Western Rock Lobster Council Inc.

Australian Government

Fisheries Research and Development Corporation

Market Investigation of the Impact of Rock Lobster Aquaculture

(FRDC Project Number 2007/249)

FRDC FINAL REPORT

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FRDC PROJECT NUMBER 2007/249

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Non technical Summary

2007/052 Market Investigation of the Impact of Rock Lobster Aquaculture

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OBJECTIVES:

1. Provide a clear indication of the current status of the WA WRL in the global market, identifying the factors that affect market price and market share.

2. Outline some potential future markets for aquaculture products in Australia and in other countries considering off season production and specific sizes.

3. Identify any marketing impacts that may result as a consequence of WA aquaculture product entering the market both generally and for the WA WRL industry

4. Identify potential market implications to WA's WRL industry and regional economies if WA does not accept and support aquaculture of WRL

OUTCOMES ACHIEVED TO DATE:

The reports provided by the consultants in parts 1 and 2 of the project have been used to develop ministerial policy on Western Rocklobster puerulus allocation and aquaculture.

This project has endeavoured to provide global statistics on the aquaculture lobster market to help quantify if aquacultured lobster may affect the value of product from the wild catch sector in Australia. The broader implications of this new sector may include the effects of product style, size and timing of delivery into the market.

The project has assisted the Ministerial working group to make informed decisions regarding the effects of rocklobster aquaculture on the commercial Western Rocklobster fishery.

KEYWORDS: **Western Rocklobster, aquaculture, ministerial working group,**

Acknowledgements

Thanks go to the project steering committee; Greg Hart from Wild Oceans, Dexter Davies and the Minsiter for Fisheries, Jon Ford. Many thanks Dr Julian Morison from EconSearch South Australia, for his patience and cooperation.

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NON-TECHNICAL SUMMARY

The project was for a Ministerial working group who was developing the policy for the aquaculture and allocation of Western Rocklobster puerulus. Consequently, the reports provided by the consultants in parts 1 and 2 of the project were used to develop ministerial policy on Western Rocklobster puerulus allocation and aquaculture. Consequently, the reports were used solely by the puerulus working group until the Minister for Fisheries, the Honourable Jon Ford approved the release of the documents into the public forum.

BACKGROUND

The project commenced with the tender of expression of interests for consultants to complete each part of the project in October 2007, however only two expressions were received, one for part one and one for part two despite several formal approaches to various consultants. Consequently, the current consultants were appointed upon group consensus from the steering committee in December and report writing commenced in January.

The first draft of the report from part one was circulated to the project steering committee members for input, and a number of revisions were requested on the first draft.

NEED

The Department of Fisheries released a Scoping Paper in 2006 identifying management considerations for the allocation and growout of WRL puerulus for aquaculture. Public comments called for a study into the implications of this new industry on the markets of wild harvest product as significant concerns were raised that aquacultured product could have a significant impact on the wild caught lobster market.

These implications centre on the wild harvest industry having an established position within the global trading environment, which the aquaculture sector wishes to enter and an assessment of the financial effort being delivered to this aquaculture sector around the world is needed as there is no data currently available to our knowledge.

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Identify potential market implications to WA's WRL industry and regional economies if WA does not accept and support aquaculture of WRL

METHODS

Part 1: Engaged an Economist to assist in phrasing the relevant questions in collaboration with the Project Steering Committee. Questions could relate to size of lobsters at point of sale, type (e.g. soft shelled) of lobsters aquacultured or type of product, competition in the market place and demand for aquacultured versus wild caught lobster.

The PWG steering committee then met to discuss the scope and requirements of the project, selection criteria for appointing an economist and a market analyst were developed to conduct the two parts of the project. The Economist once appointed developed and progressed part 1 of the project. The steering committee then provided advice and direction to the PI and the economist on the project as required.

Part 2: A Seafood Marketing analyst/consultant was appointed to answer the above questions. The marketing analyst then developed and progressed part 1 of the project. The steering committee then provided advice and direction to the PI and the analyst on the project as required.

PLANNED OUTCOMES

The project was conducted in two parts, the first part was a scoping exercise, to develop the terms of reference for the market study. The second part involved carrying out research to answer the questions raised in the first part in relation to the market study. The project provided two planned outcomes based on these two aspects:

Part 1) A set of criteria for determining the effects of aquacultured lobster on the market for use by a market researcher/analyst. These criteria included the required skills and competencies for the appointed person, as well as a series of recommended questions requiring addressing by the market analyst.

Part 2) The results of the market research in terms of the impacts on the wild harvest sector from aquacultured product in the market place.

This information was useful in determining the type and scope of issues that needed to be addressed in the market analysis, and was beneficial to the PWG for use in decision making, as well as providing future proponents in the aquaculture and wild harvest sector with an understanding of what industry may be facing in the future.

RESULTS

See Appendix One & Appendix Two

BENEFITS

The project assisted the Ministerial working group to make informed decisions regarding the effects of rocklobster aquaculture on the commercial Western Rocklobster fishery.

CONCLUSIONS

The project was for a Ministerial working group who were developing the policy for the aquaculture and allocation of Western Rocklobster puerulus. Consequently, the reports provided by the consultants in parts 1 and 2 of the project were used to develop ministerial policy on Western Rocklobster puerulus allocation and aquaculture. Consequently, the reports were used solely by the puerulus working group until the Minister for Fisheries, the Honourable Jon Ford approved the release of the documents into the public forum.

APPENDIX ONE

Market Investigation of the Impact of Rock Lobster Aquaculture specific to the Western Rock Lobster Fishery

A report prepared for Western Rock Lobster Council

Prepared by WILD OCEANS PTY LTD

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Abbreviations

WA	Western Australia
WRL	Western Rock Lobster
FDA	Federal Department of Agriculture (USA)
HACCP	Hazard Analysis and Critical Control Points
SRL	Southern Rock Lobster
US	United States (USA)
EU	European Union
FRMA	Fish Resources Management Act
WCRLMP	West Coast Rock Lobster Management Plan
WCRLF	The West Coast Rock Lobster Managed Fishery
CITES	Convention on International Trade In Endangered Species
TAC	Total Allowance Caught
MT	Metric Tons (1000 kgs)

Disclaimer

The attached report has been prepared exclusively for the use and benefit of The Western Rock Lobster Council. Neither the company Wild Oceans Pty Ltd or any of it's employees undertakes responsibility in any way whatsoever to any person (other than to the above mentioned client) in respect of the report including any errors or omissions therein however caused.

Executive Summary

Over the past 10 years, the global supply of wild caught Spiny Lobster is estimated to be 70,000-80,000mt. With this knowledge, major buyers are aware that the supply of spiny lobster has reached full capacity and therefore the concept of additional supplies from aquacultured sources has been received as overwhelmingly positive.

Today, more than 50% of the world's wild caught Spiny Lobster production is of a size smaller than the commercially caught Western Rock Lobster. There are many examples of pricing and market perceptions of foreign species to acknowledge and consider when discussing Aquacultured Lobster production of Panulirus Cygnus (WRL).

In essence the total wild caught WRL production represents approximately 10% of the world's commercial spiny lobster production and only 5% of the total lobster production, if clawed Atlantic lobsters are included. Importantly this represents nearly 20% of the worlds commercial spiny lobsters caught over 380g in size, demonstrating that there is a significant marketplace already operating for the smaller sized spiny lobsters.

Wild Oceans researched the markets for aquacultured WRL with leading lobster buyers and producers across the world from both current WRL and non WRL buyers. Generally, responses were overwhelmingly positive however some concerns were raised and discussed.

Impacts on buyers for the supply of Aquacultured WRL

Benefits

- Possible reduction in peak pricing periods
- Greater stability in supply and pricing
- Increase in total supply and re-substitution against other species.
- Opportunity for new size categories
- The possible development of new or niche market options

Negatives

- Perception of Aquacultured over Wild caught maybe lessened due to quality and/or product characteristic differences.
- Possible lower perception of WRL as a specie type.
- Possible overall reduction in peak pricing reducing some wild caught speculative gains.

Impacts on Wild Caught WRL Producers

Whilst not perceived to be a benefit or a negative from the buyer's perspective, a number of areas were highlighted and discussed based on the possible impact to the wild producer.

Benefits

- Increase in market size by ability to supply consistently over a 12 month period
- Increase in availability of infrastructure such as processing, storage and logistics.

Negatives

- Reduced demand for Pink WRL over Red (particularly for under 460g sizes)
- Reduced demand for Frozen Whole Raw lobster as a Live substitute

Current Markets

The markets for smaller sized wild caught lobsters are already well established, readily available and thriving across the globe. It is expected that this will continue to grow with ongoing interest from new and traditional buyer markets.

As the global demand for Spiny Lobster increases, industry experts forecast higher average sales prices will be possible and there-by allow for higher costs of production both for the wild catch and aquaculture sectors. It is suggested however that, wild caught lobster is limited by a finite and seasonally variable supply. In terms of frozen pricing, the overall consensus of buyers and producers is that for smaller sizes there is considerable work required to achieve viable pricing. In terms of Live pricing, there is much greater confidence however this will still need to be measured against the species and the quality of the delivered product.

Evolving markets will determine pricing based on product type, supply capacity and opportunity for substitution.

Without consideration of the ever changing operational viabilities and financial hurdles, Lobster fisheries around the world, once considered non-commercial (due to their average smaller sizes, shapes and specie types) are now fully operational with regular sales channels and continuing market development. These fisheries all impact in someway on the total lobster and seafood markets of the WRL.

During the extensive consultations with market leaders, Wild Oceans found that although there were many reservations about the viability of WRL aquaculture in the short term, the buyer community was generally in full support of the concept.

There is a window of opportunity for Western Australia to not only stabilize its supply base of WRL to the world markets but to also increase its total lobster market yield thus enhancing and expanding the market base.

The development of Industry Codes of Conduct for production quality and the regulated export of juvenile lobsters through minimum legislated sizing are considered essential for the longer term mutual success of both the aquaculture and wild capture WRL sectors.

In summary, this report finds that given the likelihood of aquaculture targeting for smaller WRL predominantly as a Live product, there would be limited opportunity for negative impacts on the larger Wild capture WRL sector, and none likely greater than the current risks that presently exist with the unregulated quality of wild capture processors of today.

Objectives, Scope and Approach

Objectives

The objective of this document is to

1. Provide a background into the current global markets including relationships with WRL.

2. Discuss the questions detailed in the Econ-search document *'Criteria for Determining the Impact of Farmed Lobster on the Market for Western Rock Lobster'*

- how an influx of lower quality aquaculture product could impact the demand for wild capture product;

- how marketing aquaculture lobster at smaller sizes could impact the wild capture sector;

- how countries currently supplying world markets with aquaculture rock lobster could impact adversely on the WA wild capture fishery;

- how the timing into the market of WRL aquaculture could impact the wild capture fishery;

- how the export of Pueruli could be harmful to the wild capture fishery;

- how increasing global demand could reduce the impacts of aquaculture rock lobster on the wild capture fishery;

- how strengthening exchange rates adversely impact on the wild capture fishery in the face of increasing supply through aquaculture;

- and how promotion of substitutes (e.g. southern rock lobster) into niche markets could leave the WRL wild capture sector more exposed to the effects of increased supply of aquaculture rock lobster.

3. Provide feedback on the research undertaken by Wild Oceans relating to the impact of Aquacultured or farmed Western Rock Lobster on the market.

Scope

The scope of this report is to provide the reader with an overview of the global lobster market and respond to the Econ-search document. These results and comments refer to Spiny Lobster only. This document is not intended to discuss considerations such as the following:

- Economic costs associated with the overall wild caught or aquaculture industry production
- Market risks caused by environmental impacts
- Market Fluctuations caused by global economic changes
- Market profitability
- Competitive risks from foreign aquacultured industries

Research Method

The global lobster market is ever changing through consumer trends and fluctuating supply options. With this knowledge, Wild Oceans considered that face to face interviews with major buyers would be a

valuable and informative method to gather the research for this project. Not only does this approach unlock the sentiment as to possible future commercial opportunities, it also recognizes and highlights possible concerns.

In researching the various international markets and the possible impacts of WRL aquaculture, Wild Oceans has interviewed not only the buyers of WRL but also the existing buyers and suppliers for the smaller lobster species.

Region / Country	No of Buyer Interviewees
China/Hong Kong	4
Taiwan	6
Japan	11
Europe	6
United States	6
Middle East	6

- ***Appendix A – Aquaculture Lobster Research Project Sample Questionnaire***
- ***Appendix A1 – Combined Aquaculture Wild Oceans Research Data***

Information detailed in this document has also been collated from the experiences shared by Wild Oceans management and staff over the past 20 years.

Introduction and Background

Lobsters are traditionally high class seafood in almost every part of the world. There are said to be more than 630 known lobster species of which 209 species are marine. With the world searching the whereabouts of its total supply from shallow to deep, several new and possibly commercially viable spiny lobster species have been discovered in the past decade (Palinurus Barbarae)

Throughout the world there are various known biomasses which are not commercially harvested to their full potential due to effects such as political issues and economic limitations. This report is based on the Spiny Lobster industry only.

Aquaculture

For the purpose of this document, 3 types of Aquaculture are referred to:

- **Propagated** - raised from egg / closed cycle aquaculture
- **Aquacultured/Farmed** - raised from one size to another / holding and fattening
- **Pounded** - caught from wild and held for a period of time long enough to require feeding

Lobster Types

Spiny Lobster

Non clawed lobster refer to ocean dwelling lobster includes species of Panulirus sp, Palinurus sp, Jasus sp, Pro-jasus sp. The shell is generally covered with thorny spines and bristles and is found throughout the world.

Clawed Lobster

Clawed Lobster refers to clawed ocean dwelling lobster including the species Homarus sp. The majority of commercially harvested Homarus species are found in the colder waters of the Atlantic Ocean occurring in the NE of North America and Western Europe. The two major types being H. Americanus and H. Gammarus.

Other Lobster

Other lobster shall includes all other lobster types clawed and non clawed such as slipper lobsters, squat lobsters, scampi's, deep water lobster, fresh water lobsters etc.

Aquaculture throughout the World

Propagated

Although the scientific achievement of laboratory propagation has been well published, the success in commercial propagation and rearing is yet to be achieved - although researchers are advising of a steady progression.

In Australia, the main species being examined with some level of success are P ornatus (Northern or Tropical Rock), Jasus edwardsi (Southern Rock) and Sagmariasus vereauxi (Eastern Rock). At the time of writing this report, there was minimal commercial investment being directed at the propagation of WRL and therefore the commercial viability is still in the future.

Aquacultured / Farmed

Unlike the long research and development path required to progress through the propagation process's, a variety of countries have moved directly to investing in the harvesting of wild juveniles for intensive aquaculture and rearing to commercially viable sizes.

Pueruli and post-Pueruli are relatively hardy marine animals – both for WRL and many other lobster species. They can be easily transported in insulated containers with battery-powered electric pumps aerating the water in much the same way that live fin-fish are presently being transported. This includes both domestic and export. Techniques of collection and transport are continuously improving, many of these improvements flowing on to the commercial sector researchers.

Given the ease of both transport and collection, it is relatively easy to understand why so many interested commercial parties (globally) have preferred to undertake aquaculture projects. Fishery managers prefer this approach as recent research into areas such as 'biological neutrality' and 'biological diversity' are more simply dealt with by the cautious harvesting of wild grown lobsters – juveniles/pueruli. Modeling from biological neutrality research suggests that the commercial fishery production has the potential to be enhanced significantly with minimal impacts on the biomass.

Vietnam

At present, Vietnam is the only recognized and commercially viable full scale spiny lobster aquaculture industry. Juvenile or post puerulus lobsters are caught predominantly by lamp fishing or using special collector devices. These devices enable the capture of sizes ranging from just a few grams and larger.

The aquaculture industry in Vietnam was known to have peaked in 2005 with approximately 4000mt of aquacultured lobster produced. It is thought that due to the effect of the unregulated collection of juveniles, the number of juveniles being caught is decreasing with each passing season. Today, the production yield is yet to move back over 2500mt.

To supplement Vietnamese aquaculture farm requirements (for juveniles), recent practices have seen ornate juveniles being collected from as far away as Bangladesh, Burma, Sri Lanka, and Indonesia. The legality of importation and the associated handling channels are currently unclear.

It was also noted that in 2006/2007, above normal mortality and disease rates were experienced in the Vietnamese lobster farming sector. This was largely attributed to a combination of weather changes and reduced tolerances following the aquaculture from younger juveniles / post puerulus.

During interviews, several Chinese buyers noted that in the past, quality issues i.e. inferior quality levels had been observed with Vietnamese aquacultured products.

Even though today Live Vietnamese origin Tropcial Lobster (p. ornatus) is discounted slightly over other origins of the same size, the product overall still commands a significantly higher average selling level year by year and has managed to find market space for as much as it can produce.

Other Countries

In India it is well understood that juvenile lobsters Panulirus Homarus under 50g can be easily grown to 200g+ in less than 6 months. Juvenile Panulirus Polaphygus can achieve growth to 100g in 3 months. However when considering the grow-out cost and ultimate market value of these lobsters compared to the Panulirus Ornatus species, there has still been to date a commercial deficiency in the viability of both these species for aquaculture. It is important to note that recent price improvements and deepening supply troughs however are bringing further evaluation.

Countries such as Indonesia that continue to harvest unregulated juvenile lobster (of all types) in large quantities often separate Panulirus Ornatus species for sale to local and foreign aquaculture farms. As mentioned, other specie juveniles that are mostly considered unviable for aquaculture continue to be exported in bulk to consumer markets either in live or frozen forms. It should be noted that there are a number of government funded projects in Vietnam and Indonesia looking at the improvement of the husbandry techniques, with a specific focus on nutrition and further studies on alternate or supplemental live aquacultured products (including other spiny and slipper lobster species).

