



Australian Government
Department of Agriculture



The Australian Animal Welfare Strategy (AAWS) – The Development of Specific Operator (Boat) level Fish Welfare Guidelines in the Commercial Capture Fishing Sector



An initiative of the Aquatic Animal Welfare Working Group of AAWS

Dr Paul Hardy-Smith

July 27, 2015

FRDC Project No 2012/507

**AUSTRALIAN
ANIMAL
WELFARE
STRATEGY**



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ISBN 978-0-9756047-5-5

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Acknowledgments

The Project Team would like to thank the Australian Government, Department of Agriculture for the funding that allowed this project to happen, Dr Jon Daly for his valuable work in collating and summarising much of the welfare literature as it pertained to welfare considerations identified in this report, Dr John Humphrey for his valuable comments on the draft report, the commercial fishermen who agreed to be involved in this project, and members of the Aquatic Animal Welfare Working Group of the Australian Animal Welfare Strategy (AAWS) for their assistance and advice.

It is also hoped that the momentum created by AAWS and particularly by the Aquatic Animal Welfare Working Group in the field of fish welfare will continue, despite the funding for AAWS having ceased.

Executive Summary

The story behind the development of specific operator (boat) level welfare guidelines in the commercial capture fishing sector goes back a number of years, beginning with the formation of the Australian Animal Welfare Strategy (AAWS) and the AAWS Aquatic Animal Welfare Working Group.

The AAWS was an Australian Government initiative which aimed to protect and promote the welfare of all Australian animals, including aquatic animals. It provided a more consistent and coordinated national approach to animal welfare than had been done previously.

The Aquatic Animal Welfare Working Group (AAWWG) was one of six Working Groups formed under AAWS to progress the strategy. An early task undertaken by the AAWWG was a review of existing fish welfare arrangements in Australia. This was essentially a stocktake and contained an inventory of what was then relevant animal welfare documentation and information that had fish welfare implications and considerations. The stocktake report limited itself to welfare of finfish, and focused on the four key finfish sectors in Australia - aquaculture, ornamental, recreational and the commercial capture fishing sectors.

A workshop was then organised for each of the four key finfish sectors, including the commercial capture fishing sector¹. The key objective of each workshop was to bring together a representative group of stakeholders to consider and discuss issues of fish welfare through a workshop process.

The commercial capture fishing sector in Australia is a vast and diverse sector both in terms of ocean area that is fished and the number of wild fish captured each year. There are over 350 fisheries in this sector and each year millions of wild fish are captured by commercial fishing vessels using a variety of fishing techniques, including trawling, gill (mesh) netting, trapping, hand lining and purse, haul and Danish seining.

This sector already has a considerable number of Codes of Conduct, Best Practice Manuals and Environmental Management Plans/Systems (EMP/EMS). Fish quality is a focus of the sector and this has direct linkages to fish welfare. It is well established that improvements in fish quality and fish welfare can occur with improved handling and slaughter techniques.

At the workshop, the development of legislated and enforceable minimum regulatory welfare standards through the AAWS process was not supported by workshop participants, but producing specific overarching guidelines to assist in reducing unnecessary suffering² of fish during their capture, slaughter and holding was considered a worthwhile aim of any process going forward. The potential improvements in fish quality and fish welfare provided a win-win approach for both commercial fishers and the fish they were capturing.

Based on the outcomes from this and the other sector workshops, the AAWWG developed a generic set of *Overarching Welfare Principles* (“Obligations”) to help guide the development of sector specific welfare Codes of Practice or guidelines³.

The Principles that apply to the commercial capture fishing sector are primarily numbers (5), (6), (7) and

¹ The report on this workshop is provided in Appendix D of this report.

² The term “suffering” has been used in the context of the stress imposed on fish, although it is a subjective term and there is still ongoing debate in the scientific community regarding whether or not fish feel pain and can “suffer”.

³ The Overarching Welfare Principles are included in their entirety in Appendix C of this report.

(8) i.e.

5. *During any handling of live fish:*
 - *care should be taken to avoid any damage to the fish*
 - *fish intended to remain alive should be returned to the water promptly*
6. *Any fish selected for harvest should be killed as rapidly as possible, by humane means suitable for the species*
7. *For fish harvested from the wild timely handling from capture to death is essential to minimise suffering*
8. *Capture methods should be designed to minimise the capture of unwanted fish*

Subsequent to the development of the Overarching Welfare Principles, the AAWWG developed six generic fish welfare guidelines covering the majority of commercial capture fishing sectors:

- i. Trawl
- ii. Hand lining
- iii. Seine - beach
- iv. Seine- purse
- v. Gill (mesh) net
- vi. Pot/Trap

These guidelines were endorsed by industry and widely disseminated through various industry groups.

