

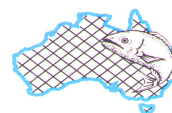
# Adding value to an under-utilised fish species (Silver Warehou)



Malcolm McLaughlin, Russell Hudson  
and Ian Knuckey  
2009



**McLaughlin Consolidated Fishermen Ltd**  
ACN 100 341 384 ABN 22 100 341 384



WHOLESALE, MARKETING AGENTS, IMPORTERS, EXPORTERS AND PROCESSORS  
AUSTRALIA'S FINEST SEAFOOD



**Australian Government**  
**Fisheries Research and  
Development Corporation**





Adding value to an under-utilised fish species  
(Silver Warehou)

Malcolm McLaughlin, Russell Hudson  
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FRDC Project 2007/209  
2009

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**Adding value to an under-utilised fish species (Silver Warehou)**

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2009

Published: Fishwell Consulting Pty Ltd  
22 Bridge Street, Queenscliff, Victoria, 3225

ISBN: 978-0-9808289-0-0

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**Preferred way to cite:**

McLaughlin M., Hudson, R. and Knuckey, I., (2009). Adding value to an under-utilised fish species (Silver Warehou). FRDC Project 2007/209. Fishwell Consulting.

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## **NON-TECHNICAL SUMMARY**

<b>Project No. 2007/209:</b>	<b>SESSF Industry Development Subprogram: Adding value to an under-utilised fish species (Silver Warehou)</b>
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**PRINCIPAL INVESTIGATOR:** **Malcolm McLaughlin**

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### **OBJECTIVES**

1. Conduct research to confirm appropriate markets for Silver Warehou;
2. Develop a new seafood product from Silver Warehou that will appeal to the consumer and is competitively priced to similar imported products;
3. Adapt techniques to process Silver Warehou into suitable products;
4. Establish training program for processing staff to ensure product Quality Assurance (QA);
5. Describe how the process applied to Silver Warehou can be adapted to other low value species.

### **OUTCOMES ACHIEVED**

**McLaughlin Consolidated was able to develop a method of bulk handling, processing and packaging Silver Warehou that preserved the flesh's white appearance and was appealing to consumers.**

**The products were presented to seafood buyers of a local and Hong Kong supermarket chain. Both responses to the product were very favourable with a verbal commitment to increase the awareness of the fish with a strong marketing campaign.**

**This response encouraged McLaughlin Consolidated to make plans to purchase, process and package Silver Warehou on a commercial scale. Over 20 tons of Silver Warehou were shipped to Thailand for processing and packaging.**

**During this time, the seafood buyers for both the local and Hong Kong supermarkets were replaced with people not keen to market unknown fish species, or favoured**

**promoting other species of fish. McLaughlin Consolidated made a decision to process and package only a small amount and stock these in the Hong Kong supermarkets.**

**Without the supermarket's support, the product did not enjoy retail success in the Hong Kong outlets. The remaining 21 tons in Thailand was shipped back to Australia. Local interest was very strong and all the fish was sold reasonably quickly.**

**Local wholesalers of seafood products have begun to copy the method.**

**The knowledge that Silver Warehou can be bulk frozen and processed in this manner has resulted in an overall increase in the base-level price that this species achieves on the market floor.**

Fishers participating in the Southern and Eastern Scalefish and Shark Fishery (SESSF) have faced considerable economic challenges in recent years. Flat prices received at the wharf coupled with rising costs and a reduction in the TACs of some species has led to thinner profit margins. The 2006 government buyback of licenses may have alleviated some pressure on stocks, but the industry has long recognized that value-adding and larger markets for the fish species would have a flow-on effect to fish prices and profitability.

During the 1990s, McLaughlin Consolidated decided to value-add two previously low value species (Tiger Flathead *Neoplatycephalus richardsoni* and School Whiting, *Sillago flindersi*) through improved processing and marketing. Subsequently, they have considered that the process applied to these two species could also be applied to other low value species captured in the SESSF. At the initiation of this project, Silver Warehou (*Seriolla punctata*) had one of the highest global TACs (3227t in 1998) in the SESSF and was one of five main species captured in the fishery that was not classified as overfished (Morison and McLoughlin, 2008). Unfortunately, the flesh of Silver Warehou turns an off-white colour when exposed to air for a length of time, which has reduced consumer demand for the product. Moreover, a large proportion of the catch of Silver Warehou is landed during the spawning months of July, August and September which can deflate the prices. In the past, many hundreds of tonnes of this species were discarded at sea due to lack of markets. McLaughlin Consolidated believed that the sales and consumption of this species could be improved by a change in processing technique. Discussions with the chief seafood buyers of local and Asian supermarket chains during late 2006 confirmed the potential of Silver Warehou in the retail market.

