Prawns should be consumed as soon as possible after purchase.

*Enjoy your Prawns as soon as possible after purchase.*



[www.australianprawns.com.au](http://www.australianprawns.com.au)

**tip**

For great tips how to devein prawns, let Curtis Stone show you.  
<https://www.youtube.com/watch?v=uGrajJ5ZYo>

Figure 5. “Enjoy your prawns” – Prawn quality, handling and preparation information for consumers

**SAFE & HEALTHY PRODUCT**  
 Strict product testing methods are in place to keep the product food safe, including procedures for cleaning, personal hygiene and hygienic work practices. Product testing confirms that prawns processed on board are not contaminated in any way.



There are 4 main Australian wild caught prawn species groups:

  
BARRAMUNDI

  
DECAPOD

  
EBC

  
TIGER



**WHERE DO YOU FIND**




**WHERE DO YOUR PRAWNS COME FROM?**




LOVE AUSTRALIAN PRAWNS


**FROM OCEAN TO PLATE**  
The wild harvest prawn supply chain




**FISHING**  
 Prawns are caught by trawling, which involves pulling a fishing net through the water column. Strict management rules and monitoring are in place in all Australian prawn fisheries to ensure healthy stocks and a sustainable marine ecosystem.




**HANDLING**  
 Modern trawlers almost always have a snap freezer on board, a special freezer designed to bring the temperature down as quickly as possible. It enables prawns to be quickly frozen ensuring the quality of the prawns is as good as fresh. Frozen prawns are then held in a storage freezer at -18°C or colder.



**CONSUMER**  
 Information on preparation and cooking of prawns is available via the Love Australian Prawns brochure "A handy guide to prepare, thaw, store and enjoy your prawns safely". For further information visit Fishfiles "Australian Seafood All Access Chef & Hospitality Tutorial - Prawns" [www.youstabo.com/user/FRDcrthFlw](http://www.youstabo.com/user/FRDcrthFlw)




**SAFE PACKAGING**  
 Fishermen on board the boats ensure packaging is performed in a clean environment and boxes are handled carefully, meaning consumers receive the best quality prawns possible.



**PROCESSING**  
 Grading for size and quality is performed on board to make sure all prawns are in good condition and of a standard that will allow uniform cooking times.

**WHOLESALE/RETAIL**  
 On arrival at their final destination (the restaurant, wholesaler, retailer), prawns are checked for quality, appearance and grade. Frozen prawns are thawed, ready to be enjoyed by the consumer at home or in the restaurant.



**THE COLD CHAIN**  
 Keeping prawns at a consistent temperature is essential to ensure consumers receive a premium product, and so temperature checks are regularly conducted (commonly at 12, 18 and 24 hours after catch).

Figure 6. “Where do your prawns come from?” – Wild harvest supply chain information

for consumers

## PHASE 5: REPORTING AND EXTENSION

Presentations on the Quality Assurance program and project were given at the following events:

- Presentation to ACPF members (Port Lincoln) at meeting aligned with Seafood Directions October 2013
- Presentation to Shark Bay PTOA, December 2013
- Presentation to Spencer Gulf West Coast PFA on QA project June, 2014
- Invited presentation to Refrigerated Warehouse and Transport Operators (RWTO) conference Cairns, August 2014
- Invited Presentation and distribution of material at the Australian Home Economics Institute national conference, Perth September 2014

*Although I have not fully analysed the conference evaluation survey, approximately 95% delegates rated your session a '4' or a '5' on a 1-5 scale, with 84% rating it a '5', which is really amazing (we don't often get responses like that!), and clear evidence that delegates learnt much and really enjoyed your presentation.*

### **Dr Janet Reynolds Convenor, HEIA Conference Academic Program Committee**

- Presentation and distribution of material at Prawn Research and networking event, Perth (15 September 2014), Brisbane (27 October 2014) and Adelaide (11 November 2014) with joint attendance of >200 people
- Presentation and distribution of material at the CRC seafood retailers network meeting in Hobart 13-14th October, 2014
- Article prepared and published in SEAFOOD MAGAZINE, June 2015
- Presentation: Howieson, J., Jenkins, H., Hollamby, K., Colquhoun, E., Lawley, M., and Gallagher, J (2015) New Directions for the Australian Prawn Industry World Seafood Congress Grimsby September 2015
- Presentation: Howieson J. (2015) Prawn QA in Australia: A Whole of Chain Approach. WCAF, Qingdao November 2015 (invited) (Figure 7 )
- Project briefing prepared for ACPF Board meeting, December 2015





Figure 7. Poster announcing the presentation by Dr Janet Howieson at WCAF in Qingdao

## 4. General Discussion

The project has produced a range of summary materials and training resources that can be accessed by the Australian wild harvest prawn industry supply chain. However, the challenges of engagement with the prawn industry previously noted were also inherent in this project. It was significant that the well organised/professional fishers were most responsive to this initiative, but it is these same fishers that are most likely to be already producing high quality consistent product. Current attention to quality issues by such operators is due to well organised internal quality schemes and demanding specifications from end-users requiring large volumes of product. As with the development of the national marketing campaign itself it has proven difficult to engage the smaller operators (eg in Queensland) who may have the most pressing quality issues. However with the resources and aligned summary documentation developed it is hoped uptake will continue with time, beyond the scope of the project.