Throughout the world there are many countries including Japan, Taiwan, China, Malaysia, Thailand, Vietnam, Singapore, India, Australia, New Zealand, South Africa and USA who are investing research time and money into the successful aquaculture of lobsters. These species include spiny and clawed types, fresh and salt water species as well as slipper types.

Pounding and General tank holding

It is common practice for the clawed Atlantic lobster to be pounded for long periods before being released into the market. Pounding of spiny lobster species has rarely occurred commercially for any great length of time (beyond 8-10 weeks) and usually are held for no longer than 2 weeks.

For the clawed Atlantic lobsters, there are no direct substitutes during poor catching conditions and there are increases in pricing for live or fresh supplies over that time. This has provided for a viable and reoccurring annual business model.

For spiny lobster species, product or substitute species have generally been available throughout all times of the year, with spiking demand periods occurring at fairly regular intervals. From discussions with interviewees, the benefits for holding spiny lobsters for more than 2 months have been inconsistent when considering improved returns against costs.

In Western Australia volumes of lobsters are often held into peak periods of improved returns such as Chinese New Year, Mothers Day, Christmas and New Year. Such holding conditions rarely have exceeded 6-8 weeks due to limited gains. Recently, the improvement in returns from holding product over has started to produce more significant gains as the supply troughs deepened. In the 2007/2008 season, lobsters held in WA from December and sold by end January or early February were noted to have obtained premiums of more than US$14-18/kg (5-6 weeks).

In New Zealand, sea-cage pounding of product caught during high catch periods also returned improvement by as much as US$20/kg. It has been suggested by various New Zealand producers that the

natural ocean environment provides the best and cheapest method for holding lobsters prior to peak demand (whereby quota is target caught for specific delivery periods).

There has been a steady increase in tanking strategies throughout the world, both for exporters and buyer distributors to take advantage of market demand forces. Unfortunately for some fisheries the supply troughs have been irregular and it has been difficult to find continuous high premiums. The WRL fishery is a good example for seasonal catch fluctuations across seasons with trough reductions, diminishing premiums and long term investment decisions being difficult to justify.

The capacities for efficient holding and quality maintenance are varied by species and country however with more regular and greater yields, this area of lobster production and processing is anticipated to see increased attention and investment in the future.

Lobster Types

Wild Caught Spiny Lobster

Of the spiny lobsters, there are generally three main types of genera that contribute to the main commercial productions. *They are Jasus* (cool-temperate shallow-water), *Palinurus* (deep-water) and *Panulirus* (shallow-water tropical or sub-tropical).

It is difficult to obtain precise information with regards to the total commercial wild caught spiny Lobster catches. In the year 2000, it was estimated that for all regulated and unregulated sectors, the global annual production was in the vicinity of 70,000mt - live weight.

General consensus is that commutative production of all wild catch sectors has either peaked or is falling. As the world's demand continues to grow for Lobster products, pressure on fisheries to continually perform to maximum yields are resulting in significant peaks and troughs. This is creating enormous benefits for some sectors and opening up more attention for exploitation for others.

Factors other than live storage capacity that impact on the peak production returns include;

- higher risks and market impacts of inventory (in terms of both market and FX)
- financing capacities and costs
- storage and maintenance costs
- limited production or processing capacities available (for either value added or standard production)

The recent phenomena experienced with the doubling of clawed lobster catch during the mid 1990's should serve as a pre-cautionary notice about the unstable nature of the world's marine environment.

COMMON SPECIES OF SPINY LOBSTERS					
Significant fishery and approx catch - 30 Year Snapshot					
				Estimate Catch MT (000 kgs)	Estimate Catch MT (000 kgs)
				1976	2006
				***est.**	***est.**
TROPICAL					
Panulirus	argus	Brazil, Florida, Bahamas, Caribbean, Cuba, Nicaraguan		22,800	38,000
	gracilus	Ecuador, Panama		270	400
	homarus	East Africa, Indonesia, Oman, Somalia, Philippines, India		400	5,000
	laevicauda	Brazil		3,000	2,500
	longipes	PNG, Australia, Asia, India, East Africa, Vietnam, Solomons			100
	ornatus	PNG, Australia, Asia, India, East Africa, Vietnam (Farmed), Sri Lanka		540	6,000
	penicillatus	Reunion, Pacific Is, Galapagos, Solomons, PNG, Philippines		400	1,500
	polyphagus	Pakistan, India, Thailand, Southeast Asia		3,700	4,000
	versicolor	Indonesia, Asia, East Africa, South Pacific			200
	regious	Maurtania, Western Sahara, Sierra Leone		450	800
			TOTAL	**31,560**	**58,500**
SUB-TROPICAL					
Sagmariasus	verreauxi	Eastern Australian, New Zealand		125	150
Palinurus	charlestoni	Cape Verde Islands		25	40
	delagoae	South East Africa		60	50
	mauritanicus	Mauritania, West Africa		150	200
Panulirus	cygnus	Western Australia		8,900	9,000
	inflatus	West Mexico, Guatemala		1,500	1,500
	interruptus	California		120	200
	japonicus	Japan, South China Sea, Taiwan, South Korea		1,200	900
	marginatus	Hawaii		10	
	pascuensis	Easter Island		5	50
	stimsoni	Hong Kong/China		10	50
			TOTAL	**12,105**	**12,140**
TEMPERATE					
Jasus	edwardsii	New Zealand, Southern and South East Australia		7,205	7,000
	frontalis	Juan Fernandez Island, Chile		50	150
	lalandii	South West Africa, Namibia		6,200	2,800
	paulensis	St Paul, New Amerstam Islands		900	450
	tristani	Tristan de Cunha		5	500
Palinurus	elephas	UK, France, Spain, Italy, Portugal, Morocco, Mediterranean		1,500	1,800
	glichristi	South Africa		970	1,000
			TOTAL	**16,830**	**13,700**
	TOTAL	**ALL SPINY (MAJOR COMMERCIAL AREAS)**		**60,495**	**84,340**
		WESTERN ROCK LOBSTER (p.cygnus)		**14.7%**	**10.7%**

**Significant commercial fishing only*

Western Rock Lobster

Characteristics

Western Rock Lobster as a species is recognized throughout the world as a premium Lobster product, both in terms of species characteristics and the industry quality standards from which it belongs.

Generally the well known characteristics are agreed upon by almost all markets. This includes:

Species Characteristics	Processing / Harvest Characteristics
Raw Shell Color	Well regarded hygiene standards
Cooked Shell Color	Large annual production volume
Premium Meat Flavour	Consistency of industry quality and pack standards
Premium Meat Texture	High production technology and capabilities
Excellent Freezing Quality	Frozen production only from LIVE landed product
Low Body / Tail Ratio	Premium Country of Origin
Generally low live mortality	Low use of chemicals and additives

Market Utilization

Perhaps one of the most significant co-incidental advantages that the Western Rock Lobster has are in the markets of Japan and Taiwan. The species is very similar to that of the locally caught species Panulirus Japonicus. To the average consumer the product is unrecognizably different particularly the darker red and coral red colors which have been commonly substituted throughout the previous Japanese markets as locally caught spiny lobster.

In addition, with the strengthening of the Japanese and Taiwanese economies and, the decline in local Japonicus production, the Western Rock Lobster has been easily substituted for and today is a significant part of cultural menu inclusions.

- Wedding menu's
- Restaurant menu's
- Celebratory buffets and menu's
- Osechi Packs (End year gift packs)

When interviewing Western Rock Lobster buyers the one most common difficulty citied (other than increasing prices) was the irregularity of supply, in terms of color, size or quantity. This was believed to be an issue both across one season to another or within any particular season.

Processing

Processors in Western Australia are presently entitled to manage their own Live Lobster supply capacity through the holding or pounding of live lobsters. This entitlement is permitted providing that the holding does not constitute the process of aquaculture (growth) ie. Where by sustained feeding is required.

Processors do however have some allowance for the limited feeding of mussels etc to maintain health during the holding period.

There is at present no legislation in place to restrict the out of season sale or "holding over" of live or frozen products by any licensed processor. Whilst WRL fishermen are entitled to hold lobsters on board or at land under restricted conditions during the season, they are however prohibited to hold any Live product under any circumstances or conditions 48 hours after the closure of the WRL season.

As at the time of writing this report, Western Rock Lobster puerulus and all other sizes and stages through to 76mm carapace length (approximate minimum 380g Whole Live Weight) are totally protected under the FRMA. Furthermore, both processors and fishermen are presently prohibited in actively rearing Western Rock Lobsters either from pre-legal or legally taken sizes.

Attributes and Comparisons

The attributes of the various lobster species are publicly disputed by fishermen, processors and buyers. Historically this is across a wide range of preferences and prejudices, and is measured against the specific requirements of each market. Each species and product type fitting a specific market requires balance across quality, price and known availability (production vs supply).

The following table details examples of various species to 'Western Rock Lobster', highlighting the complexity of the market demands;

Species and Origin	***Characteristic***	***Explanation***
Panulirus Ornatus (North Queensland)	**Positive** Painted / Colorful Stronger / easier to tank **Negative** Color/ variegation Texture / Freezing capacity Warmer water lobster	 Decorative / eaten raw as sashimi China buyers have greater confidence(less risk to hold) Whole cooked does not present well Frozen preservation is not as good Cooked taste is less appealing than WRL
Jasus Lalandi (South Africa – West Coast)	**Positive** Small sizes available Cold Water species and similar in appearance to southern rock lobsters **Negative** Weaker / long distance Large head to body ration	 Cheaper piece pricing enabling greater menu variation and pricing categories. Easier for substitution against the highest valued live species especially in colder climate regions eg Beijing Buyers have less confidence to tank China buyers have greater confidence (less risk to hold) Much lower tail (meat) yield compared to WA Lobster for all sizes.

WRL Markets

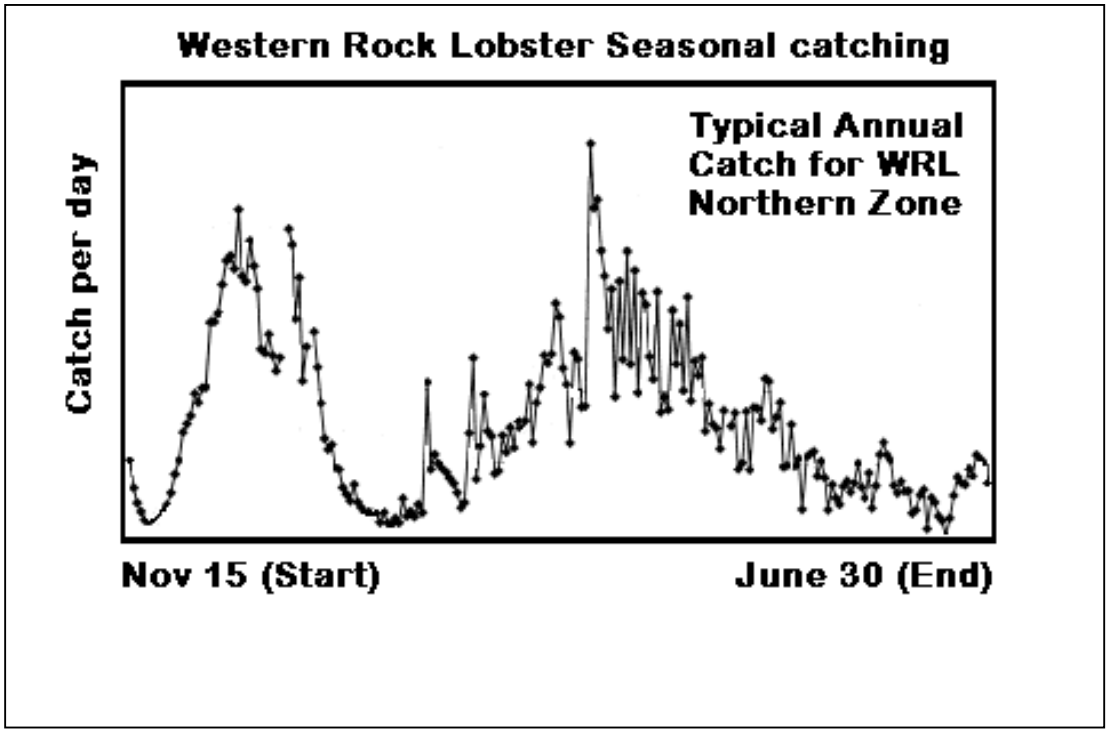
The five main markets for Western Rock Lobster across the world have varying requirements across all product types. The table below highlights the current WRL product for each region as well as the challenges met with these WRL products.

Market	Live Lobster	Frozen Whole Lobster	Lobster Tails
China	Fluctuating volumes Fluctuating prices Inconsistency of sizes Restricted Season Periodic high mortality rates	Limited market Heavy competition with frozen dead lobster (from live WRL shipments)	No Major market
Taiwan	Fluctuating volumes Fluctuating prices Inconsistency of sizes Restricted Season Periodic high mortality rates	Fluctuating volumes Fluctuation size U/600g availability Production is well before demand period	No Major market
Japan	Fluctuating volume Prices are getting too high for menu inclusion Inconsistency of red color availability Restricted Season Periodic high mortality rates	Fluctuating volumes Fluctuation size U/460g availability Production is well before demand period	Only a minor market Limited interest for red colour only
USA	No Major market	Limited Market..... Generally too expensive	The biggest market however inconsistency of supply from season to season has reduced long term buyer channels.
Europe	Mortality / too far from WA	Fluctuating volumes Inconsistency of red color Buyers unwilling to buy far enough ahead of demand (Production is well before demand period) Very few EU approved packers (in 2007/2008 only 2/4 packers were EU registered) Generally too	Only a minor market but with capacity for improvement..... Generally too expensive High import tariffs for Australian origin

	expensive High import tariffs for Australian origin	Very few EU approved packers (in 2007/2008 only 2/4 packers were EU registered)

The opportunity exists for the WRL industry to extend the seasonal catching periods to include months beyond the current seasonal timeframe. Consideration into implementing this change should be undertake, as this may result in a greater spread of production, alleviate buyer supply concerns and provide extended menu or distribution arrangements.

Western Rock Lobster Receival Graph



The graph details examples of the peaks and troughs over a full catching season.

Western Rock Lobster: Actual Catches and Future Predictions

Abrolhos Islands				Leeman North (Geraldton areas)				Leeman South (Fremantle areas)				
Season	Zone A Whites Nov-Jan (mt)	Zone A Reds Mar-June (mt)	Zone A Total Catch (mt)	Zone B Whites Nov-Jan (mt)	Zone B Reds Feb-June (mt)	Big Bank Feb 10+ (mt)	Zone B Total Catch (mt)	Zone C Whites Nov-Jan (mt)	Zone C Reds Feb-June (mt)	Zone C Total Catch (mt)	TOTAL CATCH (mt)	
1992/1993	No Catch	1670	1670	1861	1804	336	4001	3631	2968	6599	12270	Actual
1993/1994	No Catch	1622	1622	1506	1914	420	3840	2775	2749	5524	10986	Actual
1994/1995	No Catch	1703	1703	1624	1970	342	3936	2704	2449	5153	11134	Actual
1995/1996	No Catch	1900	1900	1563	1827	91	3481	2158	2245	4403	9875	Actual
1996/1997	No Catch	1789	1789	1615	1930	71	3616	1840	2656	4496	9972	Actual
1997/1998	No Catch	1792	1792	1528	1896	158	3582	2248	2856	5104	10636	Actual
1998/1999	No Catch	1945	1945	1734	2222	208	4164	2904	3970	6874	13191	Actual
1999/2000	No Catch	1714	1714	2012	2320	184	4516	3712	4491	8203	14617	Actual
2000/2001	No Catch	1673	1673	1650	1704	150	3504	3000	3089	6089	11416	Actual
2001/2002	No Catch	1634	1634	1111	1654	50	2815	1656	2861	4517	9016	Actual
2002/2003	No Catch	1713	1713	1423	1812	19	3254	2417	4002	6419	11386	Actual
2003/2004	No Catch	1884	1884	1666	1666	188	3520	4060	4100	8160	13564	Actual
2004/2005	No Catch	2188	2188	1523	1600	99	3222	3652	3000	6652	12062	Actual
2005/2006	No Catch	2076	2076	1401	1513	40	2954	2786	2510	5296	10326	Actual
2006/2007	No Catch	1987	1987	1382	1594	N/A	2976	1795	1825	3620	8583	Actual
2007/2008	No Catch	1850	1850	1400	1600	N/A	3000	2150	2250	4400	9250	*Est.
2008/2009	No Catch	1900	1900	1400	1750	N/A	3150	2150	2350	4500	9550	*Est.
2009/2010	No Catch	1750	1750	1250	1450	N/A	2700	2000	2000	4000	8450	*Est.
2010/2011	No Catch	1650	1650	1000	1450	N/A	2450	1450	1650	3100	7200	*Est.

Determining the Impact of Farmed Lobster on the Market for Western Rock Lobster

How an influx of lower quality aquaculture product could impact the demand for wild capture product?

There are varying levels of quality experienced with WRL. This spans across all product types including Live, Whole Frozen, Frozen Tails and other/value added. Over the past decade there has been up to 15 different licensed exporters producing WA lobster for both the international and domestic markets. During this period, providing minimum legislated hygiene and labeling requirements have been met, quality control has been the sole responsibility of the processor.

As a result, buyers and consumers have experienced a broad spectrum of quality levels, with ultimately the market dictating acceptability in terms of consumption and pricing.