During November/December 2006, McLaughlin Consolidated conducted a series of freezing and processing trials to determine if Silver Warehou could be frozen and when thawed, processed into a seafood product of high quality.



It was found that if cutlets were sliced from the fish when only partially thawed, they could be then vacuum sealed and refrozen with the flesh maintaining a white appearance and firm texture. Samples were presented to the supermarket seafood buyers who approved of the product and committed their companies to stocking it.

Commercial production commenced following the 2007 winter spawning months with over 20 t of Silver Warehou shipped overseas for processing. However, the seafood buyers at both supermarket chains had been replaced, and the new buyers did not share their predecessors support for the product. After limited sales in Asia the remaining fish were freighted back to Melbourne, Australia. The product proved very popular with retailers in Melbourne and the remaining fish were quickly sold.

McLaughlin Consolidated considered the project a success despite the lack of sales in Asia and plan to adopt this method when large landings of Silver Warehou occur at spawning time. Regardless of the time of year, however, when bulk amounts of Silver Warehou land on the market, this processing technique offers an alternative to selling the product as fresh whole fish or fresh fillets. This alternative has already had the effect of changing the value-perception of fish-buyer/processors, thereby increasing the base-price offered for this species regardless of the form of the end product.

**Keywords: Silver Warehou, processing, value-adding**

## **ACKNOWLEDGEMENTS**

We wish to thank David and John Guillot and the skipper and the crew of the *Lady Cheryl and Empress Pearl* for their efforts in providing the project's Silver Warehou. We gratefully acknowledge Andrew McLaughlin, David Jurikevich and Dale Hine of McLaughlin Consolidated Fishermen Ltd. and Tony Bossio for their assistance in processing and packaging.

## **BACKGROUND**

Fishers participating in the Southern and Eastern Scalefish and Shark Fishery (SESSF) have faced considerable challenges in recent years. Flat prices received at the wharf coupled with rising costs and a reduction in the TACs of some species has led to thinner profit margins. The government buyback of licenses may have alleviated some pressure on stocks, but the industry has long recognized that value-adding and larger markets for the fish species would have a flow-on effect to fish prices and profitability.

During the late 1990s, McLaughlin Consolidated decided to underpin the price of small-and medium-size Tiger Flathead (*Neoplatycephalus richardsoni*) at the Melbourne Fish Markets when there was little demand for small fish other than for processing into surimi. The Flathead were skinned and turned into boneless fillets. This represented a considerable cost to McLaughlin Consolidated which had to train and retrain staff to process smaller fish. McLaughlin Consolidated built up a considerable stock until buyers could be found, and once the market recognized the value of this product, demand increased such that the price per kilogram at the wharf increased from \$0.80 per kilogram to at least \$6.00 per kilogram during October 2006. Skinless and boneless flathead now sells at a premium and sets the benchmark for Flathead sold in Australia.

A similar situation occurred with the exporting of School Whiting (*Sillago flindersi*) by McLaughlin Consolidated to Japan and Thailand. The market for this product was about to collapse, but through processing of the fish offshore and remarketing of the fish as a consumer 'take home' product from the supermarket, sales were revived and increased to the point where the price fishers were receiving at the wharf had increased by 31%.

McLaughlin Consolidated considered that the processing and marketing techniques that were utilised for Tiger Flathead and School Whiting could be modified and applied to other low value species captured in the SESSF.

At the initiation of this project, Silver Warehou (*Seriolla punctata*) had one of the highest global TACs (3227t in 1998) in the SESSF and was one of five main species captured in the fishery that was not classified as overfished (Morison and McLoughlin, 2008). Unfortunately, the flesh of Silver Warehou turns an off-white colour when exposed to air for a length of time, which has reduced consumer demand for the product. Moreover, a large proportion of the catch of Silver Warehou is landed during the spawning months of July, August and September (Table 1) which can deflate the prices (Figure 1). In the past, many hundreds of tonnes of this species were discarded at sea due to lack of markets.

Historically marketed as trevally, government regulations forced marketers to change the name to spotted warehou and then silver warehou. As a consequence, the species has poor market identification and acceptance. Compounding this issue is that the fish changes colour to an off white colour after filleting due to oxidation of the flesh (Figure 2). In addition, the flesh lining the inside of the stomach is discoloured by its main diet of planktonic tunicates (Kailola *et al.* 1993). During winter, when the fish are spawning, little prey is consumed, leaving the stomach wall pale white (Malcolm McLaughlin pers. observation).

