

GUIDELINES FOR SEAFOOD RETAILERS

FEBRUARY 2002



CONTENTS

FOREWORD	II
1. INTRODUCTION	1
2. SEAFOOD SPOILAGE - CAUSES AND CONTROL	2
3. PERSONAL HYGIENE	8
4. PREMISES HYGIENE	10
5. SEAFOOD HANDLING AND STORAGE	17
6. FOOD SAFETY PROGRAMS AND HACCP	26
7. MAXIMISING SEAFOOD QUALITY	34
8. PRESENTATION, PROMOTION AND MARKETING	39
9. PRODUCT KNOWLEDGE AND CUSTOMER SERVICE	42

FOREWORD

The Western Australian seafood retail industry is a dynamic environment in which to conduct business. Changing consumer demands toward new products and increasing focus on value added and pre-prepared seafood presents a new range of processes undertaken by today's seafood retailers. To ensure food safety and quality, now more than ever before, seafood retailers must be well informed.

The economic benefit to the community that is derived from the fisheries resource is substantial. From harvest through to end user the seafood industry is a large employer of people, both directly and indirectly. Seafood retailers carry the added responsibility of being the window through which the rest of the community views the industry.

These seafood retail guidelines are designed to give a foundation for those employed in the seafood retail sector to develop knowledge and skills to improve their business. Whether you are a seasoned retailer using the guidelines as a refresher, or you are embarking on a new career, I urge everybody in the seafood retail sector to utilise these guidelines to facilitate production of safe, quality seafood for the domestic consumer.

A handwritten signature in black ink, appearing to read 'Peter P Rogers', written in a cursive style.

Peter Rogers
Executive Director

1. INTRODUCTION

This handbook offers assistance and guidance in the management of seafood safety and quality, with each module providing practical information and advice on how to ensure seafood safety and quality during all stages of retail distribution and sale.

It can be inserted into your Food Safety Program for future reference and utilised for staff training.

Fresh seafood is one of the safest foods available, but if people suspect that they have contracted an illness from food it is the seafood that frequently gets the blame. In reality many food poisoning instances are caused by a variety of foods other than seafoods. There is a public perception that seafood is high risk, in fact in the cases attributable to seafood it is invariably the activities of the seafood handlers that have caused the problem.

Surveys suggest that food safety is of the utmost importance in the mind of the consumer. Therefore, it makes sense for the seafood industry and retail operators to be perceived as providing safe, quality food.

The following information will help retailers manage potential hazards and assist in staff training. This should result in a higher degree of professionalism and greater customer confidence. Research suggests that, over a period of time, this will result in an increase in sales and a more vibrant seafood industry.

Posters and a handbook on seafood retailing are available and complement these guidelines.

2. SEAFOOD SPOILAGE - CAUSES AND CONTROL

What is seafood spoilage?

As every seafood retailer knows, seafood is a very delicate food and if it is to reach the consumer in good condition it must be handled with care and speed.

Seafood spoilage is the physical and biochemical deterioration or breakdown of tissue in seafood. As seafood spoils, the external appearance undergoes great change, particularly to the skin, eyes, gills, flesh and organs. At the same time, the odour changes from an initial fresh sea odour to a sour fishy smell.

What is the result of seafood spoilage?

If seafood is not stored and handled correctly, it can very quickly spoil and 'go off'. The following table outlines the undesirable consequences of seafood spoilage.

Spoilage Consequences	Cause
Reduced shelf life	Due to the action of bacteria, enzymes and oxidation.
Off flavours and smells	From the breakdown of tissue through the action of bacteria and enzymes.
Taints	Off flavours that arise from contamination during handling and preparation.
Reduced quality	Deterioration of the visual, physical and chemical characteristics of seafood from the action of bacteria and enzymes.
Food poisoning	Predominantly from the contamination and growth of bacteria.

Seafood spoilage will dramatically reduce the shelf life of seafood. The term 'shelf life' refers to the time period that seafood can be stored and consumed before spoilage makes it unpalatable. The shorter the shelf life the shorter the time you have to sell produce at the best possible price.

TABLE 1 **What causes Seafood Spoilage?**

Cause	Effect	Controlling Factor	Mode of control
Bacteria	Live healthy fish can be covered in bacteria, while the flesh remains sterile. After death, incorrect handling can introduce bacteria to the flesh resulting in spoilage. Seafood handlers and the environment are other sources that may result in bacterial spoilage and the resulting 'off' odours and flavours.	Temperature of seafood: below 5°C, or greater than 60°C	Prevents bacteria from growing or producing toxins. Kills bacteria.
		Rapid processing	Minimises the time when bacteria can grow.
		Good storage practices: separation (raw & ready-to-eat) Covering food	Prevents cross contamination. Protects seafood from contamination.
		Good handling methods	Prevents contamination & cross contamination.
		Healthy & hygienic staff	Prevents contamination & cross contamination by disease
		Clean & hygienic premises	Prevents contamination & cross contamination.
		Using correct packaging	Prevents bacteria from getting onto the seafood.
Enzymes	Enzymes are present in the flesh and various organs (e.g. gut) of all seafood. They function to break down food into energy. After death, enzymes will continue to function resulting in the break down of flesh to a soft texture, with unpleasant odours and flavours	Temperature of seafood: between 2°C and -1°C Temperature greater than 75°C Thorough wrapping	Slows the activity of enzymes. note: Between -1.5°C and -5°C enzyme activity is increased. Thorough cooking will halt enzyme activity. Reduced exposure to air slows enzyme activity
Oxidation	Oils in seafoods will react with oxygen in the air over a period of time causing rancidity (strong fishy odour and flavour). Oily fish will become rancid faster than lean fish. The bright red colour of muscle	Correct packaging reduces contact with oxygen, such as vacuum packing or thorough wrapping.) Rapid processing	Physical barrier prevents contact with oxygen. Minimises length of time product is exposed to air.

	will become dull and eventually turn brown. Oxidation is a major cause of spoilage during prolonged freezer storage. Dehydration will accelerate oxidation	Glazing, where a thin coating of ice is applied to frozen product Holding frozen product at or below -30°C MAP - modified atmosphere packaging.	Physical barrier prevents contact with oxygen. Colder temperatures reduce level of oxidation. Evacuates oxygen from the atmosphere surrounding the product, replacing with another gas.
Dehydration	The drying out of seafood causes a reduction of flavour, juices and loss of weight, Severe dehydration of frozen seafood is referred to as freezer burn. It may result in a dry 'woody' appearance or the build up of icicles within pre-packaged goods	Using correct packaging Glazing, where a thin coating of ice is applied to frozen product Constant temperature of frozen product below -30°C.	Physical barrier prevents dehydration Physical barrier prevents dehydration Temperature fluctuations result in the partial thawing and refreezing of product. This process results in the rupture of cell walls and the loss of fluids from within the cell.
Physical damage	Torn, bruised, cracked or crushed products are all results of rough handling.	Training staff in appropriate handling and storage techniques. Using appropriate containers for storage and handling.	Staff realising the importance of correct handling procedures and following these instructions. Containers that are suitable for protection of product.
Rigor Mortis	Rigor mortis has three stages; pre-rigor, rigor and post rigor. Fish have very delicate connective tissue between muscle blocks, if a fish is handled roughly while in rigor mortis, it will damage this tissue resulting in a texture change and loss of moisture and flavour. Fish going slowly and gently through the process of rigor mortis will extend the shelf life of product.	Filleting should never occur before the commencement of rigor, While a fish is in rigor it should not be straightened out or bent. Chilling slows and extends the process of rigor.	The muscle contraction without a supporting skeleton will result in a tough texture. While in rigor the straightening or bending of a fish will result in the tearing of muscle blocks away from the connective tissues resulting in a 'gaping' or torn fillet. While in rigor spoilage is minimal.

What is contamination?

Contamination is the introduction of a contaminant on to or into a food.

There are three types of contamination:

Bacterial	Bacteria can get on to seafood from the environment, food handlers, or the premises and equipment.
Chemical	Chemicals can get on to seafood from cleaning chemicals not being properly rinsed off equipment or excessive food additives. Chemicals can get into seafood from a polluted harvest environment.
Physical	Physical objects can get into seafood from food handlers and the processing environment (e.g. jewellery, hair, dust)

Contaminated seafood may cause consumer illness, such as:

- food poisoning resulting from bacteria,
- chemicals that may cause sickness, or
- physical objects that may result in injury.

Contamination of seafood may result from exposure in the environment (for example, polluted waters) or through direct contact during processing. It is often during processing activities that bacterial contamination of seafood occurs. Even hygienically produced seafood will have some bacteria on it after processing.

What is bacterial spoilage?

The most important cause of seafood spoilage is bacterial growth. Bacteria live almost everywhere as they are present in water, air, mud from the sea floor, external surfaces (for example, in slime) and in the gut of all seafood.

Controlling bacteria can save money by reducing wastage and maintaining seafood quality. Like most other living creatures, bacteria need food, moisture, warmth, and time to survive and multiply.