In this project (2012/507), specific operational fish welfare guidelines have been developed based on the generic guidelines through application in six individual commercial capture fishing operations. These operator specific guidelines have used the Overarching Welfare Principles and the generic commercial fishing welfare guidelines to develop documents that are practical, applicable and specific at the operator level.

The following vessel/operator specific fish welfare Guidelines were developed through this project:

1. Fishing welfare Guidelines for Fishing Vessel FV Karen Anne II, owned by Neville Clark.

Karen Anne II is an 8m aluminium net boat operating as a commercial fishing vessel in Corner Inlet, Victoria. The type of fishing practiced from this boat is 'haul seining'.

2. Fishing welfare Guidelines for Fishing Vessel operating under license GL25 owned by Gary Leonard.

The boat operating under license GL25 is a 17' (5.18m) aluminium boat fishing in the Gippsland Lakes, Victoria. The type of fishing practiced from this boat is 'set mesh netting'.

3. Fishing welfare Guidelines for Fishing Vessel operating under license G15 owned by Arthur Allen.

The boat operating under license GL1 is a 17' (5.18m) fibreglass boat fishing in the Gippsland Lakes, Victoria. The type of fishing practiced from this boat is 'set mesh netting'.

4. Fishing welfare Guidelines for Fishing Vessel and tenders operating with registration FXWG owned by Steve Howe.

The boat with registration FXWG is a 6m aluminium boat operating as a commercial fishing vessel with tenders on the Great Barrier Reef off Innisfail, Queensland. The type of fishing

practiced from this boat is ‘hand lining’ for reef fish.

5. Fishing welfare Guidelines for MG Kailis Fishing Vessel Torbay.

The boat FV Torbay, owned and operated by MG Kailis, is a commercial 24.5m steel trawler operating in the Pilbara Fish Trawl Interim Managed Fishery in the north of Western Australia. The type of fishing conducted from FV Torbay is ‘trawling’.

6. Fishing welfare Guidelines for MG Kailis Fishing Vessel Raconteur II.

The boat FV Raconteur II, also owned and operated by MG Kailis, is a commercial 24.5m steel trawler operating in the Pilbara Fish Trawl Interim Managed Fishery in the north of Western Australia. The type of fishing conducted from FV Raconteur II is ‘trawling’.

This project was not about changing fundamental fishing practices or techniques. This project was:

- (i) about working closely with commercial fishers to document how fish welfare issues are being addressed by good operators given the constraints of their style of fishing; and
- (ii) “ground truthing” the practicality of the guidelines developed through AAWWS.

The results were very encouraging and demonstrated that through incremental change in handling and improving the knowledge of operators there can be benefits for fish welfare but also continued economic viability of the operations.

Keywords

Fish welfare, commercial fishing, haul seining, mesh netting, trawl, line fishing, economic viability

1 Introduction

The story behind the development of specific operator (boat) level welfare guidelines in the commercial capture fishing sector goes back a number of years, beginning with the formation of the Australian Animal Welfare Strategy (AAWS) and the AAWS Aquatic Animal Welfare Working Group.

1.1 The Australian Animal Welfare Strategy

The AAWS was an Australian Government initiative which aimed to protect and promote the welfare of all Australian animals, including aquatic animals. It began in 2005 as a partnership that was developed with extensive stakeholder consultation including government, community and animal industries. It was adopted and endorsed by all State and Territory governments.

The AAWS provided a more consistent and coordinated national approach to animal welfare by developing, adopting and promoting sound standards and practices and enhancing existing animal welfare arrangements. It was developed to provide the national and international communities with an appreciation of animal welfare arrangements in Australia and to assist industries and the community in outlining directions for future improvements in the welfare of animals. Critically, the AAWS provided a framework for sustainable improvement in animal welfare outcomes based on scientific evidence and social, economic and ethical considerations.

The Aquatic Animal Welfare Working Group (AAWWG) was one of six Working Groups formed under AAWS to progress the strategy in each of the six sectors. It was made up of representatives from the commercial capture fishing, ornamental, recreational and aquaculture sectors, State government and Not for Profit organisations (Animals Australia, RSPCA). It also had technical experts (fish health professionals).