McLaughlin Consolidated had previously exported head and gutted Silver Warehou to Japan but the market had collapsed after large volumes were captured in New Zealand and the Falkland's and dumped on the market and due to the compulsory change in market name. McLaughlin Consolidated believed the sales and consumption of this species could be improved by a change in processing technique. Discussions with the chief seafood buyers of local and Asian supermarket chains during late 2006 confirmed the potential of Silver Warehou in the retail market. They considered that further processing would be unviable in Australia but by exporting the fish whole to Thailand where processing costs are cheaper, it could be turned into a highly regarded consumer product.

## **NEED**

There is little opportunity for fishers in the SESSF to increase profitability. All major species have been allocated quotas, and there is little scope to increasing quotas with most species fully exploited or overfished. While much research has focused on the collection of biological data, assessment of the status of fish stocks and the impact of fishing on the environment, there is a need to investigate value-adding to species currently captured by the fishery (Knuckey 2004).

Silver Warehou is one of the most promising low value species to trial for value-adding. Despite having one of the largest quotas in the SESSF, there is little demand from the public consumer for Silver Warehou because of its lack of recognition from name changes and the off-white colour of the flesh when exposed to air for a length of time. The lack of market, coupled with large catches landed during winter months has lead to many hundreds of tonnes of this species being discarded.

The cost of establishing new markets for both the Flathead and School Whiting were considerable and were borne solely by McLaughlin Consolidated, though all fishers benefited and continue to benefit, from the higher prices. The products were so successful that McLaughlin Consolidated can no longer afford to process small to medium Flathead as the high price at the wharf makes it unviable.

McLaughlin Consolidated had been approached by the Park and Shop supermarket chain in Hong Kong to provide a fairly cheap line of fish for them to stock in their 5,000 supermarkets in Hong Kong and Southern China. It was felt that Silver Warehou could meet this demand if a good product could be developed.

Silver Warehou is a relatively unfamiliar fish to overseas processors. This project was needed to develop processing techniques, consumer-appealing packaging, provide process training and production planning.

## **OBJECTIVES**

1. Conduct research to confirm appropriate markets for Silver Warehou;
2. Develop a new seafood product from Silver Warehou that will appeal to the consumer and is competitively priced to similar imported products;
3. Adapt techniques to process Silver Warehou into suitable products;
4. Establish training program for processing staff to ensure product Quality Assurance (QA);
5. Describe how the process applied to Silver Warehou can be adapted to other low value species.

## **METHODS**

### **Confirming markets (1)**

McLaughlin Consolidated undertook discussions with both the chief seafood buyers of Woolworths in Australia and Park and Shop in Hong Kong to assess the demand for a low priced seafood product and whether Silver Warehou could meet this need.

### **Trial processing**

McLaughlin Consolidated built on its previous experience in exporting Silver Warehou to Asia. Trials were conducted at the McLaughlin Consolidated factory in Melbourne to determine: 1) an improved method of handling the fish to ensure no oxidation takes place; and 2) a processing method that preserves the flesh's white appearance.

From previous experience selling Silver Warehou, McLaughlin Consolidated knew that fish in the head and gutted form dried out after freezing and, because of its high fat content, the flesh tended to deteriorate quickly. In addition, by heading and gutting and then freezing the body, two lots of processing would be required before retailing, adding to the cost of the product. It was considered that future processing of the fish would revolve around minimizing handling of the fish. It was envisaged the fish would be frozen whole and held in the freezer for varying periods before being thawed and processed.

## **Confirming markets (2)**

Once the trials had determined a product that would appeal to consumers, trips were conducted to Asia and Sydney, to meet and present samples of Silver Warehou to the chief fish buyers of the selected supermarket chains. Discussions were undertaken with the buyers on strategies to present the product, pricing, timetable of production and promotion of the product. Based on these discussions, McLaughlin Consolidated were in a position to determine the profitability of freighting the fish to Asia, processing it and exporting to Australia and Hong Kong.

## **Product development**

When opportunities for selling the fish product were identified, three areas needed to be addressed:

1. packaging design;
2. development of quality assurance guidelines; and,
3. selection of a processing plant that was able to process the fish and willing to train staff in the appropriate processing techniques.

McLaughlin Consolidated has a secure relationship with a processing plant in Thailand that has processed numerous Australian and overseas fish species for McLaughlin Consolidated to export, either to Australia or to other regions of the world. In parallel with the processing trials, methods of handling and processing the fish were recorded in order to develop a quality assurance guideline to apply to commercial processing and production. McLaughlin Consolidated discussed the viability of training, processing, packaging and exporting the product to Australia and Hong Kong with the Thai company. Trips were conducted to Thailand to gauge the suitability of training staff, freighting, storage and processing of the fish, and exporting the product to Australia and Hong Kong.