In a seafood premises the most likely sources of bacteria are:

Raw seafood	Seafood contains bacteria in the gut and on the skin, which can get on the flesh during processing.
The staff	Carry all sorts of bacteria on and in them. The most dangerous bacteria carried by food handlers are <i>Staphylococcus aureus</i> (Golden Staph) and gut bacteria like <i>Salmonella</i> and <i>E. coli</i> .
The premises	Walls, equipment and floors if not regularly and properly cleaned carry bacteria.
Pests & vermin	Rodents, birds and insects can all bring bacteria into a food premises.
Waste materials	Will actively grow bacteria.

What is cross contamination?

Cross contamination occurs when we accidentally move contaminants from one place to another (such as from dropped seafood on to the preparation bench, then from the dirty bench on to a clean piece of seafood).

Cross contamination is particularly important between raw and cooked or 'ready-to-eat' seafood. Cross contamination can occur when raw seafood comes into direct or indirect contact with cooked or 'ready-to-eat' seafood during preparation, storage, or display. Consumption of cooked ready to eat seafood that has become contaminated with bacteria from raw seafood, may result in food poisoning.

What is food poisoning?

Food poisoning is any illness caused from eating contaminated food. Allergies, heavy metals, viruses and chemicals can all cause food poisoning. However, the main cause of food poisoning is bacteria.

The symptoms of food poisoning and the time between eating contaminated food and the start of symptoms (that is, the onset time) will vary depending on the bacteria causing the illness.

Food poisoning symptoms may include:

- nausea,
- diarrhoea and vomiting,
- stomach pains,
- sweating and fever, and
- headache.

People can get food poisoning from eating the bacteria or from the toxins produced by the bacteria. After consuming contaminated food, the onset time of food poisoning may vary from hours to days. Fast-acting food poisoning is caused by bacterial toxins, while food poisoning that takes days to develop is caused by the bacteria growing in the gut of the consumer.

It is important to remember that food poisoning is a potentially life-threatening condition. Those more susceptible to food poisoning are infants, the elderly, and the sick.

Who is responsible for the increase in food poisoning?

There are three main groups that could be responsible for causing a food poisoning incident;

- the food manufacturer,
- the food service sector (retail and catering), or
- the consumer.

The Australia New Zealand Food Authority (ANZFA) estimates that food manufacturers are responsible for 10-20 per cent, the food service sector for 60-70 per cent, and consumers for 10-30 per cent of food poisoning incidents.

How do you control seafood spoilage and prevent food poisoning?

Seafood spoilage cannot be stopped, but it can be slowed to a minimum. Reducing the temperature of seafood is the single most effective way of slowing spoilage, obtaining maximum shelf life, and preventing food poisoning.

Temperature control is critical for controlling the rate of seafood spoilage and preventing bacterial growth.

- One day of shelf life is lost for every hour fish remains at room temperature (25°C).
- Seafood at -10°C looks and feels as hard as seafood at -30°C, yet it will deteriorate more rapidly.

Many factors influence seafood spoilage. Table 1 displays factors that should be used together to minimise the rate of seafood spoilage.

3. PERSONAL HYGIENE

Why is personal hygiene important?

People carry bacteria in their gut, nose, mouth, ears, hair and on their skin. These bacteria are quite normal and do not affect us, however, if they are transferred to food they can grow to numbers that can cause food poisoning. *Staphylococcus aureus* (Golden Staph) lives in the hair, ears, nose, armpits, groin, cuts, pimples, and boils as well as under jewellery. The intestines of humans can also contain salmonella and *E. Coli*.

Bacteria can be transferred to our hands when we use the toilet, scratch our face or sneeze into our hands. Cross contamination of seafood with these bacteria can occur during any handling and preparation activity.

Good personal hygiene is therefore essential for the safe handling and preparation of seafood.

What is good personal hygiene?

Good personal hygiene is essential for preventing bacterial contamination of seafood, and can be as simple as:

- washing your hands frequently,
- wearing clean protective clothing, and
- keeping yourself healthy and clean.

Seafood premises are required to provide a dedicated hand wash-basin equipped with soap (preferably liquid soap), a supply of warm water, nail brush and disposable paper towels or hot air dryer. This basin is not to be used for any other activities (e.g. washing seafood). It is preferable to have foot, knee or solenoid operated taps.

Staff should wash their hands with soap and warm water:

- before handling seafood,
- after handling raw seafood and before handling cooked seafood,
- immediately after using toilet,
- after eating or smoking,
- after performing cleaning duties,
- after handling any waste materials, and
- immediately after coughing or sneezing into hands, wiping nose, scratching head, face or body under protective outer clothing.

Washing hands must be done thoroughly, or a lot of bacteria are left on the skin. The correct method of hand washing involves the following steps:

1. Wet your hands with hot water.
2. Use soap to lather your hands and then rub lather up to your elbows.
3. Scrub under your finger nails with a brush.
4. Rub the lather between your fingers and hands for at least 30 seconds.
5. Rinse off all soap with warm water.
6. Dry your hands with a paper towel (avoid cloth towels as they spread bacteria).

7. Do not touch your face, clothes or other parts of your body after you have washed and dried your hands.

Protective clothing is used to protect the food from contamination and may include:

- hair covering (caps or hair nets),
- apron,
- gloves, and
- enclosed footwear or boots.

Food handlers are required to maintain clean protective clothing that prevents food from coming into contact with any portion of their ordinary clothing. The upper and lower torso is to be covered when handling or preparing un-packaged seafood.

Hair is a common cause of physical and bacterial contamination of foods. To prevent hair from coming into contact with food or food contact surfaces, food handlers are required to wear clean hair covering when in food preparation, packing and services areas.

Quite a number of outbreaks of food poisoning have been caused by people who are ill. Colds or 'flu can result in coughing and sneezing which may directly contaminate seafood or may result in poor hygiene (such as not washing hands). Diarrhoea and infectious illnesses (like hepatitis) pose a significant risk to food safety as they can be transmitted through food.

Staff are required to tell management if they are suffering from:

1. Severe cold or 'flu symptoms.
2. Stomach cramps, vomiting and/or diarrhoea.
3. Contagious or infectious diseases.
4. Infected wounds, sores or boils.
5. Dermatitis, rashes, or skin irritations.

They are not permitted to perform any activity where there is direct contact with seafood, and should only work in areas where there is no risk of contamination.

Following is a list of some other recommended personal hygiene requirements.

- Cover cuts, burns, rashes or other injuries. Use brightly coloured, waterproof bandages & wear a disposable glove over the top.
- Remove all jewellery as it prevents effective hand washing and poses a risk of physical contamination.
- Remove nail polish, heavily scented hand creams or other cosmetics that could contaminate the seafood.
- Do not eat or drink in food preparation or storage areas.
- Do not smoke in food preparation or storage areas.

It is a good idea for seafood businesses to document their requirements for personal hygiene and have them accessible to all staff. A sign or poster of the requirements may be useful. It is important to note that visitors and contractors must also abide by the personal hygiene requirements.

4. PREMISES HYGIENE

Good premises hygiene is essential for producing safe seafood and a good shelf life.

Good premises hygiene includes:

- cleaning and sanitation of seafood preparation surfaces and equipment,
- controlling pests and vermin (such as rodents, cockroaches, flies),
- effective waste disposal, and
- maintenance of premises and equipment.

Why do we clean and sanitise?

Cleaning and sanitation is often seen as a chore. It is done at the end of the day, staff are tired, and it has a financial cost. Failure to perform effective cleaning however, can result in substantial product losses, and possible food poisoning.

All surfaces, equipment and utensils that come into contact with seafood should be cleaned and sanitised at least on a daily basis. This means it should be odourless, free of soil, and be almost entirely free of bacteria.

The main reasons we clean and sanitise regularly are;

- to minimise the risk of contamination (e.g. bacteria, insects, foreign objects),
- to maintain safe seafood and prevent food poisoning,
- to maximise product shelf life,
- to reduce premature product spoilage and waste,
- to prevent the attraction of pests and vermin,
- to prevent objectionable odours,
- to meet regulatory requirements,
- to satisfy customers, and
- to provide a safe environment to work in.

What is cleaning?

Cleaning is the removal of all waste materials from surfaces. Waste material may be anything that is harmful to the food, unsightly, or a potential food supply for the bacteria. Seafood waste materials would include fish scraps, protein residues, fat, blood, guts, scales and slime.

Because of fatty residues and sticky slimes, a detergent is necessary to effectively remove waste materials from seafood preparation surfaces.

A detergent is a cleaning chemical that:

- is able to 'wet' the surface,
- softens and penetrates waste materials,
- breaks up fats and holds them in suspension,
- lifts waste materials so they can be rinsed away with water,
- does NOT kill bacteria.

What is sanitising?

Because detergents do not kill bacteria, surfaces, equipment and utensils that have been thoroughly cleaned also need to be sanitised.

Sanitising is the killing of bacteria on a clean surface through the use of;

- steam,
- hot water (>75°C), or
- chemicals, applied as foams or sprays.

There are many types of chemical sanitisers available, but it is important that they;

- are of food grade,
- must be applied at the right concentration, and
- require time to work (contact time).

Chlorine-based sanitisers are often used due to their low residual properties. Phenol-based sanitisers are not recommended as they leave a residue that can taint seafood.

What is good housekeeping?

Good housekeeping is the practice of ‘cleaning as you go’. Continually cleaning up is necessary to:

- control contamination, and
- maintain a safe working area.