Much of the quality differences are in areas such as

- specification control,
- production capacity,
- equipment capacity,
- natural product variances,
- naturally occurring problems (recent moults, coral spawning, oxygen levels, temperatures, moon phases etc.

General processing quality issues which could be observed from both Aquacultured and Wild Caught Lobster may include the following points. These can be deemed either as positive or negative to the industry.

Live

- Transit mortality
- Appendage loss
- Shell damage
- Size and color variations and grading
- Incorrect or overuse of additives
- Stress induced meat melting / cellular digestion.

Whole Frozen / Frozen Tails / Valued Added Frozen

- Freezing differences by process and storage
- Melanosis
- Appendage loss
- Shell damage
- Size and color variations and grading
- Packaging
- Incorrect or overuse of additives

Quality issues for Current Wild Caught WRL

General processing quality issues which could be observed from only Wild Caught Lobster may include the following points. These could be deemed as either positive or negative to the industry.

- Stresses or mortality due to water/ocean fouling including Coral Spawning, pollution, temperatures, salinity levels.
- Low meat yields or shells quality post moulting.
- Natural predation of all sizes from phyllosoma juvenile/adult e.g. seals, octopus and fish etc of potted lobsters.
- Stresses or morality due to current catch and processing handling techniques.

Quality issues for Aquacultured Lobster

General processing quality issues which could be observed from only Aquacultured Lobster may include the following points. These could be deemed as either positive or negative to the industry.

- Differing standard of taste – through feed
- Differing flesh characteristics – through feed or handling
- Shell coloring – opportunity to improve
- Disease
- Fungal Infections, although wild caught populations have at times found natural high prevalence
- Tail fan necrosis possible from extended holding
- Forced moults
- Physiology / Shape / Meat Recovery
- Shelf Life / holding mortality

The causes for the above could be attributed to stresses from other less natural events and environments.

- High stocking density
- Unsuitable or inadequate feeds
- Changes in Water quality
- Fluctuating or Incorrect Temperatures
- Cannibalism

It is important to have an understanding of how the quality of Aquacultured Lobster species from other regions would compare with the wild caught product of the same species.

Commercial propagation does not presently exist in Western Australia. However in the case of Vietnamese Farmed Tropical Lobster (Panulirus ornatus) where husbandry techniques are extremely unsophisticated, two recognizable characteristics are becoming entrenched into the market.

- Enhanced cheek growth
- Less preferred/notable change in taste

Although wholesalers or importers recognize these differences, retailers and consumers are generally unaware.

Limited premiums are now being paid for Wild Product over farmed products in terms of origin. Examples of this include North Australia and Indonesia Wild Caught vs Vietnam Aquacultured.

Commonly pounded but not yet aquacultured species from Mexico, New Zealand, Southern Australia, and South East Asia are well known in the market for suitable holding and transporting. Pounding may occur either post or pre-export and is usually for no period longer than 10 weeks.

Summary

The perception of the market as to quality and appearance was divided quite simply by those with lobster aquaculture buying experience and those without. Every experienced buyer of aquacultured lobster noted recognizable differences in the product compared with wild caught however those buyers without exposure to aquacultured products expected only minor or negligible differences.

Concerns raised:

- Reduction in customer perception of WRL could result in a lower demand and pricing for Wild Caught products.
- An increase in demand and pricing for high quality wild caught products whilst adding supply pressure to the lower quality wild caught products.

Providing the following controls are implemented to a high level, it is suggested that processed aquacultured lobster product from Western Australia would achieve a generally high level of quality.

- Structured and planned processing;
- By specification, timing and quantity
- Defined quality standards
- Demonstrated code of practices.

Note: Currently there are no minimum industry quality standards for wild caught WRL.

How marketing aquaculture lobster at smaller sizes could impact the wild capture sector;

Today, lobsters smaller than the WA minimum commercially wild caught size are being sold throughout the world in significant quantities and in a broad range of product types. These are produced from many nations and are estimated to comprise of approximately 40% of the total global lobster commercial production.

Throughout the world, lobsters are produced ranging in sizes from approximately 25g through to 5kg. Depending on the specific attributes of the lobster, small lobsters may be processed to a range of production types in general the most valuable type is Live.

Production Types

- Live
- Whole Cooked and Whole Raw Frozen
- Whole Cooked Fresh
- Frozen Raw and Cooked Tails
- Lobster Cooked medallions
- Raw and Cooked Lobster Meat (Body and Tail)
- Raw and Cooked Lobster Heads
- Lobster Sauce
- Lobster Meat
- Canned Lobster
- Special processing e.g. Split or Split and Clean
- Further processed e.g. Thermidor ready
- Special quality forms e.g. Sashimi grade etc
- Special Freezing Forms e.g., Liquid Nitrogen, Blast, Brine, other

High Profile Lobster Producing Nations

There are many countries currently producing lobsters 'smaller' than the present commercially wild caught WRL, these include:

- Indonesia
- India and Sri Lanka
- Burma
- Bangladesh
- South Africa
- Namibia
- Tristan / St Helens / St Paul's
- Madagascar
- Oman
- Yemen
- Morocco, Western Sahara, Mauritania, Sierra Leone
- Philippines
- Japan
- Indonesia
- India
- Burma

In researching the possibility of buyers adapting their preferences to include smaller sized aquacultured WRL (presently unavailable), buyers expressed their general interest and enthusiasm but with the belief of likely lower pricing. Japan was an exception as further discussion highlighted possible premiums.

- ***Appendix B – Examples of Fisheries Commercially Producing 'Small' Spiny Lobster***

Regulations and Restrictions

Recently, there have been moves in particular markets to restrict the sale or collection of small sizes. This is either as a result of legislation, regulations or some form of quarantine controls.

Quarantine

Foreign live lobster products are presently prohibited from entry into Australian or New Zealand markets, however they are generally unrestricted into most other major lobster consuming markets. There are no restrictions for the importation of frozen foreign lobster into Australia or New Zealand.

Regulative

Specific markets require certain levels of accreditation and auditing, such as FDA and HACCP registration for the USA, European registration and other traceability certifications. Those certifications however rarely make reference to minimum size requirements.

In order to promote Lobster aquaculture, Taiwanese import duties apply only to Live lobster over 100g, but equally to all frozen products.

Legislative

A range of countries throughout the world have decided to restrict minimum catch sizes, however in some countries such as the USA, the ruling pertains to a species type rather than as a country or area or origin.

In the US market the Panulirus Argus species must be 3 inch in length of carapace or 5 ½ inch as a tail. Other markets such as Bermuda have an even greater size limit for Panulirus Argus. The legislation in Cuba protects it's resource by making it illegal to be in possession of any Panulirus Argus product without appropriate documentation proving how, where, when and from who it was obtained.

The US also firmly enforces its LACEY ACT whereby contravention of foreign fishing regulations is punishable within the US. Over recent years, specific to the lobster industry, there have been well publicized convictions in the USA, for Caribbean and South Africa breaches of minimum size regulations and exceeding foreign TAC's.

Current producing nations of Panulirus Argus are meeting to investigate the implementation of CITES arrangements across all lobster fisheries to encourage sustainable harvest strategies and reduce illegal market and catching activities.

In Western Australia, legislation presently prohibits the capture or holding of WRL with a carapace length of less than 76mm. It is however not illegal to possess a similar looking Panulirus Japonicus or Panulirus Longipes of any smaller size.

Other restrictions for WRL involve quantity, sex, setose, tar spot, egg baring or even seasonal restrictions.

A clear demonstration of the variety of origins that are already exporting to one of the largest WRL markets, Japan can be seen by the charts documented in

- ***Appendix C : Japanese Import statistics for 2006 and 2007 for both Live and Frozen Spiny Lobster.***
-

Changing Market Trends

Currently throughout the world, smaller sized lobsters are used in a wide range of menu options based on the needs for;

- Presentation / decoration
- Taste
- Unit pricing
- Portion serving
- Method of delivery
- Reliability
- Availability

Below are two examples of foreign market trends:

Japan

The Japanese market was once renowned for being the highest paying market for any West Australian lobster product. Although many other countries are purchasing West Australian lobster products, this market still has the capacity for premium commodity pricing and niche opportunities specifically for smaller WRL.

Society

Social trends have made convenience a major factor in Japanese consumer's food purchases. More women are pursuing career opportunities, marrying later and having fewer children. The number of unmarried men has also risen. Meanwhile, the percentage of Japan's senior citizens is increasing due to the country having one of the longest life expectancies in the world. There is also a decrease in the birth rate.

In general the citizens in these demographic groups have less time or energy to cook for themselves. Consequently the growth in pre-prepared products and eating out is increasing at a rapid pace.

Health and Safety

Despite changes in purchasing habits, Japanese consumers are showing more concerns for food safety. This is often associated with product origins rather than production differences such as farmed or wild caught. Highly regarded producing countries such as Australia continue to be well positioned to achieve premiums into the future.

Value for Money

With a decade or more of deregulation, internationalization and a prolonged economic recession, Japanese consumers continue to seek quality food products at more reasonable prices without necessarily compromising on quality. Prior to the year 2000 it could be said that unlike other markets in the world, the Japanese were the most discriminating in terms of quality. Generally, they would not purchase poor quality products no matter how low it was priced.

Today, in terms of lobster, wholesalers and importers are well versed in obtaining cheaper or poorer quality products from a variety of origins in order to meet their pricing targets. There are still minimum standards in terms of health parameters however the products are often re-packaged or re-worked in either Japan or a 3rd country processing site in order to facilitate their acceptance in the market.

Tradition and Substitution

Whilst Western style dining and cooking are entrenched into modern Japanese food culture, lobster continues to play a significant role in menu creation. Although the species, size, color and type are being continually revisited with more variations and substitutions gaining acceptance every year.

China

China's live market demand and appetite for spiny lobster has exploded over the last five years. Small lobster - 50g to 200g are delivered daily to the Chinese market with the majority sourced from South East Asian suppliers. Recent demand has seen more requests for frozen lobster to Northern cities, with both Beijing and Shanghai now regularly purchasing containers of foreign whole raw lobster.

Society

With China's booming economy, the percentage of middle class Chinese is increasing along with the growth in number of double income families. More emphasis is being shown to special occasions as a time to reward for hard work. Restaurants are also seeing an increase in customers from sectors not previously seen.

Health and Safety

With the bird flu scare in early 2000's and the recent publicity of poor aquaculture practices in the southern prawn farms, many consumers are now willing to pay higher prices for Live and fresh wild caught products. There is a distinct trend for fresher safer food resulting in the development of better frozen food Cold Chains. These are particularly in the North. Prices for live lobster have increased substantially and frozen lobsters are now increasing in numbers and demand.

Value for money

The increase in demand from the Chinese market for live lobsters has raised two areas of concern;

1. The mortality rate on arrival has increased due to poorer quality, stemming from producers attempting to maximize more of their production to live. These mortalities are generally processed to frozen after arrival or sold as fresh (dead). This has reduced the demand for, and perception of, frozen product particularly whole raw into the southern cities.

2. Fluctuations in market prices is more evident with the increase in supply of poorer quality live lobster. Prices vary extensively between peak and lower demand periods.

Tradition and Substitution

Live lobster is being substituted with frozen raw lobster in increasing volumes. However as markets increase other seafood products such as crabs and larger shrimp are also becoming viable substitutes. Other species such as Thenius Orientalis and live spanner crabs and live dungeness crab is also increasing. Additionally, American Homard lobster consumption is also starting to develop.

Substitution from Foreign Wild Caught Lobster

From general market feedback, it is recognized that smaller foreign wild caught lobster is already used as a substitution for WRL. The key reasons behind possible substitution varies with each market :

General overview on Key Markets for WRL include ;

Country	**Japan**
Main WRL size	360-500g (preference 360/460)
Product Types	Almost all product types, with greatest preference for value added product.
Comments	2nd Biggest market for WRL Whole Frozen, 3rd largest market for WRL Live, Biggest buyer of small sizes. To better understand Japan, it would seem that an understanding of the reason behind the initial success of the WA Lobster in Japan is the similarity in appearance between *Panulirus Japonicus* and *Panulirus Cygnus*. Japanese domestic Lobster production. ***Also refer to Appendix C: Japanese Import statistics for 2006 and 2007 for both Live and Frozen Spiny Lobster.***
Main Substitution	A wide variety lobster species except ornatus and green colored lobster There is a preference to purchase red colors and smaller sizes. When not available, buyers often have no other choice than to purchase alternative product such as pink WRL colors and/or red color other species. With fixed menu costs, the market has been forced to substitute WRL with smaller sizes for foreign species.

Country	**China**
Main WRL size	360+ (All sizes)
Product Types	Mainly Live, some small qty of Whole Frozen Raw
Comments	Biggest market for Live WRL and growing. No premiums or discounts for shell colors
Main Substitution	Largely interchangeable for any species, depending on price and mortality/strength. Smaller sizes are generally less interchangeable.

Country	**Taiwan**
Main WRL size	360-600g
Product Types	Almost all product types except lobster tails, mainly whole frozen.
Comments	Biggest market for WRL Whole Frozen, 3rd largest market for WRL Live
Main Substitution	Mexico, Vietnam, India, Indonesia and Middle East. Generally only interchangeable by similar size. Smaller sizes occupy separate market sector to WRL, and are generally discounted either live or frozen

Country	**Europe**
Main sizes	460g-1kg
Product Types	Mainly Whole Frozen and Lobster Tails, with increasing value added product.

Comments	3rd largest whole frozen export market, 2nd biggest Tail market, generally too far to buy any quantity of Live WRL. Biggest buyer of Cooked chilled Lobster (although not a huge quantity in total)
Main Substitution	All Lobsters are generally substitutable however the market for smaller sizes is limited. There is a limited market only for the higher priced WRL.

Country	**USA**
Main WRL size	360g+ (from all whole size)
Product Types	Mainly lobster tails, small quantity of value added and whole frozen.
Comments	Biggest lobster tail market for WRL and all other species, premiums paid for large sizes.
Main Substitution	Mainly substitutable with other cold water or Australian origin tropical lobster. Generally sold at higher end restaurants.

Country	**Australia**
Main WRL size	360-700g
Product Types	Almost all product types however limited live quantity. Preference for whole cooked.
Comments	2nd biggest market for WRL Whole Frozen. Main consumption as Whole Cooked with significant sales for the smaller sizes targeted through Supermarket chains with sales volumes significantly influenced by piece pricing. Main targets supermarkets : 360/460g, Main Food Service targets 460/600g
Main Substitution	Cuban, Florida and Indonesia and tropical North Australian with lower, WRL become less interchangeable – all sizes (smaller and larger)

- ***Appendix D depicts an 8 Year Price Indicator of Substitute Lobster Species within the Japanese Wholesale Market***

Throughout world markets, smaller foreign Wild Caught lobster is being substituted for WRL. This is at varying degrees. The key factors for substitution to other smaller species are mostly being recognized in Japan, these include:

- More competitive piece or per kg pricing
- Product availability
- Product consistency

Other factors which impact on the decision making processes for suitable or comparable substitution include

- Color,
- Taste,
- Price,
- Product Type
- Health and Safety

Possible Positive impacts of smaller sized WRL substitution

- Retention of WRL wild caught premium markets during periods of low season catches
- Growth of WRL markets through supply stablisation.
- Increased global exposure of WRL, regardless of whether the product is aquacultured or wild caught.

Possible Negative impacts of smaller sized WRL substitution

- Downward or restrictive demand price pressure on lower demand product types wild caught WRL.
- Menu changes reducing some market sector demand for larger WRL wild caught products

Summary

Through this investigation it has been identified that there is already an existing market for small lobster. This market is not currently accessed by WRL.

The pre-existing market for smaller sized lobster is currently being supplied by a wide variety of foreign species. The impacts to the markets would be directed to these less favoured foreign species as WRL is considered, in the most place, a premium species. This was most evident in Japan, where interviewees commented on their preference for WRL and likely negative implications for existing major foreign producers such as South Africa, Indonesia and India etc.

How countries currently supplying world markets with aquaculture rock lobster could impact adversely on the WA wild capture fishery;

Although there is increasing investment and attention by industry for aquaculture and pounding, today the Vietnamese Lobster Fishery is the only recognized commercially viable aquaculture fishery.

Aquacultured Lobster development is now well entrenched within the Vietnamese market. Aside from the questions over sustainable harvesting and environmentally sensitive husbandry, the industry is thriving. New market opportunities are opening and proving successful.

During the early stages of aquacultured lobster development in Vietnam, the industry raised concerns regarding the impact on wild caught lobster. In particularly, the Live Lobster industry of North Queensland and Torres strait of which Vietnam was developing lobster of the very same size and species. Today, it is apparent that there has been very little negative impact on the wild caught sector with the market experiencing unprecedented growth in net returns and market demand even during periods of unseasonally high productions.

In researching current sales of aquaculture lobster products, the only species and origin commercially sold and commented on was that of Vietnamese Tropical lobsters (Panulirus ornatus).

85-95% of all lobster farmed in Vietnam was reported to be produced and exported as Live as the highest yielding product form. The majority of this product being targeted to Hong Kong/China markets with most sizes exported being between 600g to 1.5kg. There are still some small quantities of 100-200g sizes being sold in combination, but are not targeted for specific production.

5-15% of all lobster farmed in Vietnam was reported to be produced to whole raw frozen or frozen raw tails. These are the lowest yielding product forms, produced either upon live quality grading or during times of large scale mortality or production stress. Frozen products were being both consumed domestically and exported, with the majority of tailed product being sold in markets such as Japan, Korea or USA. Tail sizes ranged from 2oz to 30oz with the majority evenly spread from 10oz to 20oz.