It was considered unlikely that staff in the Thai processing plant would be familiar with handling and processing the Silver Warehou. Extensive training by McLaughlin Consolidated staff was needed to ensure the processing staff complied with the Quality Assurance guideline.

McLaughlin Consolidated engaged a local graphics designer familiar with food packaging, with a brief to design a package(s) that appealed to Australian and Asian consumers.

## **RESULTS AND DISCUSSION**

### **Confirming markets (1)**

Discussions on the potential of Silver Warehou in the retail market were had with the chief seafood buyers of Woolworths and Park and Shop during late 2006. The buyers expressed interest but needed to know in what form the product would be presented.

### **Trial processing**

During November/December 2006, McLaughlin Consolidated asked two vessels to ice and tag Silver Warehou captured on the last night of fishing. Upon arriving at McLaughlin Consolidated factory, these fish were immediately “soldier-stacked” in 12 kg cartons enclosed in plastic. Holes were inserted on the side of the carton to facilitate freezing when they were frozen to -22°C in a blast freezer. Boxes were then kept frozen for 1 week, 1 month, 2 months and 3 months.

The box of Silver Warehou that had been stored in the freezer for one week was completely thawed and the fish removed. The fish were processed by both filleting and slicing cutlets. The flesh was found to be firmer than the head-and-gutted form previously exported by McLaughlin Consolidated. As expected, however, the flesh discoloured within a few hours (Figure 2). Within the same batch, the cutlets discoloured as well.

In contrast to the above, the box of Silver Warehou stored for one month was only partially thawed. The fish firstly had the fins removed, then the stomach opened with a roe knife, a knife designed to avoid cutting the roe sac (Figure 3). As the stomach and roe were still frozen, they could be removed with relative ease. The fish then had its head removed, and cutlets sliced to almost the entire length of the fish (Figure 4). The cutlets, while still semi-frozen, were placed in vacuum packs to remove air and retain the colour of the flesh (Figure 5). The vacuum packs were then refrozen. These packs were then thawed and opened after two months to assess the quality. No deterioration was observed in the quality of the flesh.

Similar slicing trials were done on the remaining boxes initially frozen whole for 2 and 3 months to determine if there was any deterioration in quality. The fish were found to be of similar quality to the fish frozen for one month.

McLaughlin Consolidated considered they had a process and a product ready to present to Woolworths and Park and Shop supermarket chain to retail.

## **Confirming markets (2)**

During February 2007 McLaughlin Consolidated met with the seafood buyer from the Park and Shop supermarket chain in Hong Kong, and presented the vacuum sealed packs of Silver Warehou. The seafood buyer expressed satisfaction with the product and agreement was reached on the packaging of the fish, with each packet containing 340 grams of fish cutlets. Park and Shop's seafood buyer expressed a desire to stock large quantities of the Silver Warehou, and indicated its company was willing to undertake an advertising campaign to raise Silver Warehou's profile as an appealing seafood product.

In addition, McLaughlin Consolidated also presented a sample of 450 gram Silver Warehou fillets to Woolworths in Sydney. Woolworths gave a verbal agreement to stock small amounts of the product as a trial.

## **Product development**

### ***Packaging design***

The packaging design for Woolworths was going to be a similar design to that used for other Australian seafood products (Figure 6). Each package would contain 450 grams of fillets. For the Hong Kong market the packaging design was similar to fish products sourced from other regions of the world (Figure 7). Each package would contain 340 grams of cutlets.

### ***Quality Assurance guideline***

The quality assurance guideline was developed during the trial processing and adjusted for commercial production processes (Appendix 3).

## **Training and Commercial Processing**

McLaughlin Consolidated approached the seafood processing company (based in Thailand), that had previously handled their seafood, to determine if the company would be interested in processing and packaging the Silver Warehou. The company agreed, having all the equipment in place to undertake the work, but its staff needed training on how to handle and process the fish. McLaughlin Consolidated agreed to visit the plant and provide training to handle, process and package the fish for both the Australian and Hong Kong markets.

During July, August and September 2007, McLaughlin Consolidated approached two vessels to assist in providing fresh, high quality Silver Warehou. Silver Warehou from the last days fishing before unloading were retained and marked, and handled as identified in the Q&A guidelines (Appendix 3). Over the three months, 22 tonnes were accumulated and frozen. During October/November 2007 this fish was exported to the Thai fish processor in two 11-tonne containers.