Good house keeping would include the following practices:

- Regular removal of food residues, food scraps, and waste materials from work areas and amenities.
- Adequately store packaging materials to prevent contamination (for example dust, insects, chemicals).
- Maintain work areas in a neat manner, where equipment (for example tools and hoses) is returned and adequately stored.
- Provide good supply of suitable cleaning equipment such as mops, brushes, protective clothing, and gloves. Avoid the use of cleaning cloths as damp cloths breed bacteria.
- Store and maintain cleaning equipment hygienically and replace when worn.
- Store cleaning chemicals away from foods and packaging materials.

What is a cleaning procedure?

To ensure effective cleaning and sanitation, and to make sure all staff are aware of their duties, it is recommended that seafood businesses document their cleaning procedure. This procedure should cover walls, floors, benches, sinks, equipment and other seafood contact surfaces, as well as the method of chemical dilution and application. The method of cleaning may vary depending on the item being cleaned, the equipment available, and the chemicals used. Cleaning procedures can be written in conjunction with cleaning chemical suppliers.

There are many different cleaning and sanitising chemicals available, including combined detergent and sanitisers, foams, no-rinse sanitisers, and sanitiser sprays. Because of this, a generic cleaning procedure may not apply to all seafood premises.

An example cleaning procedure may include the following steps;

Step 1	Dry clean	<ul style="list-style-type: none"> • surfaces are wiped and floors swept • solid wastes (i.e. seafood scraps) are put into waste bins
Step 2	Cold water wash (removes soluble waste & softens remaining materials)	<ul style="list-style-type: none"> • use cold water under pressure to wash walls, floors and equipment. Hot water is not recommended as it causes food residues to set and become difficult to remove • start from the corners and work towards the drain (top to bottom) to reduce the spread of contamination
Step 3	Apply detergent & scrub (loosens and lifts soil and dirt)	<ul style="list-style-type: none"> • apply an approved food grade detergent to all surfaces, moving upwards from the bottom to the top and observing manufacturers instructions (i.e. concentration, contact time, temperature) • scrub equipment and surfaces using cleaning pads or sponges • remove any build up of materials (e.g. around hand basins and equipment)
Step 4	Warm water rinse (removes dissolved waste materials and cleaning chemicals)	<ul style="list-style-type: none"> • rinse all detergent from the surfaces using warm potable water under pressure from the top down
Step 5	Apply sanitiser (kills any bacteria present)	<ul style="list-style-type: none"> • very hot water (greater than 75°C) or an approved food grade chemical sanitiser may be used • apply the sanitiser to all surfaces by moving upwards from the bottom to the top and observing manufacturers instructions (i.e. concentration, contact time, temperature)
Step 6	Hot water rinse (removes sanitiser)	<ul style="list-style-type: none"> • rinse all sanitiser from the surfaces using hot potable water (greater than 75°C) under pressure from the top down
Step 7	Flush drainage system	<ul style="list-style-type: none"> • flush the drainage system with high pressure water for several minutes to prevent a build up of food residues and the possible production of odours
Step 8	Allow to air dry (removal of water prevents any remaining bacteria from growing)	<ul style="list-style-type: none"> • ensure surfaces and equipment dry rapidly. • do not dry surfaces with tea towels as they may re-contaminate the surface (if a towel is needed, use a disposable paper towel)
Step 9	Inspect	<ul style="list-style-type: none"> • inspect surfaces and equipment for cleaning effectiveness • determine if they look, feel and smell clean? (i.e. look for streaks, feel for grease residues, wipe with a tissue to detect discolouration, run your finger under bench tops, move equipment, if you can smell fishy odours then there is a cleaning problem) • may be performed as part of the 'Pre-Operational Hygiene Inspection' or during hygiene audits

What is a cleaning schedule?

How often you clean something will depend on the item being cleaned. Some items are required to be cleaned and sanitised daily, while others may be weekly or even monthly. Seafood contact surfaces should be cleaned and sanitised daily, while an exhaust canopy should be cleaned at least weekly.

One of the best tools to ensure cleaning duties are completed when required is through the use of a cleaning schedule or roster. A cleaning schedule lists all the items that require cleaning, the frequency of cleaning, who is responsible for performing the cleaning, and possibly the cleaning method to be used.

The cleaning schedule should be placed on a wall in a visible location. At the completion of cleaning, the responsible person is required to sign or initial the cleaning schedule.

The benefits of using a cleaning schedule ensure that;

- items are not forgotten to be cleaned,
- staff understand their duties and responsibilities,
- there is a permanent record of performing cleaning and sanitising, and
- staff are accountable.

Following is an example of a cleaning schedule.

Sample Cleaning Schedule

Daily Cleaning & Sanitation

Items to be Cleaned	Method	Person Responsible	Mon	Tues	Wed	Thur	Fri	Sat
Preparation benches	DS							
Hand wash basin & sinks	DS							
Buckets / Tubs / Boards	DS							
Equipment e.g. knives, tongs	DS							
Display cabinets	DS							
Bain Marie	DS							
Scales	DS							
Price labels	DS							
Utensils / Pots / Crockery	DS							
Display cabinet	DS							
Internal waste bins	DS							
Cookers / Stoves / Fryers	D							
Washing-up area	D							
Floors & walls	D							

Weekly Cleaning & Sanitation

Items to be Cleaned	Method	Responsible	Mon	Tues	Wed	Thur	Fri	Sat
Delivery vehicle	DS							
Coolroom / refrigerator	DS							
Toilets & Basins	DS							
Dry goods store	P							
Plastic curtains	D							
Exhaust canopy	D							

Monthly Cleaning & Sanitation

Items to be Cleaned	Method	Responsible	Mon	Tues	Wed	Thur	Fri	Sat
Freezers	D							
Cupboards / Shelving	D							
Lighting & ceiling	D							
Walls	D							
Windows & screens	D							
Exhaust fans / Ventilation	D							
Drains / Grease Traps	P							
Yard & surrounds	P							
External Waste disposal area	P							

Cleaning Method:

P = Physical

D = Detergent

S = Sanitiser

How is pest control important to premises hygiene?

Pests are a potential source of contamination. Flies, cockroaches, mice, birds, and animals all carry bacteria and, if not controlled, they can bring food poisoning bacteria into a premises.

The best cleaning and sanitising procedure can be destroyed if cockroaches or mice are active during the night. Good personal hygiene and food handling practices can also be in vain if flies have access to food processing areas or seafood is not protected from flies.

To control pests, two possible approaches that can be used:

- preventive measures, and
- elimination measures.

Preventive measures are the most effective approach and often the cheapest. They aim to:

- prevent pest entry to the premises, and
- remove the food supply (e.g. starve them out).

Elimination methods are used to control pests that gain access to premises. These types of pest control methods are usually more expensive but may be required under certain circumstances.

The location of baits and the application of chemical sprays are particularly important because baits and sprays could contaminate seafood. Baits must be located away from foods. Foods and packaging materials must be protected from chemical sprays. You may need to seek professional advice when deciding what pest control measures to use.

Preventive Measures	Elimination Measures
Fly screens, plastic strips, air blowers	Internal fly traps & zappers
Sealing access points (e.g. cracks)	Rodent or cockroach traps & baits
Eliminating harbourage sites	The application of chemical sprays
Controlling waste materials	
Effective cleaning	
Cover all foods or store in lidded containers	

Effective pest control also requires routine premises inspections to look for signs of pest activity (such as smears, droppings, gnaw marks). This could be done weekly as part of the cleaning program. Look in the places where activity may be expected, such as inside cupboards, underneath refrigerators, and in drains.

Why is waste disposal important to premises hygiene?

Seafood waste is highly perishable and may generate offensive odours. Seafood scraps and waste materials are a potential food supply for bacteria.

All pests require food and moisture to survive. Waste materials are an important food supply for pests, so controlling your waste will help control pests. If you remove the food supply you can effectively 'starve them out' and prevent them from breeding.

Effective handling and disposal of waste would include:

- avoiding contact with protective clothing,
- washing hands after handling waste materials, and
- identifying waste bins and using lids.

Why is the maintenance of premises & equipment important to premises hygiene?

The design of a food premises must:

- protect food, equipment, appliances and packing materials from the weather,
- enable easy and adequate cleaning,
- prevent the entry of pests and vermin, and
- exclude, as far as practicable, the entry of dirt, dust, smoke, foul odours and other contaminants.

As a general rule, if something is easy to clean, it will get cleaned. Consequently, it makes good sense to keep your premises in good repair. Internal walls, floors and ceilings must be smooth, durable, resistant to corrosion, non-toxic, impervious to water and non-absorbent. They must be maintained free from cracks, crevices and other defects. If they do not fit this description they will be harder to clean and often will not be cleaned thoroughly.

5. SEAFOOD HANDLING AND STORAGE

Seafood purchased by a retail store for on-selling to the consumer, must be safe and of sufficient quality to ensure it will not spoil during expected storage times. Good handling and storage practices are needed by the retail store to ensure that the customer receives safe seafood that will keep for a reasonable time, is fresh in appearance and colour, and is palatable when consumed.

How do I purchase safe, quality seafood?

The three most effective ways of ensuring you purchase safe, quality seafood are to:

- know your supplier,
- perform a receipt inspection, and
- ask your suppliers to show you their Food Safety Program.