The general consensus of buyers of Vietnamese Aquacultured lobster is that the production is stable or falling.

Summary

Even though very few markets have seen aquacultured lobster, there was indeed a general interest shown from the majority of buyers indicating their open mindedness about future procurements opportunities, across all specie types.

It was generally considered across all markets that aquaculture lobster products would not be able to achieve price premiums over the same size and color of its own wild caught type in the commodity market environment.

In most cases buyers expected to see pricing discounts for aquaculture production against wild caught options of the same species. There were differing views when considering niche opportunities which considered possible premiums in valued added production, such as Japan.

Recent evidence of frozen Vietnamese lobster tails exported to the USA was noted. Although, it wasn't until further product examination and discussions on product origin was held, that the buyer became aware that the product was from aquaculture operations.

Today, world markets with aquacultured rock lobster are impacting adversely on the larger sizes of the WA wild capture fishery (400g+). In saying this, the impact effects only the WRL Live markets specifically the Chinese and Taiwanese markets. It is also evident that a percentage of both the Chinese and Taiwanese markets prefer the tropical ornatus species over WRL. The reasons given were:

- Presentation – colour
- Firmness of meat for sashimi
- Stronger tanking holding capacity

It was noted that the cost of Juvenile collection, production and transportation generally limits the sale of commercially viable Vietnamese aquacultured (under 400g) smaller sized lobster.

How the timing into the market of aquacultured WRL could impact the WRL wild capture fishery;

The WA commercial industry has produced an average of approximately 10,000mt of WRL per annum for the past 10-20 years. Commercial production has focused on the majority commodity types of;

- Lobster Tails
- Whole Frozen
- Live

Considering these main 4 production types, the impact of aquacultured product entry timing would vary. Although it is expected that the main focus of aquaculture would be to target the premium production item of live, where possible premiums could be obtained during wild capture production troughs. The possibility of aquacultured lobster being supplied during these troughs might reduce the benefits of wild caught WRL however this is unlikely to be the case if the aquacultured product is of a different size e.g. smaller than 300g.

- ***Appendix E details the Reported Commercial Production of Western Rock Lobster 1999 - 2000***

Lobster Tails

Generally raw lobster tails are produced over the entire wild capture season with a larger % usually correlating with peak landing periods, production capacity and/or the lack of other premium product type demands. Lobster Tail production is also often a finance tool used during heavy production periods for obtaining pre-sales advances.

Although other markets such as Japan and Europe are tail buyers, the majority of WA Lobster tails have been sold into the US market and often under consignment arrangements. Product is generally released to the market as required, however given the often significant finance cost and risk associated, packers have shown a varied approach to marketing.

Whole Frozen Lobster

Wild Caught whole frozen WRL lobster is generally produced over most of the season and as with lobster tails, the biggest production usually correlates to major catch periods. The large majority of Whole frozen is processed from 380-570g sizes, with only limited quantities produced as larger sizes.

Generally speaking the highest seasonally valued Whole Frozen product has been Whole Cooked RED A (U/460g), and is almost entirely sold into Japan. During general product shortages this premium commodity product has been known to substitute to most other markets.

The major markets for whole frozen WRL in order of consumption are ;

- Taiwan
- Australia
- Japan
- Europe
- Other Miscellaneous Markets.

Major frozen consumption periods vary from market to market and are often well after or well before production peaks.

In seasons of extra large production or at times of lower market demands, the economic pressures and risks of the storage and holding of large quantities of whole frozen stock will often impact with downward pressure on other production items such as Live or Frozen Tails whereby faster payment or advance systems are available.

Inversely during times of market shortages & positive forecast demand, whole frozen production strategies may underpin minimum sell levels for those other product items.

In general, there has been a long history of major importers and distributors buying adequate volumes during the wild capture season in preparation for their full annual demand. Many of these frozen buyers when interviewed did not forecast the need for an alteration in their buying habits other than to consider and adapt to the changes in overall supply (for target sizes).

For significantly smaller sizes (U/300g) ;

- Minimal negative impacts are forecast on the wild caught WRL markets
- Possible broadening of the overall WRL market through increased size range

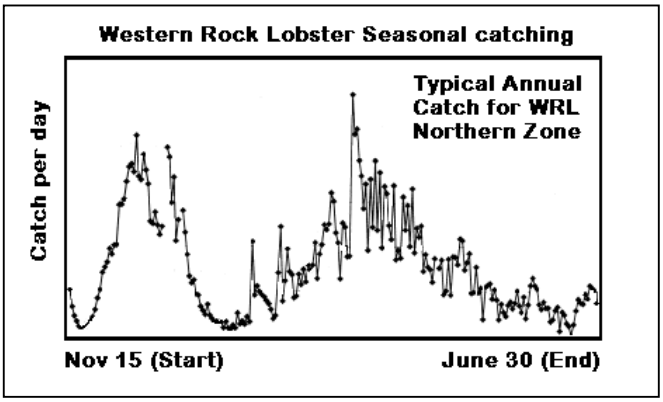
The other sizes (300g+) ;

- Increase in supply of premium sizes & colours adding support & stability to the market were considered positive to the buyer but potentially with some short term downward pricing pressure for the exporter.
- Possible substitution in some markets to allow for continued WRL supply whereby buyers are unwilling to buy frozen products so far ahead of main consumption periods (impacting on attractiveness of out of season competing species). Markets with the highest rates of finance costs such as Europe & Australia were noted to be the most likely influenced by this position.

Value added Whole frozen products are produced as a premium to the commodity forms and are similarly targeted for production during times of higher supply and lower live demand.

Live Lobster

Currently the wild caught WRL is caught in peaks and troughs, this is best demonstrated in the following graph of a typical seasonal catch (for the northern zone of the fishery).



The main peak demand periods that are a available for Wild Caught WRL Live production into the major markets are:

Late December	–	Japanese end of year Christmas New Year in Australia and Europe.
January / Feb (early)	–	Chinese New Year (China /Taiwan),
April (end) / May	–	National day in China / Hong Kong / Taiwan Mothers day – all markets Golden weak – Japan
May / June / early July	–	Traditional wedding period (all Northern hemisphere markets)

Currently the timing of wild caught WRL landings are not entirely in line with the peak demand periods of the market to optimize higher returns from live product sales. Exporters are forced to hold lobster from peak catch periods such as December catch to optimize their returns in the high demand period of January / February (CNY).

Again it would entirely depend on the size of the Aquaculture WRL supplied to the markets at each appropriate peak period. For example from late December to early January there is high demand for small size under 450g lobster however the demand in late January to early February is for the larger 500g + size

However there are significant other demand periods that the current wild caught WRL does not currently supply volumes of product to that Aquaculture. WRL could take full advantage of no matter what size is produced. These include

Late July / August	- lead up to the ghost month (august lunar month)
August/ September	- Mid Autumn festival (moon festival)
October	- Taiwan festival 10th day of 10th month

Summary

Essentially, it was thought by all interviewees that Aquacultured WRL would predominantly be based on maximization of returns through the sales of premium product types during times on peak demand.

This generally meant a very limited % of frozen production other than where niche product forms, sizes or colours provided better returns than live. Any production to commodity production items would be minimal and considered of insignificant impact.

Smaller sizes were generally perceived to have nil or minimal impact on the larger wild caught sector regardless of when available and in what form.

With the commercial wild catch season of only 32 weeks, the opportunity for WRL aquaculture to focus on live or fresh supply during the off season was quite obviously forecast to have minimal negative impacts on the wild caught WRL sector.

With adequate infrastructure in place to hold for long periods, supply of similar sized aquacultured WRL during the peak wild season seems highly unlikely, given the likelihood of uncompetitive pricing. Inversely supply during wild catch troughs and high demand was considered the most probable with the option to expand into competitive wild catch periods only likely to occur upon market expansion and continued premium pricing.

Whilst the generally agreed pursuit of general profit maximization should control the flow of Aquaculture supply to periods of low wild capture supply and high market demand, the ability for private operators to act either uncompetitive or unprofitably would always exist.

In this regards, considerations of cash flow, market access and holding capacity strategies are beyond the scope of this documents consideration. Other issues which may encourage the unprofitable supply could be linked to quality issues or a wide range of financial limitations and or risk management strategies.

How the export of Pueruli could be harmful to the wild capture fishery?

Present laws prohibit the catching, holding, export or interstate transfer of undersized lobsters from Western Australia. Before allowing the export of small juvenile lobsters to foreign countries for aquaculture, it is important to understand the potential for the loss of control over;

- Pricing
- Supply
- Quality

Pricing

Foreign country aquaculture has the capacity to be significantly more competitive than that from Western Australia. Cost advantages might include:

- Lower cost of production (feed & labour costs)
- Lower environmental compliance
- Improve mortality cost due to proximity
- Lower transit costs to market due to proximity
- Reduced duty / importation costs due to proximity
- Improved FX positions. Eg Vietnam

Supply

Whilst propagation has not been commercially achieved, aquaculture input supply controls may be possible by the limitation of Pueruli harvest licensing.

Aquaculture output supply would be more difficult to control in foreign situations. Such issues of concern would be:

- No control over output size
- No control over market destination

Quality

Quality differentials resulting from foreign aquaculture of WRL might considerably alter market perceptions and impact on the pricing capacity of the wild caught WRL sector.

- Live Lobster differentials as with Vietnamese history are likely to be comparable with only minor quality variations and associated pricing impacts.

- Frozen production which although may not be the target product may have the capacity to significantly influence premium frozen markets of the wild caught WRL, where it is the product of dead or weak lobster

This might be compared with the current frozen supply from Vietnam, which is currently being sold in small quantities to the major markets of Japan, Taiwan and USA at significant discounts.

The markets have experience in receiving low quality frozen tropical lobster products from similar origins. However with a non traditional supply of WRL from these similar origins, the markets are unlikely to be aware of its aquacultured origin and may have a possible negative impact on the perception of the wild caught WRL.

It is important to note that at present, there are no minimum industry quality standards existing in the WRL production sector and similar quality perception influences may still be major factors even with domestic aquaculture production.

Summary

Throughout the variety of buyer interviews, outside of the experienced Live aquaculture buyers of China, very few interviewees in any of the major markets understood or expected to see any substantial differences in quality over WRL aquaculture vs wild caught production.

Whether by subcontract aquaculture arrangements or outright sales, whilst the argument for foreign WRL aquaculture may still hold weight for improved beach returns (for harvested juveniles), the potential for a negative impact on both the WRL wild capture fishery and any established domestic WRL aquaculture fishery could be substantial.

How increasing global demand could reduce the impacts of aquaculture rock lobster on the wild capture fishery;

When considering the global supply of lobsters from all wild capture fisheries, the majority consensus was that production had peaked and was likely now in decline or at best stable. This consensus carried right across all major lobster buying nations from tropical / warm lobster species through to the cold water types. Examples of the recent declines in West Australian, Cuban & Brazilian lobster productions were put forward as evidence.

Where there may be an increase in the global lobster demand, the opportunity for sale into premium markets is limited by a finite and seasonally variable wild caught supply. This does not always allow for the maximization to premium product types – such as live lobster.

Where demands have improved, the market has become highly sensitive and is most obvious during periods of high demand and low supply. However quantifying any specific increases in the global lobster market remains difficult.

Major foreign buyers and producers were interviewed as to their own market place outlook. The China market is intensifying. Comparisons of Live WRL prices into Hong Kong/China during the lead up to the Chinese New Year in 2007 versus the same period in 2008 noted improvements of around US$10/kg with even greater increases noted for other species.

- Chinese New Year 2007 / US$40/kg CFR (approximate WRL market peak)
- Chinese New Year 2008 / US$50/kg CFR (approximate WRL market peak)

The reduction in demand for Live & frozen WRL products into the other major markets of Japan, Taiwan & USA however has been considerable, which has been assisted by the continued reduction in annual production of wild caught WRL. An example of the annual sales into the Japanese market for live WRL can been seen below:

Export Comparisons of LIVE ONLY Western Rock Lobster sales into JAPAN for MARCH

March	Exported Quantity All Markets – Live WRL (approx. kg)	Exported Quantity Japan – Live WRL (approx. kg)	Exported Proportion Japan – Live WRL (approx %)	Average CFR price for Live WRL (JPY per kg)
2006	470000	115000	24.5%	3850
2007	340000	75000	22.1%	4400
2008	300000	60000	20.0%	4250

Summary

The consensus of interviewees was that global lobster growth capacity relies heavily on the continuing expansion of the Chinese demand. Whilst this does not necessarily

mean that China will be the key buyer for aquacultured WRL, it should continue to absorb an even greater percentage of competitor lobster products. This may result in flow-on benefits to other markets (both frozen & live).

Increased global demand could offset impacts of larger size aquacultured WRL by the softening of supply troughs and annual production variations.

Peaks and troughs from the limited wild capture WRL 380g+ sizes are expected to see the continued exaggeration of live pricing differentials regardless of smaller aquacultured WRL. For the smaller wild caught South African, Indonesian & Philippine live sector, the impacts may be more extensive.

WRL frozen markets may ultimately be impacted by a knock-on effect caused by an increased frozen supply of smaller foreign production items (once sold as live), but this is only speculation about the short term.

Ultimately, increases in demands should be reflected in improved average prices throughout global lobster markets. An increased market capacity for all sizes should allow for higher costs of production for the wild capture sector and the viable establishment of a mostly non competing aquaculture sector.

At the time of writing this report, the Chinese market was the single most important element in the fruition of this improving global demand forecast and should be carefully noted by risk managers.

Buyer interviews noted the following market trends with specific regard to WRL;

USA	Falling Demand & Price destabilization for frozen WRL, no live market
Japan	Falling Demand & Price destabilization for frozen & live WRL
Taiwan	Falling Demand & Price destabilization for frozen & live WRL
Europe	Stable & reasonably strong, shortages from traditional wild catch sources
Mid East	Growing for all products, still insignificant in comparison to main markets
Australia	Increasing demand, booming economy and cheaper A$ export pricing equivalents
China	Rapidly increasing market capacity, still predominantly focused on live supply but improving for frozen options. The major buyer of Vietnamese Aquaculture Lobster product (estimated at 90%+).

How strengthening exchange rates adversely impact on the wild capture fishery in the face of increasing supply through aquaculture ;

Historically the vast majority of lobsters sold internationally have been sold in US currency (with a few exceptions), however more lobster producing nations have begun to limit their exposure by contracting in more stable currencies such as the EURO.

Cuba, the world's 2nd largest producer of Whole Frozen Spiny Lobster has recently converted all sales into EURO, whether they sell to Japan, Taiwan, Australia or Europe. South African and & Namibian lobster exporters are now negotiating & contracting almost every frozen product in either EURO or JPY.

Although WRL lobsters are exported and sold generally in USD, EURO or JPY currencies, it is ultimately the capacity of the buyer to exchange that currency that determines the affordability and the competitive position against other origins and products.

WRL exporters are working to mitigate their own positions of exposure between buying on the beach (to fishermen) in Australian dollars and selling in foreign currencies. Without fixing significant long term currency value contracts, the conversions of a strengthening Australian dollar continues to reduce the final sales returns back to the industry. Obviously, this also works in reverse.

With the strengthening of the Australian dollar, the Australian domestic market has increased consumption of WRL considerably. Local origin is being more favored at lower prices, over foreign imports (regardless of the pricing gaps).

This was commented on by major lobster importers which during lower Australian currency value periods (when WRL was worth significantly more AUD$) had previously found buyers focusing on 'value for money' and targeting foreign imports that were within even just a few dollars.

The following tables, show the export of whole cooked lobster sold at US$29.50 would have to have been sold domestically at AU$38.00 in 2006, where in 2008 for the same, US$29.50 it would be sold at AU$31.00.

Date	Australian Wholesale Prices (Whole Frozen)	US equivalent	AUD/USD	USD/EUR	USD/TWD	USD/JPY
15-Dec-06	AUD$36.00-38.00	US$28.17 – $29.74	0.7825	0.7637	32.58	117.825
15-Dec-07	AUD$32.00-33.00	US$27.58 – $28.45	0.8620	0.6933	32.36	113.275
19-May-08	AUD$31.00-32.00	US$29.56 – $30.51	0.9537	0.6414	30.54	104.041

When considering export markets, recent foreign exchange movements specifically against the USD, which is Australia's main trading currency for Lobster products, Australia is noting an increasingly worse position. This is not the case for some of WRL key frozen and live competitors.

EXAMPLE: Australian Dollar vs South African Rand (A Major Frozen Competitor – wild caught)

Date	AUD/USD	% Difference	USD/ZAR	% Difference	% Net Difference
15-Dec-06	0.7825		6.9850		
15-Dec-07	0.8620		6.8745		
19-May-08	0.9537	21.90%	7.4769	-7.00%	29.9% (against AUD)

In specific relation to the supply competition from foreign aquaculture, the impacts of FX movements against the USD from Vietnam have been negligible. WRL has seen more than a 20% loss since 15 Dec 2006 being 22.4% worse off than Vietnam when considering USD sales returns. In such a situation, the improving competitive position of the Vietnamese product is essentially fuelling continued business support & investment.

EXAMPLE: Australian Dollar vs Vietnamese Dong (Major Live Competitor – Aquaculture)

Date	AUD/USD	% Difference	USD/VND	% Difference	% Net Difference
15-Dec-06	0.7825		16.077		
15-Dec-07	0.8620		16,104		
19-May-08	0.9537	21.90%	16.165	-0.50%	22.4%(against AUD)

Source : www.xe.com

How promotion of substitutes (e.g. southern rock lobster) into niche markets could leave the WRL wild capture sector more exposed to the effects of increased supply of aquaculture rock lobster.