1.2 Aquatic animal welfare stocktake

One of the first tasks the AAWWG undertook was to undertake a review of existing fish welfare arrangements in Australia. This review⁴, commissioned by the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF), was essentially a stocktake of fish welfare in Australia in 2006 and contained an inventory of what was then relevant animal welfare documentation and information that had fish welfare implications and considerations. The report limited itself to welfare of **finfish** (vertebrates) and focused on the four key finfish sectors in Australia - aquaculture, ornamental, recreational and the commercial capture fishing sectors. The Executive Summary of this stocktake report has been included in Appendix A of this Report.

Following on from the stocktake review, the AAWWG then obtained further funding to organise and conduct a workshop for each of the four key fish sectors. The key objective of each workshop was to bring together a representative group of stakeholders to consider and discuss issues of fish welfare workshop process. The underlying principle applied regarding fish welfare was that what constitutes minimum “acceptable” fish welfare should be the same irrespective of whether that fish is farmed or kept in a household aquarium or captured wild from the sea.

⁴ A Review of Current Welfare Arrangements for Finfish in Australia, Panaquatic Health Solutions Pty Ltd, 19 September, 2006.

1.3 The commercial capture fishing sector

The commercial capture fishing sector in Australia is a vast and diverse sector both in terms of ocean area which is fished and the number of wild fish captured each year. Australia has the world's third largest fishing zone, extending up to 200 nautical miles out to sea⁵. Generally, the States are responsible for managing coastal fisheries out to 3 nautical miles (nm) from the low-water mark, and the Commonwealth is responsible for managing fisheries in Australian waters beyond 3 nm (i.e. from 3 nm to 200 nm) (Borthwick, 2012).

There are over 350 fisheries in this sector and each year millions of wild fish are captured by commercial fishing vessels using a variety of fishing techniques, including trawling, gill (mesh) netting, trapping, hand lining and purse and Danish seining.

1.4 Risks and opportunities related to fish welfare in the wild capture sector

The workshop for the commercial capture fishing sector was held on July 10/11, 2007. It provided a forum for discussion of what the commercial wild capture sector considered were the risks and opportunities related to fish welfare within the sector. Understandably the task of developing an individual welfare document for each fishery would be difficult.

The workshops noted that many animal welfare practices had already been adopted in this sector to improve overall product quality (a key commercial driver) and satisfied the general principles necessary to minimise the suffering of fish. The commercial capture fishing industry already has a considerable number of Codes of Conduct, Best Practice Manuals and Environmental Management Plans/Systems (EMP/EMS).

There were a number of options considered by participants at the workshop for going forward on the issue of fish welfare in this sector. "Doing nothing" was an option, but was not supported. Participants believed there was benefit in assisting the industry to continually improve welfare practices particularly concerning the minimisation of stress between *capture* and killing (*slaughter*) of fish, and during the *transport* and *holding* of live fish.

There were some important outcomes at this workshop. They included that:

- The commercial capture fishing sector did not require the development of legislated and enforceable *minimum regulatory standards* through the AAWS process. Though these may be required if standards drop in the future;
- Likewise, there was no need to develop *Australian Standards*[®] for this sector on issues of fish welfare;
- Industry already clearly understood there were improvements in fish quality with improved handling and slaughter techniques leading to a better financial return;
- Reducing unnecessary suffering⁶ of fish during the capture, slaughter and holding of fish was

⁵ <http://www.agriculture.gov.au/fisheries>, viewed January 2015

⁶ The term "suffering" has been used in the context of the stress imposed on fish, although it is a subjective term and there is still ongoing debate in the scientific community regarding whether or not fish feel pain and can "suffer".

considered a worthwhile aim, although it was acknowledged that it was not considered possible to eliminate all suffering when capturing wild fish. Animal welfare advocates attending the workshop agreed with this acknowledgment;

- Differences in techniques exist between handling large numbers of small fish and handling a smaller number of larger fish. It was considered less difficult to humanely slaughter a smaller number of larger fish, using methods such as spiking and stunning, than a large number of small fish. The use of an “ice slurry” possibly addressed concerns in relation to slaughtering large numbers of small fish but it was acknowledged that there is no research supporting this method (or others) as the most desirable technique from a product quality and welfare point of view.

The process going forward to develop animal welfare arrangements in the commercial capture fishing industry, as identified and agreed to by participants at this workshop included that:

- The process for progressing fish welfare in the commercial capture fishing sector should be through the AAWS Aquatic Animal Welfare Working Group;
- A generic set of *Overarching Welfare Principles* (“Obligations”) should be developed that would be applicable to all commercial capture fishing sectors; and
- These *Overarching Welfare Principles* should be used to guide the development of catch method specific welfare Codes of Practice or guidelines if the sector deemed it desirable or necessary.