Careful selection and evaluation of your suppliers will ensure seafood has been harvested from uncontaminated waters by commercial fishermen, and that it has been handled and stored safely.

Checking the following at receipt will confirm seafood safety and freshness:

- product temperature (chilled seafood should be below 5°C but ideally between -1.5° and 2°C; frozen seafood should be below -18°C),
- package condition and use-by-date of pre-packaged seafood,
- hygiene and cleanliness of the transport vehicle,
- a record of the species, harvest date and location, and supplier's name, and
- visual quality criteria, as listed in this handbook.

To minimise the potential risk to consumers, seafood retail outlets should be able to trace seafood back to the supplier. This information is necessary to allow for rapid notification and effective recall if seafood contamination is suspected.

The results of any inspection should be recorded to provide permanent evidence of good supply. This can be achieved by recording the information on the receipt or delivery docket, or by using a 'Goods Received Inspection Record'.

Date	Product	Supplier	Quantity	Inspection Result	Comments & Action Taken	Checked By (signature)
				<ul style="list-style-type: none"> • use-by-date • package condition • product temperature • quality assessment 		

If you are not happy with what you have received, do not be afraid to reject the delivery and inform the supplier. It may be a good idea not to purchase from them until they can demonstrate better control.

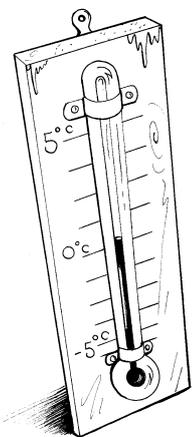
Requiring your suppliers (especially suppliers of processed ready-to-eat seafood) to have a Food Safety Program and HACCP Plan will give you further assurance that the purchased seafood has been handled and stored safely.

How do I store seafood safely?

During storage, the pleasant flavours of seafood are progressively lost as spoilage occurs, and stale unpleasant flavours develop. As these spoilage flavours increase, the seafood becomes less acceptable to the consumer.

To prevent seafood spoilage, three important factors must be controlled during storage:

- Product temperature,
- Storage time (stock rotation), and
- Protection from contamination.



Fresh seafood must be stored between -1.5° and 5°C .

Frozen seafood must be stored at -18°C or lower.

Seafood should never be at room temperature.

Storage temperatures closer to 0°C (between -1.5°C and 2°C) or lower than -18°C , will give a longer shelf life as they minimise the activity of enzymes and the growth of bacteria.

Avoid the partial freezing of seafood because

- seafood cannot be sold as 'fresh' if its temperature has gone below -1.5°C , and
- storage temperatures between -2°C and -5°C will cause the disruption of cell membranes and speed up enzyme activity.

Stock rotation during storage is important to maintain seafood safety and freshness. Never mix two deliveries and identify them by using different shelves and date codes. Rotate stock and prevent left over seafood coming in contact with fresh seafood. A stock rotation system should operate on the 'first in - first out' principle.

To prevent contamination during storage and display, seafood should be covered, separated, and well drained. The following seafood should be separated to prevent cross contamination:

- Cooked or 'ready-to-eat' from raw seafood,
- Different seafood species (especially shellfish from finfish),
- Processed seafood (e.g. smoked fish) from fresh seafood (e.g. fish fillets),
- Seafood from other foods.

Seafood must not rest in liquids during storage as this will cause the flesh to go mushy and will leach out flavour and colour.

Seafood can be stored safely:

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

How do I store fresh seafood using ice?

For maximum shelf life, the best technique for storing fresh chilled seafood is to pack it in ice. This retains freshness, quality characteristics and prevents dehydration and spoilage.

Ice operates most efficiently when it melts and when in direct contact with the seafood. The melting ice allows a heat transfer while also washing bacteria from the outside of the fish.

Effective ice storage of seafood includes the following steps:

1. Wash whole fish (both outside and inside), remove foreign matter, such as seaweed, and allow to drain. Seafood should be washed in salted chilled water to prevent flavour loss.
2. Plastic wrap any exposed flesh not covered by skin or shell to prevent contact with ice and melt waters.
3. Layer seafood in a shallow container and surround (bottom, sides and between layers) with an equal weight of crushed or shaved ice. Fillets should be protected by sheets of plastic and lie flat with the skin side up to prevent gaping. If the fillets are skinned, the sides with the bloodline should be stored facing each other to prevent leaching of blood and discolouration of fillet. Whole fish should be stored belly down and head to tail (soldier stacking). Whole crabs should be stored upside down. Green prawns should be stored in an ice slurry.
4. Cover the container during storage using lids or plastic wrap to prevent contamination.
5. Melted water should be drained through a perforated base and collected in a tray underneath. Melting can be slowed by placing the container in a chiller, but care should be taken that the thermostat is not set below 0C.
6. Replace ice as it melts or becomes contaminated.

How do I store seafood in a chiller, coolroom or refrigerator?

Chiller, cool room or refrigerator storage is often used as an effective method of controlling seafood temperature. These environments however can dry out seafood, and ice may also be needed to prevent dehydration.

If a chiller, cool room or refrigerator is used for seafood storage, it is important to;

- check the storage temperature regularly and record it at least daily. Storage temperatures can be recorded on a suitable form such as an 'Appliance Temperature Record'.
- Rotate stock.
- Ensure there is sufficient air circulation and that the unit is not over stocked.
- Open the chiller door as little as possible, as temperature fluctuations will speed up biochemical and bacterial spoilage.

Ensure seafood juices are contained, and if stored in the same refrigerator, that cooked or 'ready-to-eat' seafood is above raw seafood.

How do I store live seafood?

Live seafood should be purchased from a reputable supplier and particular care taken during handling and storage. If the live product dies, it is frequently due to little cooling and it is very hard to determine the quality and safety of this product. If this occurs it is advisable to remove the product from sale and dispose of it in a landfill waste to prevent the possible transmission of aquatic diseases. (DO NOT dispose of it through the stormwater drain).

Different species have different needs, however they all should be:

- kept cool,
- kept moist,
- kept dark, and
- handled carefully.

To achieve the best survival and longest shelf life when live seafood is stored, ensure that it is kept in the optimum temperature range to reduce mortality.

- Live lobster should be held in a tank with clean well-aerated water, between 10°C and 15°C.
- Live yabbies and marron should be held in clean well-aerated water between 10°C and 20°C.
- Live blue swimmer crabs should be held in clean well-aerated water between 10°C and 20°C. Claws should be fastened to prevent injury to one another.
- Live fish should be kept in clean well-aerated water at a temperature in keeping with their natural habitat.
- Discard any bivalves that are not capable of closing when tapped. Gaping shells where the soft tissue inside is exposed may indicate spoilage and thus should be treated with caution.

It is not always practical to keep seafood live in aquariums. Indeed in particular cases, such as oysters, the eating quality may suffer if placed in an aquarium. For specific conditions refer to the *Australian Seafood User's Manual*.

How do I handle & prepare seafood safely?

There are three main ways that seafood can be prepared for retail display or sale.

1. Fresh preparation (scaling, filleting, slicing and shucking).
2. Cold processing (marinating, pickling, smoking,).
3. Cooking.

During the handling and preparation of seafood, the following points are important for maintaining food safety:

- Maintain good staff and premises hygiene.
- Never leave seafood at room temperature awaiting preparation.
- Return prepared seafood to a temperature controlled environment.
- Prepare small amounts at a time.
- Prevent unnecessary contact with seafood.

Particular care should be taken when handling 'ready-to-eat' seafood, such as:

- raw seafood (oysters, sashimi tuna, surimi products),
- cooked seafood (whole or peeled prawns),
- smoked seafood (smoked salmon), or
- marinated seafood (pickled mussels).

Preventing contamination of 'ready-to-eat' seafood is critical as there is no cooking step, prior to consumption, which would normally kill any food poisoning bacteria. 'Ready-to-eat' seafood should be separated from raw seafood during preparation. This can be achieved by preparing at different times, different locations, or by using different equipment and utensils (e.g. colour-coded).

The vast majority of seafood is cooked prior to consumption, either by manufacturers, by retail outlets (e.g. restaurants or fish & chip shops) or in the customer's home. It is important to understand that raw seafood may contain bacteria, and if it is not cooked sufficiently it could result in food poisoning. Therefore it is essential that the cooking process will fully cook the seafood. An internal temperature of greater than 60°C is required to kill bacteria. It is not practical to check every piece of seafood that is cooked, however you can verify that a particular cooking temperature and time will achieve an internal temperature of greater than 60°C. Staff training and written instructions on the cooking of seafood will also help ensure effective cooking. Take care not to overcook seafood as it can become tough and dry.

When cooking seafood in retail outlets, minimise the time seafood is at room temperature. Avoid coating or batter mixes becoming contaminated with bacteria by using small batches and replacing often.

How do I freeze and thaw seafood safely?

The causes of seafood spoilage are retarded or eliminated when seafood is frozen. After thawing however, seafood again becomes subject to bacterial and other types of spoilage.

The faster you freeze seafood the longer its shelf life. Slow freezing may speed up enzyme activity or will produce larger ice crystals which may damage the flesh and result in a loss of quality.

Ice crystal damage is obvious when seafood is thawed, as a large amount of fluid can be lost resulting in dry tough flesh and a loss of flavour.