Niche markets are those channels which may or may not be emerging new markets, but consume production outside the traditional channels. Often these channels can be alternate markets for standard commodity type products or perhaps even new consumer groups taking valued added products and exploring new ways of consumption or use.

Over the past decade, the WRL industry has progressed with significant advances in niche market developments, as have a number of other producer nations.

Recent Commodity Product Niche Channel examples

- Live spiny lobster into USA
- Whole Frozen to USA
- Online shopping / consumer direct channels
- Specialty Buffet promotions
- Cruise Liner channels
- Mine-site catering

Recent Value added Product Niche Channel examples

- Sashimi Grade Whole Raw
- Special frozen products
- Special end user packs
- Further processed products such as Whole Split, Split & Cleaned, Tail Medallions, Cooked Tails, Meat products, Flavour infusion

Commodity niche markets provide additional opportunity and benefits for the movement of product and are often impacted less by commodity price and supply fluctuations. Options to access Niche markets with the supply of commodity products usually has limited risk and provides plenty of opportunity for supply volume flexibility. This is where product can be withdrawn or supplied with minimal lead time.

Value added channels although potentially offering the greatest opportunity to improved returns, often include a fair degree of risk through product & customer exposure. Value added Niche channels also often require the greatest additional investments in production equipment, research and development or new product marketing.

With regards to Lobster, it is often difficult to tell if a niche market is an entirely new market or new product category. Often the niche products are simply further-processed forms of the traditional commodity product. This involves simply re-formatting or re-presenting in more attractive ways to encourage additional consumption. For example, the industry for splitting, cleaning & filling commodity

whole frozen lobsters in Japan, Taiwan & Europe is well documented although when premiums are paid for once frozen pre-export processed products, they are often described as niche valued added.

Summary

Through discussions with major global lobster buyers, it was found that niche lobster market opportunities being taken up by other species such as Southern Rock Lobster would not be expected to make any substantial impact on the capacity of the wild caught WRL, to expand or contract beyond the current magnitudes seen from natural catch variations.

In was noted that as other species such as SRL develop niche markets, they were more likely to be substituted at a later date by a more consistently available WRL product (other than where attributes were non substitutable).

As the China markets increase their live demand for such species as SRL the profitability for these niche products often becomes limited.

The unfortunate result was that when WRL catches slumped during lower catch seasons, many WRL niche markets were often left dry with WRL producers focusing on the faster and easier gains from the associated commodity pricing spikes (in order to compete for maximum beach pricing and bonus profit disbursements).

Buyers anticipated the benefits of a stable aquacultured WRL supply to target & build niche opportunities rather than be included into the fluctuating standard commodity markets of the wild caught WRL. Without growing niche markets or live lobster demands it was not expected that aquacultured production could expand at a greater rate than the natural catch fluctuations of the wild sector, which have historically seen differences of as much as 2000 – 3000 mt from one season to the next.

Closing Summary

From this research amongst the global industry, the general consensus was that production of all wild catch sectors have either peaked or are falling. As the world's demand continues to grow for Lobster products, pressure on fisheries to continually perform to maximum yields are resulting in significant peaks and troughs. This is creating enormous benefits for some sectors and opening up more attention for exploitation for others.

Substitution of aquacultured WRL for wild caught sizes was initially considered as a major threat to the current commercial industry. However during this study it was widely forecast by interviewees that the negative impacts would be more likely directed against other less preferred species.

These less preferred species have mostly found market position in major WRL markets through the absence of WRL or Japonicus supplies being available in that size or color range or simply through lower pricing or opportunistic availability. Those origins thought to be the most heavily affected being South African, Indonesian & Philippine for the smaller sizes, with a wider range impacted for larger WRL aquacultured sizes. This also includes likely impacts on the similar looking species from Japan which as a smaller size presently has very few comparable substitutes.

In the Japanese market and to the lesser extent in Taiwan, there has been a preference to purchase red colors and smaller sizes. When not available, buyers searching for the P. Japonicus / P. Cygnus presentation have often had no other choice than to purchase other product such as pink WRL colors and/or red larger sizes (500g+).

In more recent years with less flexible end users and pricing points, the substitution for Red A sizes has tended to move towards the replacement by other species (at the loss of the Pink WRL frozen markets which have found alternate demand channels such as Live or Australian frozen domestic sales).

For WRL, the availability of the preferred product specifications ie smaller sizes and darker colors via aquacultured production was considered to likely impact the most upon Pink colors and/or larger sizes however it was widely acknowledged that this impact would be negligible, given the majority focus to live production during off season or supply trough periods.

Just as with Vietnamese aquaculture, any initial success from aquacultured WRL is largely predicted to come from the Live sector, with the frozen sector following on at a later stage with non commodity type products.

Premiums for live WRL would be expected to come from ;

- Shell color differentiations (darker colors achieving premiums with greater cultural acceptance / preferences due to Japonicus similarities)
- Consistent sizing
- Consistency of availability / forward delivery contracts possible
- Consistent & acceptable mortality levels upon arrival & upon re-tanking
- Price stability capacity (during peak demand periods)

Unlike Vietnam which focuses the majority of it's farmed Tropical Lobster supply into China, smaller sized aquacultured WRL would be expected to find the more commercially viable demands in the following major regions surveyed ;

Live

- Japan
- Taiwan
- China

Frozen (likely as value added / non commodity product types)

- Japan
- Taiwan
- Australia

Markets surveyed that are unlikely to accept smaller WRL either as Live or Frozen at commercially viable levels are:

- Europe
- Middle East
- USA

The capacity for market adaptation and acceptance of new lobster supply sources from Aquaculture or even newly harvested wild biomasses should not be underestimated. Evidence should be considered from recent historical examples such as the successful establishment of the Vietnamese Aquaculture sector, the development of multiple African small size producing fisheries and even the recent expansion of the Mexican live lobster industry (completely inverting from their previous 90% frozen & 10% live).

In terms of frozen pricing, the overall consensus of buyers and producers around the world is that for smaller sizes there is still a long road ahead to achieve a viable pricing and production target option. In terms of Live product targeting and pricing, there is much greater confidence, however it must still be measured against the ultimate quality and consistency of the delivered product.

It was generally acknowledged that not only are there a limited number of lobster species suitable for larger size aquaculture production, but the costs associated with this type of production are extremely high. As such, it was generally suggested that the future demand and pricing trends of larger wild capture products looks positive regardless of any possible future aquaculture entry.

References

Barber, T. 2002. *Convergence of Japanese Food Trends Spells Opportunity for U.S.. Exporters*

Cha, Tin-Yam & Yu, Hsiang-Ping, 1993, *The Illustrated Lobsters of Taiwan*

Department of Fisheries WA 1998, *Opportunities for the Holding/Fattening/Processing and Aquaculture of Western Rock Lobster*, Fisheries Management Paper No. 122, Department of Fisheries Western Australia, November.

Department of Fisheries WA 2004, *Ministerial Policy Guideline No. 20; Assessment of Applications for Authorisation with Regards to Rock Lobster Aquaculture*, Department of Fisheries WA, Perth, November.

Department of Fisheries WA 2006, *A Scoping Paper: Matters Relevant to the Development of a Sustainable Allocation and Grow-out Model for Western Rock Lobster Pueruli*, Fisheries Management Paper No.219, Department of Fisheries, Western Australia, October.

Department of Fisheries WA 2006, *An Overview of Bio-economic, Sociological and Comparative Analyses*, Fisheries Management Paper No.209, Department of Fisheries, Western Australia, January.

Department of Fisheries WA 2006, *How do Quota management Systems Work in Rock Lobster Fisheries*, Fisheries Management Paper No.212, Department of Fisheries, Western Australia, January.

EconSearch 2008, *Criteria for Determining the Impact of Farmed Lobster on the Market for Western Rock Lobster*, Report prepared for Western Rock Lobster Council, February.

Holthuis, L.B. Dr., 2006, FAO Species Catalogue, Marine Lobsters of the World, An Annotated and Illustrated Catalogue of Species of Interest to Fisheries Known to Data, Fisheries Synosis No. 125, Vol. 13 February

Melville-Smith, R. Johnston, D. Johnston, B. and Thomson, N. 2008, *Identifying Obstacles to Profitably Growing Out Western Rock Lobsters*, Fisheries Research Report No. 172, Department of Fisheries, Western Australia, January.

Phillips, B.F. 2006, Lobsters - Biology, Management, Aquaculture and Fisheries.

Phillips, B.F. Melville-Smith, R. Rossbach, M. Cheng, Y.W. Caputi, N. Thomson, A.W. Mills, D. and Crear, B. 2003, *FRDC Project 1998/302 – Rock Lobster Enhancement and Aquaculture Subprogram: Towards establishing techniques for large scale harvesting of pueruli and obtaining a better understanding of mortality rates*, Fisheries Research Report No. 144, Department of Fisheries, Western Australia

APPENDIX TWO

Combined Aquaculture Wild Oceans Research Data

Aquacultured Lobster (all species)

Have you ever purchased Aquacultured Lobster?

Taiwan					
Yes	2	No	4	Unsure	
Comments:					

Japan					
Yes		No	11	Unsure	
Comments:					

Hong Kong/China					
Yes	3	No	1	Unsure	
Comments:					

Middle East					
Yes		No	6	Unsure	
Comments:					

United States					
Yes	1	No	5	Unsure	
Comments:					

Europe					
Yes		No	6	Unsure	
Comments:					

Would you buy Aquacultured lobster if it were available?

Taiwan					
Yes	4	No		Unsure	
Comments:					

Japan					
Yes	8	No	1	Unsure	2
Comments:					

Hong Kong/China					
Yes	4	No		Unsure	
Comments:					

Middle East					
Yes	6	No		Unsure	
Comments:					

United States					
Yes	6	No		Unsure	
Comments:					

Europe					
Yes	1	No		Unsure	
Comments:					

Would you think your customers would pay a discount, same or premium over wild caught lobster?

Taiwan					
Discount	4	Same	2	Premium	
Comments:					

Japan					
Discount	5	Same	4	Premium	
Comments: Unsure x 2					

Hong Kong/China					
Discount	4	Same	2	Premium	
Comments:					

Middle East					
Discount	2	Same	4	Premium	
Comments:					

United States					
Discount	1	Same	3	Premium	
Comments: • Not sure, but more likely similar as the quality of the lobsters from the sea are always very good as processed from live. • Certainly no premium • Unsure x 2					

Europe					
Discount		Same	6	Premium	
Comments:					

Do you think you could tell the difference between wild caught and Aquacultured Lobster?

Taiwan					
Yes	1	No	1	Unsure	4
Comments:					

Japan					
Yes		No	2	Unsure	9
Comments: • We have not seen farmed ones before so not sure					

Hong Kong/China					
Yes	3	No		Unsure	1
Comments:					

Middle East					
Yes		No	4	Unsure	2
Comments:					

United States					
Yes	1	No	2	Unsure	3
Comments:					

Europe					
Yes		No		Unsure	6
Comments:					

How would Aquacultured Lobster differ to wild caught lobster?

Taiwan					
Better	1	Worst	2	Unsure	1
Taste Colour Texture Smell Quality	 1 1	Taste Colour Texture Smell Quality	2 1 		
Comments:		Comments:		Comments:	

Japan					
Better	5	Worst	3	Unsure	3
Taste Colour Texture Smell Quality	1 1 2 4	Taste Colour Texture Smell Quality	 1 1 1		
Comments:		Comments:		Comments:	

Hong Kong / China					
Better		Worst	4	Unsure	
Taste Colour Texture Smell Quality		Taste Colour Texture Smell Quality	1		
Comments:		Comments: *Heads bigger appearance		Comments:	

Middle East					
Better	1	Worst	1	Unsure	4
Taste Colour Texture Smell Quality		Taste Colour Texture Smell Quality			
Comments:		Comments:		Comments:	

United States					
Better	3	Worst	2	Unsure	1
Taste Colour Texture Smell Quality	 1 	Taste Colour Texture Smell Quality	1 1 		
Comments: • Similar I would imagine		Comments:		Comments:	

Europe					
Better		Worst	1	Unsure	5
Taste Colour Texture Smell Quality		Taste Colour Texture Smell Quality	1		
Comments:		Comments:		Comments:	

Do you think your customers could tell the difference over wild caught lobster?

Taiwan					
Yes	2	No	1	Unsure	3
Comments:					

Japan					
Yes	1	No	2	Unsure	8
Comments:					

Hong Kong/China					
Yes	3	No		Unsure	1
Comments:					

Middle East					
Yes		No	5	Unsure	1
Comments:					

United States					
Yes	1	No	1	Unsure	4
Comments: I would have to see aquacultured lobster and the species before I could comment, the same goes for the previous question. Have heard of experimenting in Florida					

Europe					
Yes		No	1	Unsure	
Comments:					

If you have purchased Aquacultured Lobster, what country or countries?

Vietnam	6		

What size ranges do you generally buy?

From Vietnam					
Live	3	Whole Frozen	1	Frozen Tail	1
100/200g	1	100/200g	1	1oz	1
200/300g		200/300g	1	2oz	1
300/500g	1	300/500g		3oz	1
500/800g	3	500/800g	1	4oz	1
500/1.5kg	3	500/1.5kg		5oz+	1
1.5kg+	2	1.5kg+			
Comments:		Comments:		Comments:	

Is the supply poor, steady, increasing or unsure?

Taiwan							
Poor	1	Steady	1	Increasing		Unsure	4
Comments:		Comments:		Comments:		Comments:	

Japan							
Poor		Steady		Increasing		Unsure	11
Comments:		Comments:		Comments:		Comments:	

Hong Kong/China							
Poor		Steady	2	Increasing		Unsure	2
Comments:		Comments:		Comments:		Comments:	

Middle East							
Poor		Steady		Increasing		Unsure	6
Comments:		Comments:		Comments:		Comments:	

United States							
Poor		Steady		Increasing		Unsure	6
Comments:		Comments:		Comments:		Comments:	

Europe							
Poor		Steady		Increasing		Unsure	6
Comments:		Comments:		Comments:		Comments:	

Is the quality better, same or worse than wild caught product? Or unsure?

Taiwan							
Better		Same	1	Worse	1	Unsure	
Comments:		Comments:		Comments:		Comments:	

Japan							
Better		Same		Worse		Unsure	
Comments:		Comments:		Comments:		Comments:	

Hong Kong/China							
Better		Same		Worse	3	Unsure	
Comments:		Comments:		Comments:		Comments:	

Middle East							
Better		Same		Worse		Unsure	
Comments:		Comments:		Comments:		Comments:	

United States							
Better		Same		Worse	1	Unsure	
Comments:		Comments:		Comments:		Comments:	

Europe							
Better		Same		Worse		Unsure	6
Comments:		Comments:		Comments:		Comments:	

Would you buy Aquacultured Western Australian Lobster if it were available in your desired product form?

Taiwan					
Yes	4	No		Unsure	2
Comments:					

Japan					
Yes	6	No	1	Unsure	4
Comments: • If price is lower and quality is same, it might be business.					

Hong Kong/China					
Yes	4	No		Unsure	
Comments:					

Middle East					
Yes	6	No		Unsure	
Comments: Yes, but price needs to be same or less than locals					

United States					
Yes	4	No		Unsure	
Comments:					

Europe					
Yes	6	No		Unsure	
Comments:					

Wild Caught Lobster

What countries do you generally buy Lobster from?

Australia (West & South)	27	Japan	1
South Africa	14	France	1
New Zealand	12	Namibia	1
India	10	Bahamas	4
United States	15	Panama	1
Oman	8	Tonga	1
Brazil	11	Myanmar	1
Mexico	8	Nicaragua	1
Indonesia	7	Thailand	1
Cuba	8	Belize	1
Yeman	4	Tristan	1
Madagascar	3	Sir Lanka	1
Chile	3	Morocco	1
Honduras	3	Oman	1
Philippines	2	Nicaragua	1
Mozambique	2	Mauritania	1
Colombia	2	Sierra Leone	1
Vietnam	6	North Africa	1
Canada	6	France	2
Chile	1		

In general, how do you rate the supply of warm water lobster ?

Taiwan							
Falling	3	Flat	3	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

Japan							
Falling	6	Flat	2	Increasing		Unsure	3
Comments:		Comments:		Comments:		Comments:	

Hong Kong/China							
Falling	2	Flat	2	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

Middle East							
Falling	3	Flat	3	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

United States							
Falling	1	Flat	3	Increasing	1	Unsure	
Comments:		Comments:		Comments:		Comments:	

Europe							
Falling	4	Flat	2	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

In general, how do you rate the supply of cold water lobster?

Taiwan							
Falling	3	Flat	3	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

Japan							
Falling	5	Flat	2	Increasing	1	Unsure	3
Comments:		Comments:		Comments:		Comments:	

Hong Kong/China							
Falling		Flat	3	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

Middle East							
Falling		Flat		Increasing		Unsure	6
Comments:		Comments:		Comments:		Comments:	

United States							
Falling		Flat	5	Increasing		Unsure	
Comments:		Comments: • Last year was off so is this a trend? In general flat as a controlled catch.		Comments:		Comments:	

Europe							
Falling	2	Flat	4	Increasing		Unsure	
Comments:		Comments:		Comments:		Comments:	

What forms do you buy lobster in?