The report on this workshop, which includes a list of attendees, is included in Appendix B.

1.5 Overarching Aquatic Animal Welfare Principles

A subsequent initiative of the AAWWG in 2008 was the development of a generic set of Overarching Welfare Principles that were applicable to finfish being farmed, transported, captured from the wild by both commercial and recreational fishers, or kept in aquaria in restaurants or private homes. The Overarching Welfare Principles are included in their entirety in Appendix C.

These Overarching Welfare Principles have guided welfare projects being undertaken through the AAWS. The Principles that apply to the commercial capture fishing sector are primarily numbers (5), (6), (7) and (8) i.e.

5. *During any handling of live fish:*
 - *care should be taken to avoid any damage to the fish*
 - *fish intended to remain alive should be returned to the water promptly*
6. *Any fish selected for harvest should be killed as rapidly as possible, by humane means suitable for the species*
7. *For fish harvested from the wild timely handling from capture to death is essential to minimise suffering*
8. *Capture methods should be designed to minimise the capture of unwanted fish*

1.6 Development of generic welfare Guidelines for the Australian commercial capture fishing sector

This project was conceptualised at the commercial capture fishing commercial capture fishing workshop held in July 2007. It was dependent on development of the Overarching Welfare Principles, which were completed in 2008.

A total of six generic fish welfare guidelines⁷ were developed through this project for the following commercial capture fishing methods:

- i. Trawl
- ii. Hand lining
- iii. Seine - beach
- iv. Seine- purse
- v. Gill (mesh) net
- vi. Pot/Trap

The development of each generic welfare guideline was coordinated through industry State Councils i.e.:

- i. For the trawl sector, the South East Trawl Fishing Industry Association;
- ii. For the line and beach seine: the Wildcatch Fisheries South Australia;
- iii. For the purse seine sector, Seafood Industry Victoria;
- iv. For the gill (mesh) net sector, the Tasmanian Seafood Industry Council; and
- v. For the pot/trap sector, the Queensland Seafood Industry Association.

The approach to developing each draft set of guidelines was similar:

1. The initial contact for preparation of the draft Code in each sector was with the Coordinating State Council for that particular fishing method. For example, Seafood Industry Victoria (SIV) were contacted initially when preparing for the purse seining draft;
2. A request was made to the Coordinating State Council to nominate a commercial fisher who regularly used that particular fishing method and who would be willing to assist Panaquatic in the initial drafting of the Guidelines;
3. The fisher was then contacted and for five of the six Guidelines met with in person to discuss the project and also discuss fishing methods employed when fishing using that particular method. For three of the Guidelines, the lead writer accompanied the fisher on a fishing trip;
4. While developing the draft Guidelines, other industry Codes of Practice or documents that were relevant to that industry sector were reviewed to ensure that the content of the draft Guidelines did not contradict anything that the industry already had in another Code or regulatory document;
5. All draft Guidelines were written in a similar manner and format and their content aligned with the Overarching Welfare Principles previously discussed; and

⁷ These Guidelines were originally developed as “Codes of Practice”.

6. As each draft Guideline was developed, the draft was forwarded to the fisher who had assisted in its development for review and comment. The draft was then forwarded to the Coordinating Council for that particular fishing method for final review.

Appendix D contains a summary of this project in which the generic Guidelines were developed. Wider consultation, endorsement and dissemination of the draft guidelines by the industry around the nation was undertaken as a separate project.

Each set of guidelines is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

2 Objectives

The Objectives for this project were:

1. To develop six operator (boat) specific fish welfare Guidelines across three States for operators using five different capture methods.

The outputs from an earlier project (Development of generic welfare Guidelines for the Australian commercial capture fishing sector – discussed in the Introduction of this Report) were used to assist in the development of these boat specific fish welfare Guidelines.

3 A review of fish welfare as it pertains to the commercial capture fishing sector

3.1 The issue of pain and suffering in fish

Whether fish can suffer and are sentient beings with conscious perception are questions that are central to the issue of fish welfare. Davie and Kopf (2006) noted that in order to suffer, an animal must possess a sensory system able to detect noxious stimuli and importantly the brain must consciously perceive the stimuli as negative. If fish do not suffer then there are no welfare issues with capturing and killing or releasing fish.