It is better to buy commercially frozen seafood than to poorly freeze it yourself. If you have to freeze seafood, the seafood must be of good quality (fresh), and it must be frozen as quickly as possible.

The following steps are recommended for the safe freezing of fish:

1. Whole fish should be gilled and gutted.
2. Wash whole fish (both outside and inside) and allow to drain.
3. Pre-chill the seafood (e.g. in a refrigerator or an ice slurry preventing water contact with exposed flesh).

4. Wrap the seafood in a clean plastic film or pack into a freezer bag.
5. Remove all the air as this will slow bacterial growth and prevent oxidation.
6. Label the seafood (species, weight, date frozen).
7. Place the seafood into the freezer in single layers (fillets flat, whole fish and crustaceans belly down with head lower than the tail).
8. Freeze small quantities at one time.
9. To extend the frozen life of seafood, whole fish may be removed from the freezer after they are fully frozen, unwrapped and dipped or sprayed with water. This will produce a protective ice layer and reduce dehydration. Rewrap, re-label and return to the freezer.
10. Fish can be kept frozen for 4-6 months (three months for oily fish).

Even if quickly frozen after catching, frozen seafood will not keep indefinitely. Bacterial activity ceases below about -10°C , but chemical and biochemical changes (enzymes, oil oxidation, dehydration) will still occur. These changes may bring about slow irreversible changes in odour, flavour and appearance. For long-term freezer storage, it is recommended that a temperature of -30°C is maintained (this may only be achieved by commercial freezers). Seafood stored at -15°C (domestic freezers) will have a much-reduced shelf life.

Other important points to remember when freezing seafood include the following.

- Never freeze unsold seafood (bacterial spoilage may have already occurred).
- Do not refreeze seafood, as it will increase the chance of bacterial spoilage.
- Handle frozen seafood gently as it can be easily damaged.
- Regularly defrost freezer as ice build up will slow the process of freezing.
- When defrosting the freezer, move seafood to an alternative freezer or totally run stocks down.

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

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

Do not thaw seafood at room temperature as the outer layers of the flesh may rapidly deteriorate while the inner layers remain frozen, resulting in the development of 'off' smells and flavours. Seafood thawed in running water may become waterlogged and there may be some flavour loss. The skin of whole fish that have been thawed in water may lose its gloss and sometimes become bleached.

How safe is my ice and water?

Ice and water has the potential to contaminate seafood and cause food poisoning if it is not manufactured or handled under hygienic conditions. Retail seafood premises can minimise the risk of bacterial contamination of seafood from ice or water by:

- using only potable (drinkable) water to wash seafood and the premises,
- using only potable (drinkable) water to make ice,
- monitoring samples of the water supply,

- regular cleaning and sanitising of ice storage facilities and ice machines,
- regularly replacing or sanitising filters,
- storing ice scoops hygienically so they do not become contaminated,
- practising good staff hygiene, and
- never re-using ice, as it will contain bacteria.

How do I display seafood safely?

It is just as important to display and serve seafood to the customer in a safe manner as it is to control safety during receipt, storage and preparation. Seafood contamination and spoilage can be prevented during display and customer service by:

- maintaining display cabinets between -1.5°C and 5°C ,
- maintaining good staff and premises hygiene,
- using clean trays for displaying seafood,
- preventing unnecessary contact with seafood (use tongs, disposable gloves, or plastic bags where possible),
- changing or washing gloves as often as you would wash your hands,
- using separate tongs for 'ready-to-eat' seafood,
- weighing seafood onto a piece of plastic wrap or into a plastic bag (never directly onto the scales),
- separating 'ready-to-eat' seafood, preferably in different compartment or by a physical barrier,
- not overstocking the display cabinet as this will reduce effectiveness,
- loading display cabinets with pre-chilled seafood (display cabinets are designed to temporarily hold temperatures but not to reduce a product's temperature), and
- not using display signs that puncture the flesh (they are a potential source of contamination and allow easy access for bacteria),

Ideally, display cabinets should be fully enclosed to maintain a constant air temperature and prevent contamination. If open display is used, protect the seafood with sneeze guards, have a 10 to 20 cm deep bed of ice, and add an 8 cm-high ice ridge along the back edge of the case.

Display cabinets should be sloped between 12° and 22° to assist cold air convection, and have a wide straight drain to allow melt water and other fluids to drain away as quickly as possible.

Spraying seafood with an ice water mist approximately every hour, or as needed, will prevent dehydration and keeps the seafood looking moist.

The importance of temperature control!

Temperature control throughout the entire process of seafood receipt, transport, processing, storage and display is critical to ensuring the retail sale of safe, high quality seafood that has a maximum shelf life. This sequence of temperature control is often referred to as the cold chain.

Because temperature control is critical to seafood safety and quality, as well as having thermometers on or in all appliances (e.g. refrigerators, freezers, display cabinets, transport vehicles), it is recommended that retailers have a portable thermometer that can accurately measure product temperatures to within 1°C .

Transportation of seafood requires all the same controls to maintain safety and quality. Transport vehicles should be maintained in a clean and hygienic state, and transport methods (refrigerated or use of ice) should be capable of maintaining seafood at between 0 and 5°C.

6. FOOD SAFETY PROGRAMS AND HACCP

How do you reduce the risk of food poisoning outbreaks?

Traditionally, food safety has been determined through premises inspection and end product testing. This form of reactive control has proved costly and ineffective. To reverse the increasing incidences of food poisoning, the new proactive approach to managing food safety is the adoption of Food Safety Programs.

Developing a Food Safety Program will help a seafood business understand its product and process, and will ensure controls are in place for identified food safety hazards. The proactive approach of Hazard Analysis Critical Control Point (HACCP) has been adopted internationally by regulators and industry.

What is a Food Safety Program?

A Food Safety Program (sometimes called a Food Safety Plan) is a written document which details the businesses activities and responsibilities associated with the production of safe food. It documents staff and operational requirements necessary to minimise the risk of food poisoning.

The food safety program will detail how a food business is going to maintain staff and premises hygiene, and manage the safety of seafood from ingredient receipt - during food preparation and storage - through to customer delivery. A Food Safety Program for a seafood retailer, may comprise of:

- staff food hygiene training,
- documents describing staff and premises hygiene requirements (GMP),
- a method for hazard identification and control (HACCP),
- a food recall procedure, and
- a system for maintaining records, reviewing the program, and amending documents.

The complexity of a Food Safety Program will vary depending on the size of the business. For some businesses, the FoodSafe Plus Program may be appropriate, while other businesses will have other requirements.

During the development and implementation of a Food Safety Program, a retail seafood business will be expected to:

- systematically identify the potential hazards that may be reasonably expected to occur,
- identify where each identified hazard can be controlled and the means of control,
- provide for systematic monitoring of those controls,
- provide for appropriate corrective action when a hazard is found not to be under control,
- provide for regular review of the program by the food business to ensure its adequacy, and
- provide appropriate records to be made and kept by the food business.

The identification of potential food safety hazards and their methods of control may be achieved by utilising HACCP principles, or by documenting them into procedures.

Once developed, the Food Safety Program is required to be:

- maintained on site,
- reviewed at least annually to ensure its adequacy, and
- audited by a Food Safety Auditor.

A Food Safety Program requires review and audit activities to:

- ensure it has been effectively implemented,
- determine if it needs updating, due to process changes or the identification of new hazards, and
- verify that food safety is being achieved.

How do I train my staff?

Food hygiene training is essential to ensure staff understand their duties and responsibilities in relation to maintaining food safety and minimising the risk of food poisoning.

It is the responsibility of the proprietor to ensure that staff undertaking or supervising food handling operations have skills in food safety and food hygiene matters commensurate with their work activities.

Food hygiene training should cover the *why* and *how* of:

- bacteria and food poisoning
- personal hygiene (washing your hands, protective clothing and staff illness or injury)
- premises hygiene (cleaning program, pest control, waste disposal)
- food handling and storage.

Food hygiene training may include on-the-job instruction, induction training, in-house training programs, or course attendance.

The Seafood Industry Training Package has been developed for all sectors of the seafood industry. Registered training providers are able to deliver fully certified training that is recognised in Australia and New Zealand. An alternative to this is the 'FoodSafe Food Handler Training Program', which is a simple in-house training program that provides basic food hygiene information to food handlers. For more information on these contact SQMI.

What is good manufacturing practice?

Good manufacturing practices (GMP) are all the activities and work practices undertaken to prevent damage, deterioration, or contamination of food or ingredients. These include setting requirements for staff and premises hygiene, the maintenance of premises and equipment, and providing appropriate equipment.

Before considering the safe preparation and storage of seafood, the premises must be properly constructed inside and out, equipment must be suitable for the purpose, surfaces must be clean, and staff must practise good hygiene.

Implementing good manufacturing practices will ensure that the foundations are in place to be able to implement a Food Safety Program. These GMPs will include subjects previously mentioned under earlier headings, including premises, staff, storage and conditions.

Documented procedures or work instructions are the most effective way to prevent contamination from food handlers, the premises and equipment. These procedures ensure staff know their responsibilities, perform their duties in a consistent manner, and provide the basic operational requirements necessary for the production of safe seafood.