Taiwan												
Whole Frozen				Raw Tails				Live				Value Added			
Yes	3	No	3	Yes		No	6	Yes	3	No	3	Yes		No	6
100/200g				1oz				100/200g			1	Under 200g			
200/300g				2oz				200/300g			3	200/300g			
300/500g			2	3oz				300/500g			3	300g+			
500g+			3	4oz				500/800g			3				
				5oz+				800/1.5kg			3				
								1.5kg+			1				

Japan															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	9	No	2	Yes	7	No	4	Yes	5	No	6	Yes	6	No	5
100/200g			1	1oz				100/200g			1	Under 200g			2
200/300g			6	2oz			1	200/300g			2	200/300g			4
300/500g			5	3oz			2	300/500g			5	300g+			5
500g+			1	4oz			4	500/800g			3				
				5oz+			6	800/1.5kg			1				
								1.5kg+			1				

Hong Kong / China															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	2	No	2	Yes		No	4	Yes	4	No		Yes	1	No	3
100/200g				1oz				100/200g			1	Under 200g			
200/300g				2oz				200/300g			1	200/300g			
300/500g			2	3oz				300/500g			2	300g+			
500g+			2	4oz				500/800g			3				
				5oz+				800/1.5kg			3				
								1.5kg+			3				

Middle East															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	6	No		Yes	6	No		Yes	3	No	3	Yes	5	No	1
100/200g			1	1oz			1	100/200g			1	Under 200g			4
200/300g			2	2oz			1	200/300g			1	200/300g			4
300/500g			5	3oz			2	300/500g			3	300g+			4
500g+			5	4oz			5	500/800g			3	Lobster meat			
				5oz+			6	800/1.5kg			3				
• Whole Fresh x all sizes								1.5kg+			3				

United States															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	2	No	5	Yes	7	No		Yes	2	No	5	Yes	2	No	5
100/200g				1oz			2	100/200g				Under 200g			
200/300g				2oz			2	200/300g				200/300g			
300/500g			1	3oz			2	300/500g			1	300g+			
500g+				4oz			2	500/800g			1				
				5oz+				800/1.5kg			1				
								1.5kg+			1				

Europe															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	5	No	1	Yes	5	No	1	Yes	5	No	1	Yes	3	No	3
100/200g			3	1oz			2	100/200g			1	Under 200g			
200/300g			5	2oz			2	200/300g			1	200/300g			
300/500g			5	3oz			2	300/500g			5	300g+			3
500g+			4	4oz			3	500/800g			5				
				5oz+			4	800/1.5kg			5				
							5	1.5kg+			1				

West Australian Lobster

Are you presently buying WA Lobster products?

Taiwan					
Yes	5	No	1	Unsure	
Comments:					

Japan					
Yes	11	No		Unsure	
Comments:					

Hong Kong/China					
Yes	4	No		Unsure	
Comments:					

Middle East					
Yes		No	6	Unsure	
Comments: No, because of high prices					

United States					
Yes	5	No	1	Unsure	
Comments:					

Europe					
Yes	2	No	4	Unsure	
Comments:					

Why do you buy WA Lobster over other species?

Taiwan			
Size	5	Quality	6
Colour	4	Consistency	4
Price	2	Other	2
		Market trend	
Availability	4		

Japan			
Size	7	Quality	8
		Relatively low mortality	
Colour	7	Consistency	2
Red colour is well accepted			
Price	3	Other	2
Price getting too high recently		Shape – closer to Japanese local lobsters	
Availability	2		

Hong Kong/China			
Size	3	Quality	2
Colour	1	Consistency	2
Price	1	Other	1
Availability	1		

Middle East			
Size		Quality	
Colour		Consistency	
Price		Other	
Availability			

United States			
Size	2	Quality	4
Colour	2	Consistency	2
Price	2	Other	
Availability	3		
		Competition against African, but part of a total compliment of cold water tails Too expensive – Firm, texture, holds up/cold water	

Europe			
Size	1	Quality	2
Colour	1	Consistency	2
Price		Other	
Availability	2		

What forms do you buy WA Lobster?

Taiwan												
Whole Frozen				Raw Tails				Live				Value Added			
Yes	5	No	1	Yes		No	6	Yes	3	No	3	Yes		No	6
400/600g 600/300g 800g+			5 3	5/6oz 6/8oz 8oz+				400/600g 600/800g 800g+			3 1	Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) Large (500g+)			

Japan															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	9	No	2	Yes	6	No	5	Yes	5	No	6	Yes	3	No	8
400/600g 600/300g 800g+			9 1	5/6oz 6/8oz 8oz+			2 5 3	400/600g 600/300g 800g+			4 1	Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) • Large (500g+)			1 3

Hong Kong/China															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	2	No	2	Yes		No	4	Yes	4	No		Yes		No	4
400/600g 600/300g 800g+			2	5/6oz 6/8oz 8oz+				400/600g 600/300g 800g+			4 4 4	Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) • Large (500g+)			

Middle East															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	1	No	5	Yes	1	No	5	Yes		No	6	Yes		No	6
400/600g 600/300g 800g+			1 1 1	5/6oz 6/8oz 8oz+			1 1 1	400/600g 600/300g 800g+				Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) • Large (500g+)			

United States																
Whole Frozen				Raw Tails				Live				Value Added				
Yes		No	6	Yes	6	No		Yes		No	6	Yes	1	No	5	
400/600g 600/300g 800g+				5/6oz 6/8oz 8oz+			6 6 6	400/600g 600/300g 800g+				Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) • Large (500g+)			1	

Europe																
Whole Frozen				Raw Tails				Live Tails				Value Added				
Yes	1	No	5	Yes	1	No	5	Yes	1	No	5	Yes	1	No	5	
400/600g 600/300g 800g+			1 1	5/6oz 6/8oz 8oz+			1 1 1	400/600g 600/300g 800g+			1 1 1	Whole • Extra Small (-100g) • Small (100-300g) • Medium (300-500g) • Large (500g+)				

Would your customers buy smaller Whole Frozen Sizes of WA Lobster?

Taiwan															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	3	No	2	Yes		No	4	Yes	2	No	1	Yes		No	
Unsure - 1				Unsure - 2				Unsure - 3				Unsure - 6			

Japan															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	6	No		Yes	4	No		Yes	3	No		Yes	3	No	
Unsure - 5				Unsure - 7				Unsure - 8				Unsure - 8			

- Comments: Smaller sizes would cause strong competition with South African lobster

Hong Kong/China															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	2	No		Yes		No		Yes	1	No	1	Yes		No	
Unsure - 2				Unsure - 4				Unsure - 2				Unsure - 4			

Middle East															
Whole Frozen				Raw Tails				Live				Value Added			
Yes		No	1	Yes	1	No		Yes		No		Yes		No	
Unsure - 5				Unsure - 5				Unsure - 6				Unsure - 6			

United States															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	1	No		Yes	3	No		Yes		No		Yes		No	
Unsure - 5				Possibly x 1 Unsure - 2								Unsure - 6			

Europe															
Whole Frozen				Raw Tails				Live				Value Added			
Yes	3	No		Yes	1	No	2	Yes	1	No	3	Yes	2	No	
Unsure - 3				Unsure - 3				Unsure x 2				Unsure - 4			

Would you pay more, similar or less than the larger sizes?

M = More, S = Similar, L = Less, U = Unsure

Taiwan															
Whole Frozen				Raw Tails				Live				Value Added			
M	1	S		M		S		M		S		M	2	S	
L	4	U	2	L		U		L	3	U	3	L		U	4

Japan															
Whole Frozen				Raw Tails				Live				Value Added			
M	2	S	1	M		S	2	M		S	3	M	1	S	1
L	3	U	5	L	4	U	5	L	1	U	7	L		U	9

Hong Kong/China															
Whole Frozen				Raw Tails				Live				Value Added			
M		S		M		S		M		S	1	M		S	
L	2	U	2	L		U	4	L	1	U	7	L		U	9

Middle East															
Whole Frozen				Raw Tails				Live				Value Added			
M		S		M		S		M		S		M		S	
L		U	6	L	1	U	5	L		U	6	L		U	6

United States															
Whole Frozen				Raw Tails				Live				Value Added			
M		S		M	1	S		M		S		M		S	
L		U	6	L	3	U	2	L		U	6	L		U	6
				• Key is price and in comparison to others available. Use Niche. • Slight premium maybe.											

Europe															
Whole Frozen				Raw Tails				Live				Value Added			
M		S	1	M		S	1	M		S	2	M		S	
L	2	U	3	L	2	U	3	L		U	4	L	2	U	4

WA Lobster General Comments

Taiwan

- Price is too high in the last 5 years.
- Frozen prices getting too expensive

Japan

- Price is getting really high recently this is why our customers looking for smaller sizes such as Karitane lobster from NZ or South African ones but they are not the best. Japanese people like the shape and the Red colour of WA lobster so if small (or lower cost) WA lobster can be supplied then better sales.
- In 20 years of lobster business, I have never seen the Aquacultured lobster before. It is a matter of deep interest.
- WA lobster price is too high
- If 200-300g size lobster is available from WA, there will be some demand, but the price is suffered by wild caught lobster

United States

- Prices are too high
- Chefs want high% success. >warms = soft/mushy meat % consistent volumes. Warm water have had a bad rep for years.
- 4/5 maybe same price > higher the market, the more the option for smaller
- WA not as strong as South Australia and New Zealand
- Prices are a problem, and the value of the US dollar

Europe

- Prices are too high
- Prices are quite high now
- Only 2 EU approved processors left
- Both EU processors have exclusive agents
- Not enough supply or offers only 2 processors left

APPENDIX THREE

WA Lobster General Comments

Taiwan

- Price is too high in the last 5 years.
- Frozen prices getting too expensive

Japan

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- In 20 years of lobster business, I have never seen the Aquacultured lobster before. It is a matter of deep interest.
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- 4/5 maybe same price > higher the market, the more the option for smaller
- WA not as strong as South Australia and New Zealand
- Prices are a problem, and the value of the US dollar

Europe

- Prices are too high
- Prices are quite high now
- Only 2 EU approved processors left
- Both EU processors have exclusive agents
- Not enough supply or offers only 2 processors left

Aquaculture Lobster Research Project
5-10 minute Survey

(Company specific information will not be published)

Company Name:	**Person Interviewed:**

1. Have you ever purchased Aquacultured Lobster?
   Yes or No or Unsure

2. Would you buy Aquacultured lobster if it were available ?
   Yes or No or Unsure

3. Would you think your customers would pay a discount, same or premium over wild caught ?

4. Do you think you could tell the difference between Wild Caught and Aquacultured?
   Yes, No, or Unsure

   How would it differ to wild caught?
   - Better: Taste, Colour, Texture, Smell, Quality?
   - Worse: Taste, Colour, Texture, Smell, Quality?

5. Do you think your customers could tell the difference over wild caught?
   Yes, No, or Unsure

Please answer this section if you have purchased Aquacultured lobster

1. If you have purchased aquacultured lobster what country/countries did you purchase from?

2. What size ranges do you generally buy?

   - Live : 100/200g, 200/300g, 300/500g, 500/800, 800/1.5kg, 1.5kg+
   - Whole Frozen : 100/200g, 200/300g, 300/500g, 500/800, 800/1.5kg, 1.5kg+
   - Frozen Tail : 1oz, 2oz, 3oz, 4oz, 5oz+

3. Was the supply poor, steady, or increasing or unsure?

4. Was the quality better, same or worse than wild caught product or unsure?

5. Would you buy Aquacultured West Australian Lobster if it were available in your desired product form? Yes, No, or Unsure

Please answer this section if you have purchased Wild Caught Lobster

1. If you have purchased Wild Caught lobster what country/countries did you purchase from?

2. In general, how do you rate the supply of warm water spiny lobster (eg. Tropical species, Caribbean, South East Asian, Mid East etc – does not include lobsters with claws)?
   Falling, Flat, Increasing, Unsure?

3. In general, how do you rate the supply of cold water spiny lobster (West Australian, Southern Australian, NZ, South African, Namibian, Tristan etc – does not include lobster with claws)?
   Falling, Flat, Increasing, Unsure?

4. What forms do you buy lobster in? (please indicate type & size)
   - Whole Frozen? Yes or No
     100/200g, 200/300g, 300/500g, 500g+ ?
   - Raw Tails? Yes or No
     1oz, 2oz, 3oz, 4oz, 5oz+

   - Live? Yes or No
     100/200g, 200/300g, 300/500g, 500/800, 800/1.5kg, 1.5kg+

   - Value Added? Yes or No
     Using lobster under 200g, 200/300g 300g+

Please answer this section if you have experience with West Australian Lobster

1. Are you presently buying WA Lobster products?
   Yes or No

2. Why do you buy WA Lobster over other species?
   Size, colour, price, availability, quality, consistency or other?

3. If so, what forms do you buy WA lobster in? (please indicate type & size)

   - Whole Frozen? Yes or No
     If yes: What size: 400/600g, 600/800g, 800g+
     Would your customers buy smaller Whole Frozen sizes? Yes, No or Unsure
     Would you pay More, Similar, Less than the larger sizes?

   - Raw Tails? Yes or No
     If yes: What size: 5/6oz, 6/8oz, 8oz+
     Would your customers buy smaller Frozen Tail sizes? Yes, No or Unsure
     Would you pay More, Similar, Less than the larger sizes?

   - Live? Yes or No
     If yes: What size: 400/600g, 600/800g, 800g+
     Would your customers buy smaller Live sizes ? Yes, No or Unsure
     Would you pay More, Similar, Less than the larger sizes

   - Value Added? Yes or No
     If yes: What size: 400/600g, 600/800g, 800g+
     From Whole: Extra Sml(under 100g), Sml(100-300g), Med (300-500g), Lge (500g+)
     From Tails: Extra Sml (under 1oz), Sml (2-4oz), Med (4-6oz), Lge (6oz+)

Would you customers buy smaller Value Added sizes? Yes, No or Unsure
Would you pay More, Similar, Less than the larger sizes?

4. Are there any negative issues about using or buying WA Lobster in general?

'Aquacultured Lobster' refers to Ocean caught Lobster that has been cultured (grown from 1 size to another, eg. Juvenile capture and grown to a larger size, which usually involves feeding and storage over an extended period of time).

Interviewed by:	**Date:**

APPENDIX FOUR

Examples of High Profile Fisheries Commercially Producing 'Small' Spiny Lobster

Indonesia Indonesia Species	Panulirus sp. (homarus, penicillatus, longipes, versicolor, ornatus, polyphagus)
Season	All year / Main production November to March. No enforced restrictions, 100% taken including juveniles, berried & setose females, etc
Total Annual Production	1000mt – 1500mt varying dramatically from season to season
Size Breakdown	80% x U/300g, 20% x 300g+
Main Products by %	55% x Live, 5% x Tails, 40% x Whole Frozen
Main Markets	Whole Frozen to Japan (Raw & Cooked), Live to HK/China & Taiwan Very few tails produced, Increasing % to valued added
Indicative pricing & examples	Frozen Whole : 100/150 @ US$14/15, 250+ @ US$20/22 Live : 80/100 @ US$20/21, 200+ @ US$25/35
General Quality or Key Characteristic	Majority of production is sold as live, however collection points are varied and mortality can be high especially during periods of high water temperatures & heavy rainfall.
Comments	Majority production is P. penicillatus which is generally not as strong as other tropical species and has a lower tail recovery, but cooks to a good color and along with homarus sp. is well favored by the Japanese. The P. Ornate species aquaculture sector is just starting and almost all is sold as Live.

Morocco / Western Sahara, Mauritania

Species	Panulirus regius, Palinurus elephas & Palinurus vulgaris * Note : Homarus gammarus (Clawed Atlantic Lobster) is also caught here
Season	May through to end December
Total Annual Production	Estimated at Catches are presently expected around 200-250mt per year for the commercial industry
Size Breakdown	Vulgaris, Elephas main catch 200-400g Regius 200g – 3kg mainly 300-600g
Main Products by %	Vulgaris 50% Regius 40% Elaphas 10%
Main Markets	Major Markets – Live (Spain and Portugal) & Whole Raw (Asia)
Indicative pricing & examples	Vulgaris @ approx 20 Euro per kg (all sizes) Regius @ 20 thru to 50 Euro per kg (all sizes) depending on market demand (very well favoured as the Royal Spiny Lobster)
General Quality or Key Characteristic	Vulgaris is reddish / pink in color and often referred to as European Red Spiny Lobster Regius is light green in colour and a very strong lobster known as Royal Spiny Lobster (similar to Jasus species) and is very well suited to live transportation and sales.
Comments	Although this biomass has been known for many years it was all thought to be over fished by foreign trawl vessels. Now with tightening controls local fishermen are starting to see an increase in catches. Currently 90% of the catch is sold directly from the fishermen to Spanish processors and transported to Morocco live and processed there. This year sees the first local Mauritanian factories opening and producing frozen whole raw and tails under the supervision of the Spanish buyers. Once the factories are established the long

	term plan is to move further south into Sierra Leone and replicate the process where significantly more product is said to be located.

India/ Pakistan / Thailand /Malaysia / South East Asia / Sri Lanka / Burma

Species	Panulirus Polyphagus, Homarus, Longipes. Ornatus
Season	March – July and September – November
Total Annual Production	Once this region produced as much as 5000-6000mt, however estimated catches are now expected around 3000 - 4000mt per year for the commercial industry. Small pockets of ornate lobster aquaculture have recently commenced operations.
Size Breakdown	Main catch 200-600g / varies from season to season with majority under 350g
Main Products by %	Whole Cooked 40% whole Raw 30% Tails 20% Live 10% Live product consisting of majority Ornatus sp. with export infrastructure improving each year for this species. The collection of ornate juveniles is gaining momentum.
Main Markets	Major Markets – Whole Raw (Asia) smaller sizes Whole Cooked to Taiwan , Japan Europe (France) Whole raw larger sizes to Middle east and Europe (Greece & Italy) Live – Asia (HK/China & Taiwan)
Indicative pricing & examples	Whole raw USD$ 19.50 – 22.00 per kg (across all sizes) Whole Cooked USD$ 22.00 - 23.00 per kg (across all sizes)
General Quality or Key Characteristic	The majority P. polyphagus / green lobster, cooks to a light orange colour Distinct muddy taste to the flesh
Comments	The largest producing nation of this group is India where processing is varied from very small operators to two main processors, product is often trawled and quality is varied. Accepted well in Asia and Mid East as a cheaper specie option however has a checkered history of poor hygiene & quality controls. Accordingly Whole Cooked Products have recorded numerous AQIS imports rejections (imports to Australia).