During November 2007, a trip was undertaken to Thailand to instruct the Thai processing staff on processing and packaging the fish. McLaughlin Consolidated spent some time with the processing staff to ensure the fish was handled and processed correctly and packaged competently in their absence.

## **Marketing the product**

Between February 2007 and October 2007, the seafood buyers at both Woolworths and Park and Shop had been suddenly replaced. This represented an enormous setback to McLaughlin Consolidated and the project's objectives. The new buyers at both retailer outlets had no relationship with McLaughlin Consolidated and no knowledge of Silver Warehou and a reluctance to invest resources into promoting an unknown product. The promise of an expensive marketing campaign for Silver Warehou in the Hong Kong market had evaporated. McLaughlin Consolidated made a commercial decision not to proceed with processing fish for Woolworths and to process only a small amount for the Hong Kong market.

One tonne of fish was processed, packaged and dispatched to Hong Kong, and placed in the freezer cabinets of only a few supermarkets (the original premise was for placement in all 5,000 outlets). Over 6 months, the product sold poorly due to:

- no marketing campaign; Silver Warehou was not familiar with Hong Kong consumers;
- poor product placement (it was placed in the back of freezer cabinets); and,
- the supermarket favoured promoting a Norwegian product.

After the 6 months, the product was withdrawn from the supermarkets and a decision made to bring back one of the containers of unprocessed fish to Australia and attempt to sell on the local market at a large loss to McLaughlin Consolidated. It was at this point that McLaughlin Consolidated decided to terminate the project.

Upon the container's arrival in Melbourne, a small sample of the fish was thawed and inspected. The fish were found to be in good condition. The fish were placed on the market and sold whole and frozen. Initial buyer caution was replaced with confidence as buyers discovered how well the product thawed. Fish retailers could keep the fish frozen whole and then slice only a few cutlets or fillets at a time to place in the display window. The container quickly sold and McLaughlin Consolidated has received many enquires since.

The remaining container was brought back to Melbourne 19 months after it was frozen, and the fish were considered in good condition. McLaughlin Consolidated was able to also sell all the fish from this container.



## **Adaptation to other low value species**

The techniques developed to process Silver Warehou could be adapted to other low value species. The main features other low value species would have to possess include:

- the flesh must be of a colour and texture that has consumer appeal;
- be able to be frozen and thawed and maintain the flesh's quality;
- be of a sufficient size to cut fillets or cutlets; and,
- can be delivered to the processor in excellent condition.

Similar freezing trials would need to be conducted with freezing the fish to ascertain whether flesh quality can be maintained after freezing for different periods.

## **BENEFITS AND ADOPTION**

The main beneficiaries from the success of this project will be commercial fishers that can:

- capture Silver Warehou during peak winter months;
- provide the freshest Silver Warehou possible (capturing the fish near the end of a trip);
- deliver the fish to the markets in excellent condition.

These fishers will achieve a ready market and higher price for their fish.

McLaughlin Consolidated intends to adopt the processing method of freezing the fish whole, and then selling the fish at opportune times.

## **FURTHER DEVELOPMENT**

The success of retailing the frozen fish locally has seen an increase in demand for the product. Consequently, other processors have attempted a similar method, underlying the success of the project. In retail fish shops around Melbourne, Silver Warehou is being sold in cutlet form. During June 2009 it was observed that other wholesalers were purchasing Silver Warehou and processing the fish by a similar method. Anecdotally, prices for Silver Warehou at the Melbourne Fish Market during June 2009 have been higher than normally expected this time of year.

## **PLANNED OUTCOMES**

The proposed outcomes of this project identified in the application included:

- 1) A high quality fish product with consumer product recognition;

- 2) An increase in returns to the fishing industry through higher demand for Silver Warehou;
- 3) A more efficient utilisation of the resource and reduction in discarding of a quota species; and,
- 4) Present opportunities for other low value fish to be utilised in a similar manner.

The most successful outcome achieved was 1) with McLaughlin Consolidated trialling, and developing an excellent processing techniques and product that, had it been supported with marketing, could easily have succeeded in Asian markets. At this stage the success of outcomes 2), 3) and 4) cannot be evaluated. Early indications are the processing method will be adopted by other local wholesalers and hence increase the demand for the fish.

## **CONCLUSIONS**

McLaughlin Consolidated has been able to successfully develop a process that can handle large volumes of Silver Warehou during the spawning season, hold the fish for a period, and process the fish into an appealing consumer product. The lack of retail success of the product in Hong Kong, due to managerial changes, was beyond McLaughlin Consolidated's control and could not have been foreseen or planned for.