Procedures need to be simple and easily interpreted by staff, and may include:

- flow diagrams,
- pictures or graphical representations, or
- written text.

Procedures may be developed and implemented for the following activities

- personal hygiene,
- cleaning and sanitation,
- pest and vermin control,
- waste disposal,
- facility and equipment maintenance,
- product handling, storage, identification and traceability,
- food temperature measurement and thermometer calibration, and
- staff training.

Written procedures should be accessible to staff and become a useful tool for staff training.

What are food safety hazards and how are they controlled?

Before you can identify possible food safety hazards associated with your business, you must first list all the steps used to obtain, prepare and serve seafood to your customers. These may include ordering or purchasing seafood; transport from market to store; receipt of seafood; storage; preparation steps (such as scaling, gutting, filleting, slicing, or shucking); processing steps (freezing, thawing, marinating, pickling, smoking or cooking); display for sale; and sale to customer.

Once you have listed all the process steps, you then need to identify all the potential hazards at each step, then determine how you are going to control them.

There are three possible types of hazard that may make seafood unsafe.

- **Biological contamination** - including bacteria, viruses and parasites.
- **Chemical contamination** - including pest control chemicals, detergents, and sanitisers.
- **Physical contamination** - including metal, plastic, glass implements or containers, jewellery, and hair.

Examples of some potential hazards that could be identified by a retail seafood business and possible methods of control are included in the following table:

Process Step	Potential Hazard	Control Measure
Purchase or receipt of seafood.	<p>The seafood is contaminated with:</p> <ul style="list-style-type: none"> • Seafood toxins (e.g. Paralytic Shellfish Poison, Ciguatoxin) • Heavy metal (e.g. mercury) contamination particularly shark and large predatory fish. • Bacteria (e.g. <i>Vibrio</i>, <i>clostridia</i>, <i>Staphylococcus aureus</i>, listeria, salmonella,) • Scrombrotoxin (histamine) • Viruses (e.g. Hepatitis) • Parasites (e.g. anisakis) • Foreign objects (e.g. wood, glass, plastic) 	<ul style="list-style-type: none"> • Approved supplier program. • Harvested from uncontaminated waters (from an approved area). • Effective chilling from harvest to the retail store. • Good hygiene during handling and transport. • Purchase of fish of a limited size. • Cooking prior to consumption.
Transport to store	<ul style="list-style-type: none"> • Contamination during transport (from vehicle or food handlers). • Growth of bacteria due to poor temperature control. 	<ul style="list-style-type: none"> • Good personal hygiene, cleaning and sanitation (Procedures & GMP) • Monitoring storage temperature. • Chiller / freezer unit maintenance. • Effective use of ice
Storage	<ul style="list-style-type: none"> • Growth of bacteria due to poor temperature control or excessive storage time. • Cross contamination between cooked or 'ready-to-eat' and raw seafood. • Contamination from staff or equipment (e.g. trays). • Use of contaminated ice or water. 	<ul style="list-style-type: none"> • Monitoring storage temperature. • Chiller / freezer maintenance. • Effective method of storage (e.g. air circulation, not overstocking, use of ice). • Stock rotation system. • Separation during storage. • Good personal hygiene, cleaning and sanitation (Procedures & GMP). • Only use potable water and ice made from potable water. • Regular cleaning and sanitising of ice storage facilities and ice machines.
Preparation steps	<p>Contamination from:</p> <ul style="list-style-type: none"> • Staff • Equipment (e.g. knives) • Pests (e.g. flies) 	<p>Procedures & GMP:</p> <ul style="list-style-type: none"> • Personal hygiene procedure • Cleaning and sanitation procedure • Pest & vermin control procedure

	<ul style="list-style-type: none"> • Cleaning or pest control chemicals 	<ul style="list-style-type: none"> • Waste disposal procedure • Facility maintenance procedure
Thawing	Growth of bacteria due to thawing seafood at room temperature.	<ul style="list-style-type: none"> • Thawing frozen seafood in the refrigerator/cool room.
Cooking	Bacteria survival due to insufficient cooking.	<ul style="list-style-type: none"> • Cooking to greater than 60°C. • Monitoring cooking temperature and time.
Display for sale	<ul style="list-style-type: none"> • As for 'Storage' 	<ul style="list-style-type: none"> • As for 'Storage'
Sale to customer	Contamination from equipment (e.g. scale) or staff.	Good personal hygiene, cleaning and sanitation (Procedures & GMP).

Listing all the steps and their potential hazards clearly demonstrates that the safety of retail seafood relies on many factors. These include the effective operation of equipment, as well as staff understanding and adhering to documented requirements. Every step is important to ensuring safe retail seafood and protecting the customer from food poisoning.

What is a HACCP Plan?

HACCP stands for 'Hazard Analysis Critical Control Points'. It is a proactive and preventive system for managing food safety. The concept of HACCP was developed in 1959 to produce safe food for the NASA space program. Since then its application during food manufacture, transport and retail service has gained international acceptance.

HACCP requires a food business to look at all the steps in the process of manufacturing or supplying food (e.g. ingredient receipt, storage, handling and preparation, display and customer service), identifying possible food safety hazards at each step, and then putting controls in place to prevent the hazards from occurring.

HACCP uses a systematic approach for the identification, evaluation and control of food safety hazards. The development of a HACCP Plan utilises five preliminary steps and seven principles prescribed by *Codex Alimentarius*. *Codex Alimentarius* (meaning 'food law') is a collection of internationally-adopted food standards.

The five preliminary steps are:

1. Assemble a HACCP team
2. Describe the product
3. Identify the intended use and consumers of the product
4. Construct a process flow diagram
5. On site verification of the flow diagram.

After the HACCP team completes the five preliminary steps, the following seven principles are applied.

1. Conduct a hazard analysis for each step in the process.
2. Determine the Critical Control Points.
3. Establish critical limits.
4. Establish a system to monitor control of each CCP.
5. Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
6. Establish a procedure for verification to confirm that the HACCP system is working effectively.
7. Establish documentation concerning all procedures and records appropriate to these principles and their application.

A HACCP plan consists of documents and records that are developed when a HACCP team follows the five preliminary steps and seven principles prescribed by *Codex Alimentarius*.

It is important to remember that HACCP manages food safety hazards associated with food and the process of production. Documented procedures covering GMP manages food safety hazards associated with staff and the processing environment.

Before the development of a HACCP plan, retail seafood businesses should gain an understanding of how to apply HACCP principles. It is recommended that at least one member of the HACCP team receives some HACCP training, and technical information can be obtained from food technologists, microbiological laboratories, and contained within industry guides and publications.

There is a lot of information available that can help you develop a HACCP Plan for your business, including guides, generic HACCP plans, and the Internet. It is important to remember that your business is unique, so adopting another business's HACCP Plan will not work. Developing your HACCP Plan utilising these guides and examples, will build understanding and commitment.

What is a food recall procedure?

A food recall is the action taken to remove from sale, distribution and consumption, foods which may pose a safety hazard to consumers. Foods that would pose a safety hazard to consumers would either contain:

- the growth of a bacterial pathogen (e.g. *Salmonella spp.*),
- toxic chemicals (e.g. excessive addition of food additives, chemical contamination), or
- harmful foreign bodies (e.g. glass fragments).

A Food Recall Procedure documents the steps to be taken by a food business when it identifies it has produced or sold potentially unsafe food. The procedure is used to trace the location of potentially unsafe food, and documents the action to be taken to ensure that potentially unsafe food is effectively controlled to minimise consumer illness.

Keeping good records of supplier deliveries (supplier names, type and quantity of seafood, date received, date of harvest) will help perform an effective recall.

For more information on how to perform an effective food recall, see the Australia New Zealand Food Authority (ANZFA) Food Industry Recall Protocol.

In Western Australia, the WA Health Department coordinates an emergency plan called WESTPLAN HEALTH. In the event of a seafood emergency, the number to call is (08) 9480 4960. This number is monitored 24 hours per day and works in conjunction with national emergency management plans.

Why are records important?

Your Food Safety Program and HACCP plan will generate monitoring records. Records should be completed accurately, be legible, and be stored in an efficient manner.

Records are important to a retail seafood business because they are:

- evidence of safe food handling and demonstrate a history of control,
- your defence if implicated in a food poisoning outbreak, and
- an evaluation that can help to identify trends or recurring problems.

What are the benefits of a Food Safety Program?

As well as fulfilling proposed regulatory requirements and growing consumer demands, the development of a Food Safety Program and HACCP Plan will also provide a retail business with many benefits. Following are some of the potential benefits which may improve operational efficiency, reduce costs and increase profits.

- Marketing tool for domestic and overseas markets.
- Safe preparation and service of food, and the prevention of food poisoning.
- Maximum product shelf life.
- Improved consumer satisfaction and increased market share.
- Better trained staff, who understand their duties.
- Ability to display 'due diligence' and protection from litigation.
- Compliance with the National Food Safety Standards for Food Safety Program development and implementation.
- Compliance with customer requirements (e.g. supermarkets or Sydney Fish Market).
- Provides evidence that a business is handling food safely.
- Potential reduced inspection/audit frequencies and associated costs.
- Precise clarification of management objectives regarding food safety.
- Reduced risk of litigation and reduced costs of any such litigation.
- Reduced cost associated with potential product recalls.