As well it has been difficult to gain national, whole of chain uptake of the agreed standard quality parameters developed and agreed by the industry technical committee. Again this is most likely due to supermarkets and other end-users preferring to use their own product standards/specifications. Size grading in particular is very end-user driven and difficult to standardise (e.g. what is extra-large, large, small etc.). It has also proven difficult to get operators to change their assessment techniques (e.g. use QI scheme rather than company specific quality parameters).

The fishers on line training tool is still a pilot. There have been challenges associated with NPF industry engagement, although this may be due to recent revamping of safety laws, with each vessel now required by legislation to develop an individual safety management system. There will be some duplication in this case between the SMS and the on-line training developed. Similarly, we believe there is some further work to be completed on optimisation, likely to arise as well from other fisheries which have indicated they are interested in modifying and then using the resource in the future. Again, this resource is expected to have continued uptake/integration into company/fishery policy beyond the scope of the original project.

The retailer and consumer pamphlets have been well received and aligning distribution with the Love Australian Prawns (LAP) campaign has been cost effective and beneficial. It is suggested that further “quality” resources can be developed/distributed/evaluated in alignment with the LAP campaign. Evaluations undertaken can be used to further improve the usefulness of the resources.

With the various levels of engagement and adoption of the developed whole of chain resources, it has been decided to complete this current project within the current time frame and request the ACPF Board to make decisions about further activities aligned with the remaining funds. This will allow the uptake and adoption to continue, being industry driven and with relevant and workable commercial time frames.

## **5. Benefits and Adoption**

- Extension of the developed resources has been wide ranging (ACPF Board members, all Australian wild harvest prawn fisheries, cold storage and transport operators, processors, food service, retailers, consumers) and in various formats (conferences, network meetings, industry meetings, industry magazines etc.)
- Adoption of the resources has been variously successful, but it is expected that adoption and development will continue, driven by industry, and beyond the scope of the current project.
- The on-line training represents an integration of training needs across a range of areas (at sea safety, environment and legislation, shipboard operations and quality and consistency). Uptake of the on-line training resource is still in pilot with NPF, and not yet extended to other fisheries.
- Retail poster and consumer pamphlets had successful uptake and adoption in independent retailers, despite efforts, supermarkets engagement was not very successful. Engagement with the food service industry aligned with the outputs of CRC 2010/770 is continuing and developing.

## **6. Further Development**

The research project has been ceased, but there are significant funds remaining, and the ACPF Board is now in the process of prioritising areas for further development.

These areas may include, but not be limited to;

- Modify the fishers on line training for specific fisheries that are interested
- Develop a short on line retail training resource (for independent retailers and supermarkets)
- Publish all the best practice guidelines.
- Innovation in extension to encourage whole of industry/chain uptake of the agreed quality parameters and modes of assessment.

## **7. Planned Outcomes**

### ***Public Benefit Outcomes***

1. A high quality product provided by all Australian wild caught prawn fisheries that meets agreed and whole of chain relevant quality parameters, is nationally consistent and meets consumer and customer expectations.
2. Develop a culture in Australian prawn fisheries that endorses and applies nationally agreed Codes of Practice.

The previously documented outputs of this project were intended to support all promotion and marketing work of the prawn industry.

### ***CRC Outputs and Milestones***

#### **Output 2.7 - Removal or reduction of barriers to seafood consumption**

Milestone 2.7.1 - Barriers to and drivers of seafood consumption identified in at least two new domestic or overseas consumer groups annually

#### **Output 2.8 - Smart processing technologies and practices**

Milestone 2.8.1 - Innovative technologies for controlling spoilage to enhance shelf life and marketability identified, implemented and evaluated for five seafood products

## **8. Conclusion**

The project has resulted in the development of a set of agreed parameters and assessment methods for “quality” Australian prawns. Best practice techniques for all stages of the supply chain have been summarised and documented, and in the case of fishers, retailers, food service and consumers, developed into training/information resources.

Despite the use of industry committees and champions, in some cases uptake and adoption of the resources is not complete. For this reason, the ACPF Board has been requested to undertake a process to advise on priorities and drive continued uptake and adoption of the resources beyond the scope of the project.

The outcomes of this project can be used to support all promotion and marketing work of the prawn industry, and in particular be linked with the Love Australian Prawns national marketing campaign.