The flow on benefits of this project has resulted in an awareness of the potential of Silver Warehou, with at this stage, one other processor replicating the processing method. Local retailers have embraced the concept of keeping the fish frozen whole and slicing only a few cutlets to present in the window.

McLaughlin Consolidated intends to adopt this method when large volumes of Silver Warehou are landed at spawning time. McLaughlin Consolidated considered the project a success despite the lack of sales in Asia and plan to adopt this method when large landings of Silver Warehou occur at spawning time. Regardless of the time of year, however, when bulk amounts of Silver Warehou land on the market, this processing technique offers an alternative to selling the product as fresh whole fish or fresh fillets. This alternative has already had the effect of changing the value-perception of fish-buyer/processors, thereby increasing the base-price offered for this species regardless of the form of the end product.

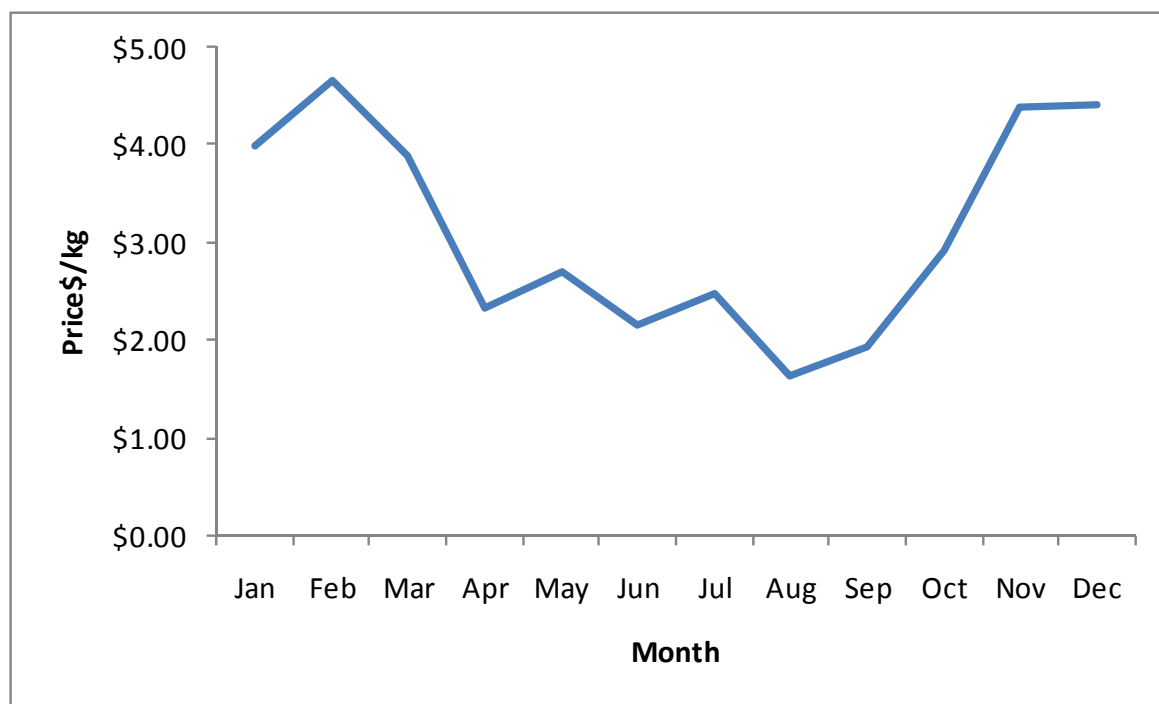
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**Table 1. Catch (tonnes) of Silver Warehou landed during 2003–2005**

<i>Year</i>	<i>Catch (tonnes)</i>											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2003</b>	300	200	200	249	188	211	684	274	171	219	140	108
<b>2004</b>	232	224	264	196	304	395	289	541	254	187	163	120
<b>2005</b>	118	170	244	197	204	98	360	338	487	332	127	114
<b>Total</b>	651	594	708	642	696	704	1333	1153	911	738	430	342