What is a Quality Assurance System?

A Quality Assurance System is a documented system that aims to ensure the supply of a quality product or service. It consists of business policies, procedures, work instructions, records, processes, resources and structure for effective quality management.

A Food Safety Program is the beginnings of a Quality Assurance System and can be expanded to fulfil the requirements of any QA Standard or Code.

There are many QA Standards and Codes to which a seafood business can become accredited. Before embarking on quality assurance, it is important to understand the differences between the various standards and codes and to know your reason for accreditation. Do not be afraid to ask for advice.

See the WA Seafood Quality Management Initiative (SQMI) publication *Quality Assurance Guidebook* for more information on QA Systems.

7. MAXIMISING SEAFOOD QUALITY

What is quality?

Before attempting to control the quality of retail seafood, you must first define what constitutes quality. The decision about quality rests ultimately with the consumer. Quality seafood can be defined as seafood that meets the customer's requirements.

Quality is a combination of various properties that influence acceptability. Attributes that determine the quality of retail seafood may include:

- Freshness - degree of spoilage
- Food safety - will not cause illness or injury
- Aesthetic considerations - size and appearance
- Satisfaction on eating -texture and taste
- Degree of contamination with undesirable materials
- Nutritional value
- Cost
- Damage
- Packaging
- Service

Some quality attributes are more important than others, and will vary depending on the type of seafood and the consumer. However, freshness and safety are the single most important requirements for all seafood. Quality attributes that affect the health and safety of the consumer are not negotiable.

Factors that affect the quality of retail seafood at the point of sale include:

- the initial quality of the seafood (from markets or wholesaler),
- time between catching and retail distribution,
- rough handling,
- temperature control,
- staff and premises hygiene,
- method of storage and display (chilled and frozen), and
- staff product knowledge.

How do I assess seafood quality?

'Sensory analysis', or using your senses, is still the most effective way of assessing the freshness and quality of seafood. It is cheap, no equipment is needed, and it is quick.

As we are already aware, when seafood spoils it goes through a sequence of changes that are readily detectable. When assessing seafood quality, the aim is to detect these changes using all your senses.

- Sight - appearance and damage
- Touch - texture of flesh
- Smell - odour of gills and flesh

- Taste - flavour and texture of flesh

Quality characteristics vary between the type of seafood and between species. No single rule applies to all seafood, however the following general quality characteristics can be used as a guide when selecting seafood.

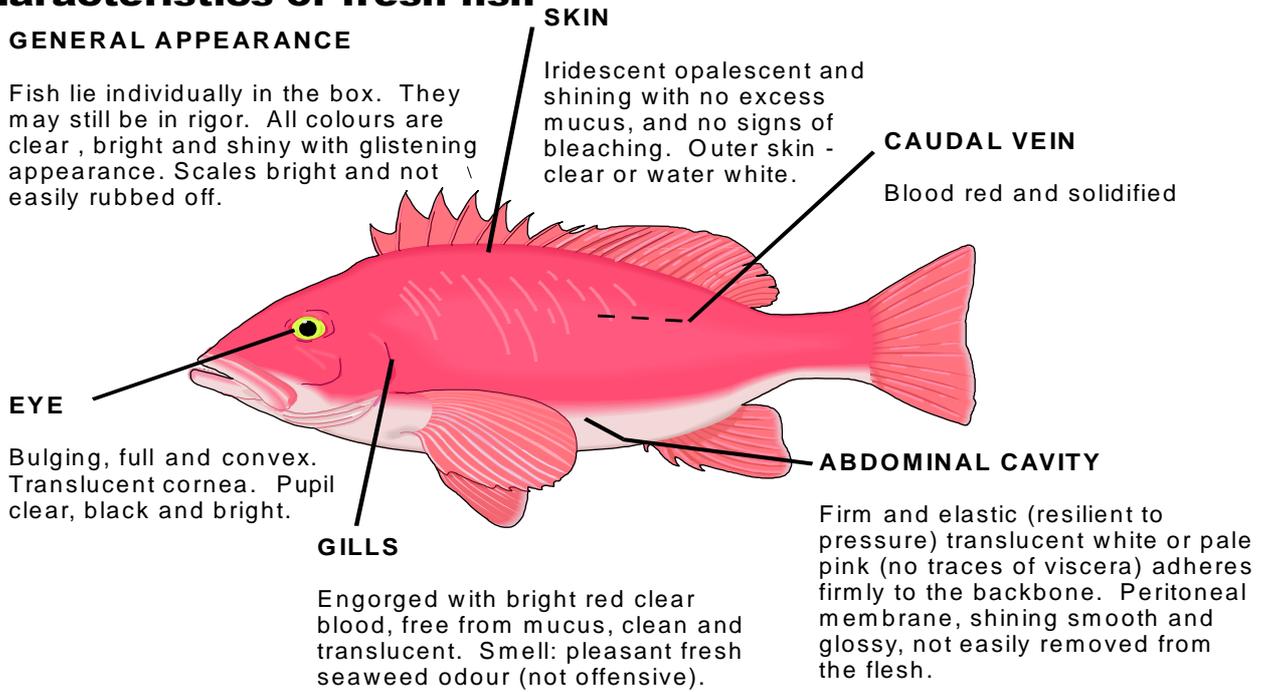
Seafood	Quality Characteristics
Whole fish - good quality	<ul style="list-style-type: none"> • Flesh is firm, moist & elastic to touch (springs back). • Smooth round eyes (not sunken), transparent cornea, & black, shiny pupils. • Skin is intact with bright, glossy, metallic sheen. • Scales lying flat and attached firmly to skin, undamaged fins. • Bright red gills with thin translucent mucus. • Glossy thin transparent and odourless body slime. • Fresh seaweed smell from gut and gill area (no ammonia or 'fishy' smell). • If gutted, no protruding bones, intact lining, no discolouration.
Whole fish - spoiled	<ul style="list-style-type: none"> • Burst belly. • Pupils sunken, cornea milky. • Skin has a thick, milky mucus, and scales missing. • Flesh is soft with no elasticity. • Gills are yellowish, bleached colour, sour odour.
Fresh fish fillets	<ul style="list-style-type: none"> • Skin is intact with bright, glossy, metallic colour. • Flesh is firm, moist & elastic, not separating, firmly attached to any bones. • Odourless slime, pleasant salty, sea smell from gut area (no ammonia or 'fishy' smell).
Crustaceans (prawns, crabs, lobster)	<ul style="list-style-type: none"> • Shell is clean, intact, bright & glossy. Prawns should not have any blackspots (an enzymic spoilage) on the shell or a "gritty" feel about them. • Firmly attached head and limbs. • Moist, firm, white flesh. • Odourless to mild pleasant odour.
Squid and octopus	<ul style="list-style-type: none"> • Bright skin, no staining and intact. • Pure white very firm flesh, not slimy. No "gritty" feel about them • Almost no smell.
Live shellfish (mussels & oysters)	<ul style="list-style-type: none"> • Clean (no sand, mud, barnacles). • Intact closed shell, or closes when tapped. • No unpleasant odours.
Shellfish (scallops, mussels, oysters)	<ul style="list-style-type: none"> • Scallop flesh white to cream. • Mussel flesh white or orange. • Oyster flesh often grey. • Firm, plump, moist & elastic flesh. • Orange roe, firmly attached. • No excess liquid in package. • No unpleasant odours.
Frozen seafood	<ul style="list-style-type: none"> • Hard frozen. • Package intact. • No ice build up (indicates thawing and refreezing). • Individually plastic wrapped or layer packed with plastic sheets. • Bright and glossy colour, no gaping of tissues. • Clean fresh frozen smell.

- | | |
|--|--|
| | <ul style="list-style-type: none">• White or bleached patches on flesh indicate dehydration or freezer burn. |
|--|--|