South Africa (SOUTH COAST)

Species	Palinurus gilchristi (South Coast species)
Season	November – September : Deep water 50-200m and up to 300 kms offshore
Fishing Restrictions Quota/Licenses	Quota 140 tons based a permit and sea going vessel (approved by the Fisheries Control) Maximum body length 460mm , commonly 220-300mm
Total Annual Production	approx 1100mt Whole Weight or 462mt Tail Weight
Size Breakdown	Varies from season to season and by catching areas Generally Lobster tails are sold 60% under 6oz, 40% 6oz+ Whole Live weight from 120g+
Main Products by %	Frozen Raw Tails as the majority (85%), balance as Whole Raw & Whole Cooked, Small % Live
Main Markets	Frozen Tails to United States, Frozen Tails & Whole to Europe with some small % as Live, also sold domestically in SA
Indicative pricing & examples	US Frozen Tail levels (as per table), Whole Frozen 300g+ @ US$24-27/kg
General Quality or Key Characteristic	South Coast Rock Lobster (Palinurus gilchristi) is a cold water lobster. It is rose in color with thin legs and is caught in the Atlantic ocean using the long line trap methods at depths from 50 – 150 m in water of 8 °C – 10 °C.
Comments	Due to the large distances from shore, the length of fishing trips and very high % to tail recovery (42-44%), this lobster is generally bulk produced to tails and frozen at sea. Product is then re-graded & re-packed (as frozen) at shore.

South Coast Lobster Tail (p. gilchristi)

Grade	Ounces	Grams	Count	Price
	PER TAIL	PER TAIL	PER CARTON	USD/LB ex store LA
K	1.5-2.5	50-65	71-90	19.00
KZ	2.5-3.5	65-90	51-70	19.50
M	3.5-4.0	90-115	41-50	21.25
J	4.0-4.5	115-130	36-40	26.25
H	4.5-5.0	130-150	31-35	26.50
G	5.0-6.0	150-180	26-30	30.75
F1	6.0-7.0	180-197	21-23	30.75
F2	7.0-8.0	197-215	23-25	29.75
D	8.0-10	215-285	17-21	27.50
C	10.0-12.0	285-380	13-16	28.75
B	12.0-14.0	380-410	11.0-12.0	31.00
A	14-16	410-454	10.0-11.0	31.75
AA	16-20	454-570	8.0-10.0	32.50
AAA	20-24	570-760	6.0-8.0	32.50
Frozen Lobster Tail Packaging: 5x10lb carton, IWP, Quick Frozen, 100% net weight				

South Africa (WEST COAST)

Species	Jasus Lalandii (West Coast species)
Season	November – September
Fishing Restrictions Quota/Licenses	eg Quota 130 tons plus OSQH 170 tons based a permit and sea going vessel (approved by the Fisheries Control)
Total Annual Production	2007/2008 TAC @ 2314mt (reduced 10% on 2006/2007 and due for another 10%) This fishery once supported a TAC of 4000mt+
Size Breakdown	50% x -280g, 20% x 280-330g, 15% x 330-400g, 10% x 400-500g, 5% x 500g+
Main Products by %	60% live, 2% Tails, 38% Whole Frozen
Main Markets	HK/China, Japan and Europe with Whole Frozen mainly directed to Japan, France & Italy. Small % sold as tails to USA (however USA was once the traditional market).
Indicative pricing & examples	Live 200g+ ($26.50 - $34) Cooked 200g+ ($24.00-27.00) Raw 200g+ ($23.00-25.00)
General Quality or Key Characteristic	West Coast Rock Lobster – Jasus lalandii is a warm water lobster. Reddish brown in color and caught in the Atlantic Ocean FAO Area 47 using the long line & short line trap method & ring net methods at depths from 2m – 160 m in water of 80C to 140C. Stored in tanks onboard the vessel. This product is similar in appearance and taste to South Australia / New Zealand species (Jasus edwardsi) however it has a pronounced larger head and does not travel live particularly well.
Comments	Although the main focus for this product is as live, the weakness of the product, the average small sizes and lower body recovery does not find general favor for buyers and distributors. It is however slowly increasing its % to live each year as a substitute for the very highly priced Jasus edwardsi. As at end Feb 2008 only 27% of TAC had been achieved with a view by most quota holders that they will not be able to achieve catch targets. Unlike 2007, 2008 catch breakdowns were including mostly smaller sizes 200-300g range. Serious concerns have recently been registered for the changing environmental conditions which may be impacting on recent landings and could see the fishery TAC be reduced beneath 1500mt in coming seasons.

Namibia

Species	Jasus Lalandii (same as for West Coast South Africa)
Fishing Restrictions Quota/Licenses	Fully Quoted controlled
Total Annual Production	TAC Approx 220-250 mt per p.a.
Size Breakdown	80% x U/240g, 20% x 240+
Main Products by %	95% Whole Frozen, 5% Tails
Main Markets	Japan and Europe for Whole Frozen. Small % sold as tails to USA, No live sales possible
Indicative pricing & examples	Whole Frozen 150-250g ($24.00-28.00)/kg
General Quality or Key Characteristic	Although much smaller on average in size, the quality & characteristics are much the same as to the South African west coast species. Due to the long distances from international airports, this product is almost entirely sold as whole frozen.
Comments	With a majority production under 250g, this product is mostly focused at the Japanese frozen market. 2007 was a poor year for the Namibian fishery with only 70% of TAC reportedly caught and accordingly a significant reduction in small frozen lobster supply to the Japanese market. 2008 projections are more in line with a full TAC achievement expected. Early 2008 contracts of Namibian Whole Cooked Sizes 52pc and smaller (150-200g) which make up approx 60% of the total catch were concluded into Japan @ JPY2980 per kg CFR Japan

Japan

Species	Panulirus Japonicus
Season	As per the chart below
Fishing Restrictions	Season restrictions
Total Annual Production	1300 – 1500 mt
Size Breakdown	Maximum body length about 370mm commonly 170mm – 270mm Approximate total size breakdown over the entire fishery. 100/150g = 10%, 150/200g = 15%, 200/250g = 15%,250/300g = 15%,300/400g = 10%, 400/500g = 10%, 500/600g=10% 600-800g = 8%, 1kg+ = 2%
Main Products by %	80% x Live, 20% x Whole Frozen (often frozen as Sashimi grade during peak production & times of higher mortality)
Main Markets	98% consumed locally (within Japan), small quantity exported to Taiwan as Live
Indicative pricing & examples	Prices range from season to season but generally 4500 yen to 5000 yen per kg for live lobster
General Quality or Key Characteristic	Very similar in color and characteristics to Western rock lobster (especially the dark red color of the Lobster caught in and around the Abrolhos Island region) however lives in much colder water conditions. Very often substituted for by Western Rock Lobster both frozen & live.
Comments	Being the local species of Japan & Northern Taiwan, this lobster is the most culturally significant for the region. It is for this reason that there exists a significant preference difference over Pink & Red WRL types. Note that 50% of production occurs in sizes below the minimum commercial size of WRL. Japonicus species may be tanked in exactly the same temperature and water conditions as per WRL. In Japan the peak catch times of Panulirus Japonicus are August / Sept / Oct however they also correspond to the highest water temperatures (often exceeding 24C) and the weakest mortality conditions. The result is a substantial % of production directed to the frozen sashimi markets for year round sale with a preference for sizes 120-200g which in 2007 sold at Wholesale levels of around JPY5000-5500/kg. Outside this peak catch period, Live prices maintain as high or higher for all sizes.

Season (* = Lobster Fishing ban period)

Fishing Region	Jan-Mar	April	May	Jun	July	August	Sept	Oct-Dec
Chiba	******	******	******	******	******	******	******	******
Kagoshima	******	******	******	******	******	******	******	******
Miyazaki	******	******	******	******	******	******	******	******
Nagasaki	******	******	******	******	******	******	******	******
Fukuoka	******	******	******	******	******	******	******	******
Saga	******	******	******	******	******	******	******	******
Kumamoto	******	******	******	******	******	******	******	******
Ohita	******	******	******	******	******	******	******	******
Okinawa	******	******	******	******	******	******	******	******
Wakayama	******	******	******	******	******	******	******	******
Mie	******	******	******	******	******	******	******	******
Tokusima	******	******	******	******	******	******	******	******
Kouchi	******	******	******	******	******	******	******	******

Yemen

Species	Panulirus Homarus
Season	Usually from October through May
Fishing Restrictions Quota/Licenses	seasons only / no size limits
Total Annual Production	Approx 150-200mt, with some annual variances over 250mt
Size Breakdown	3% x 50/100, 30% x 100/200, 25% x 200/300, 14% x 300/400, 13% x 400/500, 15% x 500/750,
Main Products by %	Approx 30% x Live, 30% x Tails, 40% x Whole Frozen
Main Markets	Mid East, Taiwan, HK, Italy, Spain, Greece
Indicative pricing & examples	Live US$30 CNF Taiwan (average) : 300g+ sizes Whole Frozen USD$ 22 /kg : sold generally as run of catch sizes Tails US$ 19.50/ lb : sold generally as run of catch sizes * under 100g separated out at a discount
General Quality or Key Characteristic	Strong lobster not the normal Homarus muddy taste Good clean lobster
Comments	Small fishery developing towards higher value products & markets. Very few lobster tails now produced in Yemen. Higher values achieved for smaller sizes over recent years have drawn further attention & investment.

Oman

Species	Panulirus Homarus
Season	October through to May
Fishing Restrictions Quota/Licenses	Unrestricted. Often caught by fishing trawlers.
Total Annual Production	300- 600mt
Size Breakdown	100g – 1kg
Main Products by %	Frozen Tails, Whole Raw & Increasing % to Live
Main Markets	Tails to USA & Europe, Whole to Mid East & Europe
Indicative pricing & examples	Tails USD$17.50 – 20.00/lb (often sold with 10-20% glaze) – across all sizes whole Raw USD$ 18 - $20 (often sold with 10-20% glaze) – across all sizes
General Quality or Key Characteristic	Very unstable quality and considered generally to be one the cheapest. Some brands and productions have improved of recent times.
Comments	Not renown for it's quality of the past, mostly due to the nature of it's capture and onboard handling. Some processors have recently commenced Live production and value adding.

Cuba (Caribbean Lobster)

Species	Panulirus Argus (same species as Florida, Brazil and other Caribbean nations)
Season	June through to end January
Fishing Restrictions Quota/Licenses	Seasons & licensed catching / 100% Government controlled Usually June thru to Jan/Feb, however recent changes have reduced time in specific catch areas as well as the limit of under 76mm carapace (recently increased from 69mm resulting in far fewer smaller size landings)
Total Annual Production	As noted in table
Size Breakdown	As noted in table
Main Products	Whole Raw, Whole Cooked, Raw Tails, Cooked, Split & Cleaned. Very small % fresh cooked and live sold to Europe. Since 2000 new products include Nitrogen frozen whole & split product. Tail production is expected to be less than 15% by 2009.
Main Markets	Whole Frozen to Japan, Taiwan, Europe, Australia Tails to Europe. Other smaller markets include Korea, China, Mid East, Canada. NOTE : Cuban products are banned from entry to USA. Cuban domestic tourist market consumes approx 10% of total production.
Indicative pricing & examples (CFR by sea)	Frozen Tails 5oz+ @ US$20-22/lb Whole Frozen 350g+ @ US$23-25/kg
General Quality or Key Characteristic	The Cuban frozen quality has significantly improved over the past 5 years and is perhaps considered the best pack amongst warm water species (even surpassing the similar style production of Florida & other Caribbean producers).
Comments	The second largest producer of Whole Spiny Lobster products after Australia is Cuba. Although not presently a major producer of small sized lobsters, they have had access to this product and still a possible future competitor in either aquaculture grow out or small size harvesting. The Cuban fishery is highly regulated with only 1 company (Caribex) able to receive process or export lobster. Even under strict catch season and effort regulation, Cuba has continued to see reduced overall annual productions. Over the past 5 years greater efforts have been made towards the reduction of effort in effected area as well as the increase of the minimum size limit towards 300g. Habitat damage through increased Hurricane activity in 2001-2004 is suspected to be a major cause however the increase in abundance of smaller sizes under 460g is yet to be observed. Cuban officials have focused significant efforts in the development or value added production using Liquid Nitrogen freezing systems and improving the logistics of catch delivery systems to maximize production strategies which includes a significant reduction in Lobster Tail production.

Cuban Lobster Industry Catch Size Profile Size (grams per whole lobster)						
Season	**210-325**	**325-495**	**495-730**	**730-930**	**930-1400**	**1400+**
1996	3.90%	19.10%	23.00%	23.30%	18.70%	12.00%
1997	5.00%	21.20%	23.90%	21.50%	17.30%	11.10%
1998	7.10%	19.20%	23.80%	20.10%	17.40%	13.40%
1999	7.50%	22.10%	23.20%	21.00%	16.60%	9.60%
2000	7.10%	21.80%	23.30%	21.90%	16.50%	9.30%
2001	7.20%	19.80%	22.60%	22.60%	17.80%	10.00%
2002	5.70%	21.00%	25.70%	22.80%	16.70%	8.00%
2003	4.70%	18.70%	22.70%	22.80%	19.90%	11.30%
2004	4.30%	23.20%	28.70%	21.70%	14.50%	7.50%

Cuban Lobster Industry			
Year	**Production Total (mt)**	**Year**	**Production Total (mt)**
1994	9673	2001	6623
1995	9407	2002	7855
1996	9375	2003	5249
1997	8996	2004	7579
1998	9424	2005	5803
1999	9903	2006	4401
2000	7434	2007	4777

Source : Caribex (Havana Cuba)

APPENDIX FIVE

Japanese Import Statistics for 2006 and 2007 for both Live and Frozen Spiny Lobster

Japan 2006: January – December 2006 Frozen Lobster

Frozen Lobster	Dec-06			Jan-Dec 2006		
	Kg	Amount (x1000)	C&FJPY/Kg	Kg	Amount (x1000)	C&FJPY/ Kg
Total	344,495	735,674	2,135	3,741,390	8,396,184	2,244
Philippine	7,870	11,685	1,484	119,006	172,614	1,450
Indonesia	52,877	110,469	2,089	93,711	190,919	2,037
Myanmar	456	1,535	3,366	2,341	9,218	3,937
India	68,050	148,101	2,176	623,410	1,126,441	1,806
Pakistan	5,870	9,020	1,536	24,850	39,037	1,570
Sri Lanka	7,190	16,083	2,236	19,915	39,707	1,993
Oman	-	-	-	6,903	20,557	2,977
UAE	6,990	17,080	2,443	6,990	17,080	2,443
England	-	-	-	26,000	63,465	2,440
France	-	-	-	290,115	649,957	2,240
Canada	-	-	-	1,546	7,001	4,528
USA	16,960	35,873	2,115	90,959	197,455	2,170
El Salvador	-	-	-	760	1,276	1,678
Bahamas	8,182	45,882	5,607	17,580	96,547	5,491
Cuba	25,500	51,666	2,026	546,705	1,025,570	1,875
Ecuador	-	-	-	6,000	9,881	1,646
Brazil	12,730	30,765	2,416	66,709	154,641	2,318
St Helena	45,250	118,664	2,622	116,660	270,531	2,318
Madagascar	14,650	27,546	1,880	152,220	258,984	1,701
Namibia	-	-	-	252,480	580,578	2,299
South Africa	30,780	77,742	2,525	308,490	720,412	2,335
Australia	34,580	16,833	486	926,090	2,636,099	2,846
New Zealand	6,560	16,730	2,550	41,950	108,214	2,579

Japan 2006: January – December 2006 Live Lobster

Live Lobsters	Dec-06			Jan-Dec 2006		
	kg	Amount (x1000)	C&FJPY/kg	kg	Amount (x1000)	C&FJPY/kg
Total	170,390	686,634	4,029	1,229,682	5,053,761	4,109
Taiwan	-	-	-	6,398	38,870	6,075
Vietnam	-	-	-	369	1,038	2,813
Philippines	-	-	-	148	242	1,635
Indonesia	820	2,857	3,484	5,736	23,717	4,134
Yemen	-	-	-	798	2,294	2,874
Canada	-	-	-	495	1,198	2,420
USA	3,720	13,397	3,601	19,251	68,882	3,578
South Africa	20,540	71,706	3,491	187,550	623,402	3,323

Australia	141,711	583,641	4,118	792,823	3,302,512	4,165
New Zealand	3,599	15,033	4,176	216,114	991,606	4,588

Japan 2007: January – December 2007 Frozen Lobster

Frozen Lobster	Dec 2007			Jan-Dec 2007		
	C&F	Kg	x\1000	C&F	Kg	x\1000
Total	2,777	291,733	810,259	2,617	3,573,626	9,350,520
Vietnam		-	-	3,016	2,842	8,571
Philippines	1,685	6,425	10,824	1,728	105,103	181,647
Indonesia	2,058	58,302	119,994	1,920	394,992	758,418
Myanmar		-	-	3,471	263	913
India	2,101	11,500	24,156	2,042	373,690	763,087
Pakistan		-	-	1,590	2,130	3,387
Sri Lanka	2,345	14,968	35,095	2,363	46,740	110,436
Oman		-	-	2,184	12,739	27,818
UAE	4,581	7,808	35,769	3,352	46,736	156,652
Yemen		-	-	2,907	14,049	40,836
England	2,794	13,000	36,324	2,584	37,128	95,924
France		-	-	2,655	310,520	824,427
USA	2,684	23,360	62,698	2,694	113,600	306,003
Bahamas	5,247	18,143	95,195	5,029	33,673	169,337
Cuba	2,676	12,436	33,281	2,606	326,612	851,057
Brazil	3,493	8,752	30,569	3,155	36,299	114,526
St Helena	2,745	26,000	71,380	2,604	67,870	176,708
Kenya		-	-	1,485	10,212	15,163
Tanzania		-	-	1,606	7,428	11,932
Madagascar	1,848	6,840	12,637	2,184	186,745	407,906
Namibia		-	-	2,826	159,950	452,025
South Africa	2,647	51,890	137,356	2,694	618,225	1,665,740
Australia	3,249	32,309	104,981	3,327	643,440	2,140,759
New Zealand		-	-	2,970	22,640	67,248

Japan 2007: January – December Live Lobster

Live Lobster	Dec 2007			Jan-Dec 2007		
	C&F\kg	Kg	x\1,000	C&F\kg	Kg	x\1,000
Total	4,060	127,530	517,801	4,514	969,315	4,375,025
Taiwan	-	-	-	6,119	4,982	30,483
Philippines	-	-	-	2,876	874	2,514
Indonesia	3,523	889	3,132	3,853	6,295	24,254
USA	3,904	3,076	12,009	3,951	14,886	58,810
SouthAfrica	3,871	14,140	54,733	3,639	207,536	755,171
Australia	4,079	105,917	432,057	4,667	601,273	2,805,864
NewZealand	4,546	3,268	14,855	5,231	133,229	696,914
USA(Guam)	4,229	240	1,015	4,229	240	1,015

Note: Japan import statistics were seen as the most useful indicator as they are generally considered to have the least data corruption and provide information across the broadest range of species & origins.