**Figure 1. Price (\$/kg) of Silver Warehou at Melbourne Fish Markets during 2008**



**Figure 2. Silver Warehou fillet's off-white appearance after exposure to air**



**Figure 3. Opening the stomach with a roe knife**



**Figure 4. Cutlets cut the entire length of the fish**



**Figure 5. Silver Warehou cutlets vacuum sealed and prior to sealing.**



Figure 6. Packaging developed for Silver Warehou for Australian markets

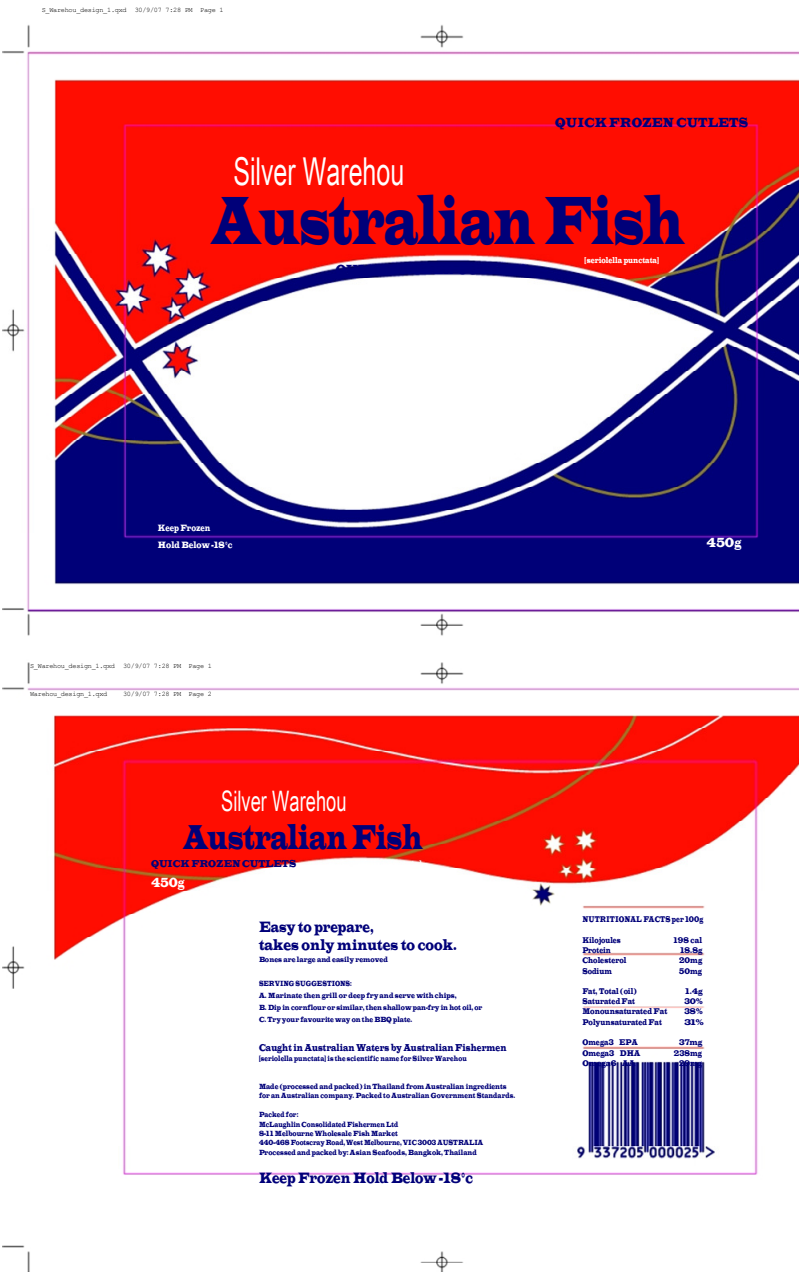




Figure 7. Packaging and presentation of Silver Warehouse for Hong Kong markets

a) Front of package



b) back





## **APPENDIX 1 - INTELLECTUAL PROPERTY**

There is no intellectual property associated with this project.

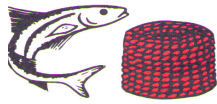
## **APPENDIX 2 - STAFF**

<b>Name</b>	<b>Organisation</b>	<b>Project Involvement</b>
Malcolm McLaughlin	McLaughlin Consolidated	Trial processing, marketing, planning
Andy McLaughlin	McLaughlin Consolidated	Trial processing
Russell Hudson	Fishwell Consulting	Project administration and Report
Ian Knuckey	Fishwell Consulting	Report

## **APPENDIX 3 - QUALITY ASSURANCE GUIDELINE**

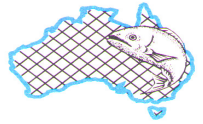
Quality assurance guidelines for the handling and processing of Silver Warehou  
for export markets





**McLaughlin Consolidated Fishermen Ltd**  
ACN 100 341 384

ABN 22 100 341 384



WHOLESALEERS, MARKETING AGENTS, IMPORTERS, EXPORTERS AND PROCESSORS  
AUSTRALIA'S FINEST SEAFOOD

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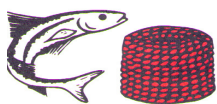
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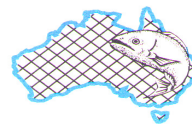
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## Introduction

This document offers guidance to the standards that must be achieved during all stages in the handling, freezing exporting and processing of Silver Warehou (*Seriolella punctata*) to ensure the highest quality fish are accepted for processing, and the highest possible standards are maintained throughout the handling of the fish.