Characteristics of fresh fish

GENERAL APPEARANCE

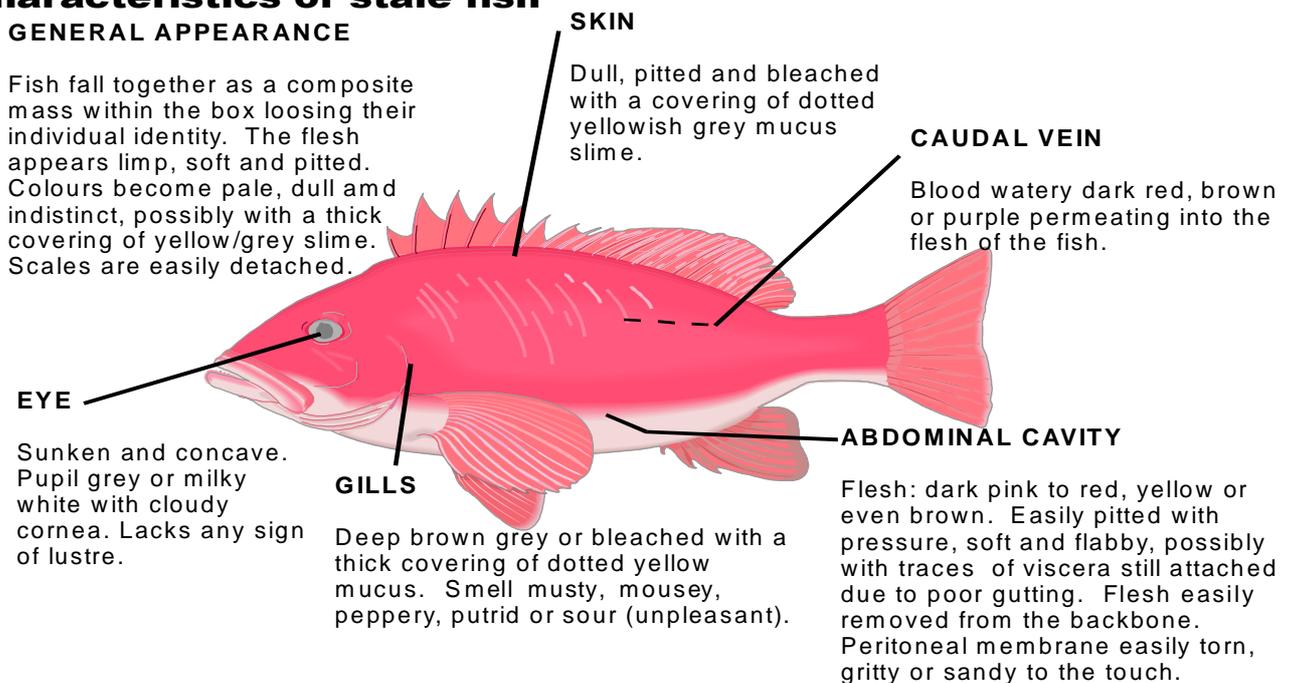
Fish lie individually in the box. They may still be in rigor. All colours are clear, bright and shiny with glistening appearance. Scales bright and not easily rubbed off.



Characteristics of stale fish

GENERAL APPEARANCE

Fish fall together as a composite mass within the box losing their individual identity. The flesh appears limp, soft and pitted. Colours become pale, dull and indistinct, possibly with a thick covering of yellow/grey slime. Scales are easily detached.



How do I maintain seafood quality to the customer?

To maximise seafood quality during receipt, storage, preparation and customer service, retail seafood outlets must:

- Handle seafood carefully
- Separate and grade
- Maintain hygiene
- Keep seafood cold
- Keep seafood covered
- Keep seafood moist
- Keep seafood moving

Fresh Vs Frozen Seafood?

The benefits of freezing seafood are a longer shelf life, and supply is not subject to seasonal variations or weather conditions. The disadvantages of freezing seafood may include deterioration of quality, drip loss during thawing, and the consumer's perception of freshness.

Incorrect freezing and freezer storage of seafood may result in:

- protein denaturing by enzyme action where proteins may lose their structure and thus their ability to hold moisture - on thawing, the flesh loses excessive moisture and looks dull, white and spongy;
- ice crystal formation and cell damage due to slow freezing;
- oxidation of the oils resulting in rancid flavours;
- freezer burn.

The quality of frozen seafood depends on the speed of freezing. Quick freezing of fresh seafood locks in flavour and quality. In some cases commercially frozen or 'sea processed' seafood is of better quality than chilled seafood that may have been incorrectly handled and stored.

8. PRESENTATION, PROMOTION AND MARKETING

Presentation, promotion and marketing play a large part in drawing customers to your shop and making the sale.

How do I display and present seafood effectively?

The importance of seafood display and presentation cannot be over-emphasised. The display will lure the customer to the shop and an interesting presentation will get the sale, particularly the impulse sale.

Seafood presentation, and the image of the premises and staff all have an impact on customers. Things to bear in mind during the presentation and display of seafood are:

- staff product knowledge (know about today's product),
- the presentation should promote product freshness,
- the premises should be seen as clean and hygienic,
- staff should be neat (e.g. uniforms) and hygienic,
- display cabinets should be kept full,
- good housekeeping,
- effective lighting,
- use plenty of ice,
- use garnishes (e.g. whole or fruit slices, well washed parsley), and
- location of product information.

Be careful with garnishes as they may contaminate seafood or result in staining. Parsley may carry bacteria or citrus fruit slices may leave marks on exposed flesh. This can be avoided by washing garnishes and by minimising product contact.

How do I create interest?

Seafood comes in a wide variety of colours, shapes and sizes, so use these characteristics to create stimulating displays. Some points to remember when trying to create interest are:

- variation,
- large variety of colours to catch the eye,
- the use of value-added products,
- bright lights to promote a clean premises,
- music and entertainment (e.g. filleting demonstrations),
- posters to keep the customers thinking about seafood,
- decor that includes an aquarium, illustrated instructions, or photos, and
- seafood arranged according to commodity (fillets, whole fish, shellfish, value-added products)

Entice your customers by providing other meal ingredients and accompaniments (e.g. bottled chilli sauce next to a display of mussels, bottles of lemon juice, bread crumbs). A good location for accompaniments is next to the cash register.

What is the best lighting for seafood?

The best lighting for displayed seafood is blue tint fluorescent lighting. Fluorescent lighting radiates little heat and the blue tint will bring out the seafood's colour and markings.

How can I use quality and price?

Arrange displays according to product quality and price. The oldest and less attractive products should be located at the back, and, if possible, sold first. To help turn over older stock a price-reduction system can be implemented. Use weekly specials to encourage return business. Take note of the best-selling places in your display and utilise these to move older stock.

What is successful promotion & marketing?

Most foods require promotion and marketing to entice customers. Seafood is probably one of the least marketed flesh foods and the least understood by customers. This gives the retail seafood businesses an opportunity to educate the customer and use new marketing ideas.

Promotional options for retail seafood businesses may include:

- face-to-face selling,
- displays and demonstrations,
- discounts, giveaways or competitions,
- media advertising (e.g. local newspaper),
- joining an association to create more profile with your promotions, and
- value-added convenience products.

To successfully promote and market seafood you must first know your customer and their needs. Customers' needs might vary depending on location and season, but may include:

- good service,
- interesting displays and presentations,
- promotional information,
- quality seafood, and
- price.

To obtain more information about your customer you may utilise:

- short questionnaires,
- a suggestion box,
- opinions from tasting, and
- talking to your customers.

Encourage the completion of a questionnaire or the use of a suggestion box by offering a prize (e.g. a voucher) for the best suggestion of the month.

Utilise preparation and cooking displays that offer complimentary bite-size samples. Once a customer has tasted something they are more likely to buy it.

Promote seafood that is in-season as it will be at its best quality and cheapest price, and utilise the 'up-market' image of seafood.

How can I use promotional information?

Seafood is not only perceived as being healthy, it is healthy! Seafood is the complete nutrition package, high in protein, low in fat and containing essential vitamins and minerals. This opens a opportunity to promote seafood as the 'healthy choice' ideal food for health conscious consumers.

Nutritional characteristics of seafood that can be promoted to the customer include:

- high protein (100g serving of fish provides approximately one third of the recommended daily requirement of protein),
- contains all of the essential amino acids (threonine, valine, methionine, isoleucine, leucine, phenylalanine, lysine, arginine and histidine) and many non-essential amino acids (taurine thought to help control blood pressure),
- low cholesterol,
- low in saturated fats,
- high in unsaturated fats,
- monounsaturated fats reduce the risk of coronary heart disease and cancer,
- polyunsaturated fatty acids (Omega-3 fatty acids are found principally in seafood) have a role to play in preventing coronary heart disease, types of arthritis, and possibly even cancer by
 - lowering the level of triglycerides in the blood,
 - reducing blood clotting,
 - prevents hardening of the arteries,
 - reducing inflammation in conditions such as rheumatoid arthritis,
 - improving the immune system,
- high in trace elements and essential minerals (Iodine, Selenium, Iron, Copper, Calcium, Magnesium, Zinc),
- high in vitamins (B group vitamins, Vitamin E, A & D),
- low in salt (associated with high blood pressure),
- easily digestible.

Typically most Australian fish contain about 75 per cent water, 20 per cent protein, 3 per cent minerals and 2 per cent fat. It has been claimed that eating two or more seafood meals per week will lower the risk of coronary heart disease.

As well as information on the nutritional benefits of seafood, customer information cards could be supplied on:

- How to purchase quality seafood
- Handling instructions
- How to prepare seafood in the home
- Recipes to promote healthy eating
- Methods of cooking seafood (steaming, baking, grilling, barbecuing, microwave, marinating, sousing, smoking).

9. PRODUCT KNOWLEDGE AND CUSTOMER SERVICE

How important is product knowledge?

Since many customers are not familiar with the large variety of seafood, face-to-face selling and product knowledge is very important.

Customers may know only a few species of fish, one or two ways of preparing or cooking seafood, and may also lack knowledge on the storage and shelf life of seafood. Therefore seafood retailers who talk to their customers about handling, quality, and meal suggestions are more likely to enhance their sales.

How important is customer service?

Staff appearance and manner have a marked effect on customer perceptions. Positive memories are what motivate customers to return.

The objective of good service is to excite, incite and delight the customer. Good customer service may include such things as:

- smart appearance,
- speed of service,
- knowledgeable and experienced staff,
- polite and personal attitude, and
- building a relationship with your customer (building loyalty).

Avoid over-promising and under-delivering as customers seek service not apologies.

Training staff in retail skills and product knowledge will enhance the customer's shopping experience and increase the sales of seafood.