APPENDIX SIX

Whole Frozen Indicator Prices in the Japanese Wholesale and import Markets

West Australian Origin – Panulirus Cygnus (CFR per kilo – import prices)

Month	Kg	X 1000 Yen	Yen/Kg	JPY/USD	US/$kg
Jan-07	25,644	96,055	3,746	121.68	$30.78
Feb-07	7,226	40,027	5,539	121.54	$45.57
Mar-07	60,785	145,211	2,389	118.34	$20.19
Apr-07	114,694	430,581	3,754	119.89	$31.31
May-07	94,514	332,228	3,515	121.81	$28.86
Jun-07	93,854	350,418	3,734	123.65	$30.19
Jul-07	50,463	170,077	3,370	122.65	$27.48
Aug-07	68,767	239,441	3,482	117.88	$29.54
Sep-07	14,259	55,214	3,872	116.06	$33.36
Oct-07	56,285	86,524	1,537	116.80	$13.16
Nov-07	24,640	90,002	3,653	112.34	$32.51
Dec-07	32,309	104,981	3,249	113.43	$28.65
Jan-08	38,337	127,552	3,327	108.68	$30.61
Feb-08	18,300	72,336	-	108.24	-
Mar-08	70,694	233,694	3,306	101.95	$32.42

Florida Origin – Panulirus Cygnus (CFR per kilo – import prices)

Month	Kg	X 1000 Yen	Yen/Kg	JPY/USD	US/$kg
Jan-07	-	-	-	121.68	-
Feb-07	-	-	-	121.54	-
Mar-07	16,920	38,733	2,289	118.34	$19.34
Apr-07	-	-	-	119.89	-
May-07	-	-	-	121.81	-
Jun-07	-	-	-	123.65	-
Jul-07	-	-	-	122.65	-
Aug-07	-	-	-	117.88	-
Sep-07	-	-	-	116.06	-
Oct-07	37,060	103,123	2,783	116.80	$23.82
Nov-07	36,260	101,449	2,798	112.34	$24,90
Dec-07	23,360	62,698	2,684	113.43	$23.66
Jan-08	17,000	41,658	2,450	108.68	$22.55
Feb-08	-	-	-	108.24	-
Mar-08	4,290	10,672	2,488	101.95	$24.40

South Africa Origin – J. Lalandii (CFR per kilo – import prices)

Month	Kg	X 1000 Yen	Yen/Kg	JPY/USD	US/$kg
Jan-07	32,920	80,826	2,455	121.68	$20.18
Feb-07	9,270	25,122	2,710	121.54	$22.30
Mar-07	29,750	78,141	2,627	118.34	$22.20
Apr-07	44,350	116,829	2,634	119.89	$21.97
May-07	127,310	350,956	2,757	121.81	$22.63
Jun-07	57,330	154,252	2,691	123.65	$21.76
Jul-07	89,500	246,543	2,755	122.65	$22.46
Aug-07	45,000	125,390	2,786	117.88	$23.64
Sep-07	25,400	67,258	2,648	116.06	$22.82
Oct-07	12,200	29,198	2,393	116.80	$20.49
Nov-07	93,305	253,869	2,721	112.34	$24.22
Dec-07	51,890	137,356	2,647	113.43	$23.34
Jan-08	31,410	85,303	2,716	108.68	$24.99
Feb-08	-	-	-	108.24	-
Mar-08	15,310	42,934	2,804	101.95	$27.51

Source : Japan Government Statistics 2007/2008

Japan Wholesale Market / Whole Cooked Lobster – April 2008

Whole Cooked Number of Pieces per 10kg carton	Origin & Price (JPY per kg)				
	Namibia Sth Africa	St Paul	Tristan Is.	Madagascar	West Australia
72	3500		3450	2100	
68	3500		3500	2800	
64	3500		3500	3000	
60	3500		3450	3000	
56	3450		3400	3000	
52	3450		3200	2900	
48	3200	3200	3200	2900	
44	3100	3100	3200	2900	
40	3000		3100	2900	
36	3200		3200	2900	
32	3200		3200	2850	
28			3200	2800	
24			3200	2800	3650 (Red)

Average Wholesaler Price listed Selling Levels (Tokyo)

APPENDIX SEVEN

Commercial Production of Western Rock Lobster 1999 - 2007

Commercial Production of Western Rock Lobster Season 1999/2000												
	Lobster Tails		*Whole Cooked*		*Whole Raw*		*Live*		*Total*		*%*	
	KG	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*
Size (g)												
A (Under 460)	364,504	975,045	2,907,707	6,609,495	789,550	1,883,413	1,574,315	3,470,854	5,636,075	12,938,807	41.10%	48.79%
B (460/570)	932,649	1,948,089	2,139,018	3,988,443	398,270	779,279	1,130,526	2,198,645	4,600,463	8,914,456	33.55%	33.61%
C (570/690)	672,964	1,105,280	384,741	585,972	63,070	100,910	500,308	800,202	1,621,082	2,592,364	11.82%	9.78%
D (690/800)	670,655	898,599	33,107	41,826	6,600	8,872	233,536	319,536	943,897	1,268,833	6.88%	4.78%
E (800/910)	277,215	269,290	137	143	1,800	1,980	185,133	209,444	464,284	480,857	3.39%	1.81%
F (910/1140)	131,581	95,359	0	0	150	132	140,467	132,788	272,197	228,279	1.98%	0.86%
G (1140/2000)	57,814	39,235	0	0	0	0	72,286	44,461	130,100	83,696	0.95%	0.32%
H (2000 +)	34,329	9,865	0	0	0	0	11,376	3,031	45,705	12,896	0.33%	0.05%
Sum	3,141,711	5,340,762	5,464,709	11,225,879	1,259,440	2,774,586	3,847,945	7,178,961	13,713,804	26,520,188		
Percent	22.91%	20.14%	39.85%	42.33%	9.18%	10.46%	28.06%	27.07%				

Commercial Production of Western Rock Lobster Season 2000/2001												
	Lobster Tails		*Whole Cooked*		*Whole Raw*		*Live*		*Total*		*%*	
Size (g)	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*
A (Under 460)	283,642	759,141	1,814,232	4,137,717	578,620	1,391,041	1,573,444	3,475,520	4,249,938	9,763,419	40.48%	48.36%
B (460/570)	622,266	1,301,498	1,272,494	2,370,918	239,820	471,613	966,541	2,191,430	3,252,522	6,335,459	30.98%	31.38%
C (570/690)	523,753	858,892	292,582	446,548	75,300	120,480	470,758	817,195	1,397,573	2,243,115	13.31%	11.11%
D (690/800)	518,782	693,325	44,888	56,552	3,500	4,727	283,534	402,313	863,837	1,156,917	8.23%	5.73%
E (800/910)	150,115	149,439	903	946	1,490	1,639	210,145	268,565	374,962	420,589	3.57%	2.08%
F (910/1140)	49,664	38,220	7,424	6,222	1,660	1,461	136,848	127,700	195,596	173,603	1.86%	0.86%
G (1140/2000)	50,964	35,353	0	0	2,010	1,588	85,244	49,925	138,218	86,866	1.32%	0.43%
H (2000 +)	20,559	5,833	0	0	430	168	4,239	1,420	25,228	7,421	0.24%	0.04%
Sum	2,219,745	3,841,701	3,432,523	7,018,903	902,830	1,992,717	3,730,751	7,334,068	10,497,874	20,187,389		
Percent	21.14%	19.03%	32.70%	34.77%	8.60%	9.87%	35.54%	36.33%				

Commercial Production of Western Rock Lobster Season 2002/2003												
	Lobster Tails		*Whole Cooked*		*Whole Raw*		*Live*		*Total*		*%*	
Size (g)	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*	*KG*	*Pieces*
A (Under 460)	495,555	1,325,882	2,392,971	5,399,141	635,100	1,513,428	1,254,326	2,766,344	4,705,501	10,843,015	43.05%	49.97%
B (460/570)	1,440,693	3,006,048	1,403,542	2,618,732	165,490	324,326	769,872	1,775,982	3,876,813	7,645,003	35.47%	35.23%
C (570/690)	766,602	1,259,616	122,861	187,215	16,250	25,800	227,612	387,324	1,134,362	1,838,722	10.38%	8.47%
D (690/800)	546,440	730,966	11,277	14,135	0	0	110,829	152,042	665,200	892,013	6.09%	4.11%
E (800/910)	187,497	180,209	462	484	840	924	102,614	117,636	294,717	297,912	2.70%	1.37%
F (910/1140)	82,424	59,733	1,082	906	0	0	66,793	63,391	150,078	123,379	1.37%	0.57%
G (1140/2000)	52,095	35,308	893	672	0	0	28,750	17,134	81,586	52,706	0.75%	0.24%

H (2000 +)	22,058	6,298	0	0	0	0	252	82	22,262	6,364	0.20%	0.03%
Sum	3,593,363	6,604,060	3,933,086	8,221,285	817,680	1,864,478	2,561,047	5,279,935	10,930,519	21,699,114		
Percent	32.87%	30.43%	35.98%	37.89%	7.48%	8.59%	23.43%	24.33%				

Commercial Production of Western Rock Lobster Season 2003/2004												
	Lobster Tails		***Whole Cooked***		***Whole Raw***		***Live***		***Total***		***%***	
Size (g)	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***
A (Under 460)	648,456	1,818,069	2,357,701	5,313,552	600,260	1,433,569	1,401,118	3,107,053	5,007,535	11,672,242	38.87%	44.95%
B (460/570)	1,537,156	3,524,431	1,593,585	2,969,809	287,310	562,228	1,206,519	2,361,702	4,624,569	9,418,169	35.90%	36.27%
C (570/690)	879,569	1,637,827	244,115	371,984	29,700	47,520	482,849	763,231	1,636,232	2,820,562	12.70%	10.86%
D (690/800)	682,402	1,031,356	12,327	15,521	3,550	4,686	258,094	348,131	956,373	1,399,693	7.42%	5.39%
E (800/910)	165,874	232,596	21	22	750	825	173,033	196,652	339,678	430,095	2.64%	1.66%
F (910/1140)	65,007	46,959	0	0	1,270	1,117	96,428	91,285	162,704	139,361	1.26%	0.54%
G (1140/2000)	55,128	36,138	0	0	440	348	66,092	41,040	121,660	77,526	0.94%	0.30%
H (2000 +)	20,793	5,930	0	0	130	51	13,900	5,070	34,823	11,050	0.27%	0.04%
Sum	4,054,384	8,333,306	4,207,749	8,670,888	923,410	2,050,344	3,698,031	6,914,164	12,883,574	25,968,698		
Percent	31.47%	32.09%	32.66%	33.39%	7.17%	7.90%	28.70%	26.62%				

Commercial Production of Western Rock Lobster Season 2004/2005												
	Lobster Tails		Whole Cooked		Whole Raw		Live		Total		%	
Size (g)	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces
A (Under 460)	368,705	1,034,609	1,962,681	4,414,682	546,340	1,298,973	1,222,956	2,706,744	4,100,717	9,455,068	35.78%	41.99%
B (460/570)	1,343,148	3,016,495	1,473,486	2,746,315	212,800	416,722	1,097,835	2,163,603	4,130,329	8,348,475	36.04%	37.07%
C (570/690)	801,646	1,411,208	299,869	456,944	49,710	79,536	385,771	622,314	1,537,487	2,570,737	13.42%	11.42%
D (690/800)	696,746	1,033,012	39,617	49,625	10,780	14,226	211,285	290,622	958,427	1,387,485	8.36%	6.16%
E (800/910)	251,806	337,682	3,791	3,971	380	418	147,627	169,905	403,603	511,976	3.52%	2.27%
F (910/1140)	93,459	68,167	0	0	0	0	110,587	106,870	204,046	175,037	1.78%	0.78%
G (1140/2000)	62,377	42,693	0	0	0	0	42,631	22,417	105,008	65,110	0.92%	0.29%
H (2000 +)	19,475	5,552	0	0	0	0	1,143	380	20,618	5,932	0.18%	0.03%
Sum	3,637,362	6,949,418	3,779,443	7,671,537	820,010	1,809,875	3,219,833	6,082,855	11,460,234	22,519,820		
Percent	31.74%	30.86%	32.98%	34.07%	7.16%	8.04%	28.10%	27.01%				

Commercial Production of Western Rock Lobster Season 2005/2006												
	Lobster Tails		Whole Cooked		Whole Raw		Live		Total		%	
Size (g)	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces	KG	Pieces
A (Under 460)	221,731	640,223	1,516,924	3,417,998	311,560	730,210	1,173,818	2,596,754	3,224,033	7,385,185	32.22%	38.05%
B (460/570)	951,494	2,260,203	1,191,225	2,218,892	261,030	511,008	1,082,140	2,118,527	3,485,889	7,108,630	34.84%	36.63%
C (570/690)	751,479	1,489,498	139,923	213,216	27,100	43,360	548,022	878,831	1,466,524	2,624,905	14.66%	13.52%
D (690/800)	702,934	1,094,602	12,957	16,289	0	0	297,109	405,792	1,013,000	1,516,683	10.13%	7.81%
E (800/910)	239,723	275,204	42	44	0	0	196,452	216,761	436,217	492,009	4.36%	2.54%
F (910/1140)	93,742	67,940	0	0	0	0	130,822	127,575	224,563	195,515	2.24%	1.01%
G (1140/2000)	49,039	31,092	0	0	0	0	70,185	44,049	119,224	75,141	1.19%	0.39%
H (2000 +)	33,672	9,598	0	0	0	0	1,699	543	35,371	10,141	0.35%	0.05%
Sum	3,043,813	5,868,360	2,861,071	5,866,439	599,690	1,284,578	3,500,245	6,388,832	10,004,819	19,408,209		
Percent	30.42%	30.24%	28.60%	30.23%	5.99%	6.62%	34.99%	32.92%				

Commercial Production of Western Rock Lobster 2006/2007												
	Lobster Tails		*Whole Cooked*		*Whole Raw*		*Live*		*Total*		*%*	
Size (g)	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***	***KG***	***Pieces***
A (Under 460)	275,508	811,929	1,051,175	2,382,833	310,070	802,014	905,388	1,833,687	2,542,141	5,954,183	31.70%	36.85%
B (460/570)	1,088,462	2,756,767	881,758	1,643,419	248,970	537,447	877,694	1,555,247	3,096,884	6,593,024	38.62%	40.80%
C (570/690)	564,314	1,113,023	149,279	227,472	33,170	98,762	339,478	467,914	1,086,241	1,933,725	13.55%	11.97%
D (690/800)	438,687	723,816	20,034	25,085	1,090	1,439	192,977	261,885	652,789	1,012,225	8.14%	6.26%
E (800/910)	196,323	279,987	32	33	1,400	1,540	141,403	160,109	339,158	441,669	4.23%	2.73%
F (910/1140)	77,722	56,565	11	9	0	0	116,267	102,242	193,999	158,816	2.42%	0.98%
G (1140/2000)	41,595	26,608	0	0	0	0	50,467	33,647	92,062	60,255	1.15%	0.37%
H (2000 +)	14,762	4,210	0	0	0	0	1,430	442	16,191	4,652	0.20%	0.03%
Sum	2,697,374	5,772,905	2,102,288	4,278,851	594,700	1,441,202	2,625,103	4,415,173	8,019,465	16,158,549		
Percent	33.64%	35.73%	26.21%	26.48%	7.42%	8.92%	32.73%	27.32%				

Source: WA Fisheries Department/Courtesy Eric Barker