## Legislation applicable

Food Standards Australia and New Zealand Code 2001

Export Control Act, 1982

Export Control (Processed Food) Orders 1992

Victorian Health Act 1958

## Sourcing of fish

McLaughlin Consolidated will only source Silver Warehou from fishers who are known to have implemented on their vessels good fish handling practices. The Silver Warehou selected for whole fish processing will be:

1. only Silver Warehou captured on the last night's fishing before steaming into port;
2. the whole fish must be immediately chilled to a core temperature of less than 4°C by placing the fish in either brine, ice slurry or ice; and then put in cool storage and a temperature of -1–0°C maintained;
3. onboard the vessel, Silver Warehou identified for whole fish processing to be kept separate from either other Silver Warehou captured or other species of fish;

## Unloading and transporting of fish

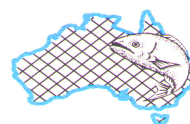
When the vessel arrives in port, the fish

- will be placed in 25 kg fish bins with sufficient ice to ensure all fish are maintained at a temperature of < 4°C.
- The fish are transported by a vehicle meeting food standards of Australia to the factory for processing.



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## **Packaging and freezing prior to export**

Upon arrival at the factory there are 3 clear processes that take place:

1. assessing the quality of the fish;
2. packaging and storing;
3. palleting and exporting.

### ***Assessment of quality***

For the fish to be suitable for export and processing it must meet stringent guidelines.

Upon arrival of the fish at the factory:

- ice levels are checked to ensure there is sufficient coverage.
- core temperatures taken with a thermometer. The fish must be at a temperature  $< +4^{\circ}\text{C}$ .
- a visual assessment is then made of eyes and gills of the fish to determine if the fish has maintained its freshness.
- a sample of fish is then selected at random and the fish are gutted to check the condition of the gut cavity. If any are badly stained then the whole catch of fish are deemed unsuitable for processing and sold on the local markets.

If the fish meet these standards then fish are declared suitable for processing and placed in a chiller room at  $0-1^{\circ}\text{C}$ .

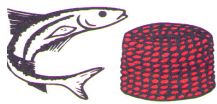
If ice levels are low then additional ice is added to the fish containers.

If the fish are declared unsuitable for packaging and exporting the fisher responsible for providing the catch will then be informed and queried as to their handling techniques.

### ***Packaging and storing***

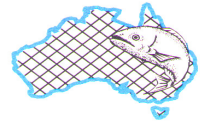
The fish are packed (soldier style with belly down) to 12 kilograms in plastic bags inside bulk cardboard cartons, with holes to ensure rapid freezing of the fish. Only a small portion of fish are taken out of the chiller to ensure rapid packing and the temperature of the fish does not rise above  $0-1^{\circ}\text{C}$  degrees. As soon as one rack is completed the rack is then immediately put in a blast freezer with a minimum temperature of  $-36^{\circ}\text{C}$ . More fish are then brought out of the chiller, a new rack is started and the process is continued until all fish are racked and frozen.

Leave fish in blast freezer for a minimum of 24 hours.



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### ***Palleting and exporting***

In preparation for export, the fish cartons need to be packed onto pallets.

This process involves:

- ensuring the core temperature of the fish in the blast freezer is at a minimum of -22°C
- the cartons are stacked on a pallet wrapped in plastic cling.
- When enough pallets are prepared to fill an export container, the container is quickly packed and maintained at a temperature of a minimum of at least -18°C, prior to and during shipping.

### **Processing**

On arrival at the factory the temperature of the container is checked along with the temperature logger to check if there has been any significant temperature fluctuation.

When fish are required for processing small amounts of Silver Warehou are removed from the freezer and only partially thawed.

The processing steps need to be done quickly so the fish does not fully thaw. They are as follows:

- the back spine of the fish is removed;
- pectoral fins removed;
- the stomach is opened and contents removed carefully;
- the gut is carefully cleaned with a gutting knife;
- the bloodline near the backbone is removed;
- scrub clean inside belly and check for any staining;
- cutlets are then produced by slicing with a hand knife at a consistent angle as shown by senior staff; the thickness of the cutlets are determined by client requirements;
- the cutlets are then packed quickly in 340g vacuum seal packs and placed back in the freezer.

The sealed packs are then held in the freezer (minimum of -18°C) until orders are received, and the temperature maintained when transporting the product to customer outlets.