However, there is considerable debate in the scientific literature regarding the ability (or not) of fish to “suffer” or feel pain. Rose *et al.* (2014), in their review of the issue of whether fish feel pain, concluded that they were unlikely to. These authors also concluded that the rationale and supportive evidence for the existence of consciousness in fishes was not compelling, nor neurologically feasible. Other authors do not agree with these conclusions, arguing that there is growing evidence that teleost fish can feel pain (for example see Torgersen *et al.* 2011) with Lund *et al.* (2007) stating that sentience in fish cannot be ruled out based on review of the scientific literature. Huntingford *et al.* (2006) notes that while the neocortex is lacking in fish and because of this it may be argued that fish cannot suffer, an alternative view is that complex animals with sophisticated behaviour, such as fish, probably have the capacity for suffering, though this may be different in degree and kind from the human experience of this state. Brown (2014), in his review of the current state of knowledge on fish cognition and the evidence for pain perception, concludes that the evidence strongly suggests fish are sentient and capable of feeling pain.

It does though become quite clear when reviewing the literature on this topic that the debate involving scientific and philosophical arguments is sometimes confused by emotional responses, to paraphrase Turnbull (2010).

The ongoing scientific debate about whether or not fish can feel pain could be used to justify a delay in examining welfare issues in the commercial capture fishing sector. The ambiguity in the science certainly means that any considerations should be taken cautiously.

But people’s attitudes (and for “people” we are talking about the general public who pay for, and consume, the fish caught in the commercial capture fishing sector) are not necessarily based on science. Lund *et al.* (2007) argues that the immediate question is an ethical one – we must consider how probable sentience in fish must be shown to be before we feel obliged to act. As Bekoff (2007) noted, it is important to blend ‘science sense’ with common sense. The AAWS Aquatic Animal Welfare Working Group believes this is reflected in the Overarching Welfare Principles it created.

Of course, as noted in Kaiser and Huntingford (2009) (and as the AAWS Aquatic Animal Welfare Working Group has been arguing since 2005) product quality is important in commercial fisheries and commercial drivers that simultaneously improve product quality and welfare offer a clear win-win situation.

Currently, the commercial capture fishing sector has wide community support in Australia and a strong social license to operate. Putting a positive message out regarding fish welfare will strengthen

this support which is what this Project aimed to do.

3.2 Welfare aspects of commercial capture fishing and the Overarching Welfare Principles

The main areas where there is potential impact on the welfare of fish being caught in commercial capture fishing relate to the methods of capture or harvest, the way in which fish are handled after capture and prior to being killed, and the methods used to kill fish. The welfare of fish that are caught as by-catch also needs to be considered.

These are addressed in the specific Overarching Welfare Principles that apply to the commercial capture fishing sector as noted in Section 1.5 i.e.

5. *During any handling of live fish:*
 - *care should be taken to avoid any damage to the fish*
 - *fish intended to remain alive should be returned to the water promptly*
6. *Any fish selected for harvest should be killed as rapidly as possible, by humane means suitable for the species*
7. *For fish harvested from the wild timely handling from capture to death is essential to minimise suffering*
8. *Capture methods should be designed to minimise the capture of unwanted fish*

3.3 Welfare and product quality

Although welfare issues pertain only to live fish, factors that affect the welfare of the fish while it is alive also have an effect on the quality of the dead product that goes to market. It is therefore relevant to examine methods for storing the catch after processing as part of a holistic approach to the issues of welfare and its effects on flesh quality.

A review article by Poli *et al.* (2005) provides an overview of welfare indicators in fish, including behavioural and physiological changes, as well as post-mortem changes to flesh quality in response to pre-slaughter stress. These authors provide a comprehensive assessment of stunning and slaughter methods (asphyxia in air, ice slurry, electrical stunning and electrocution, CO₂ narcosis, percussive stunning, and brain spike), and suggested that combining methods may be an effective way to maximise both welfare and flesh quality.

3.4 Scientific reviews of welfare in wild capture fisheries

Two articles that review the issues specific to fish welfare in wild capture fisheries are those by Metcalfe (2009) and Borderias and Sanchez-Alonso (2011). These articles address different aspects of the main issues relating to welfare in wild capture fisheries.

Metcalfe (2009) is a paper presented at an e-conference and workshop at the 5th World Fisheries Congress, Yokohama in October, 2008. The workshop was titled “Fish welfare in commercial fisheries”. Kaiser and Huntingford (2009) provide an introduction to the papers delivered at this workshop. In that workshop Metcalfe (2009) provided a discussion of the ethics and welfare associated with marine wild capture fisheries, and identified several important factors related to current fishing practices and how they can affect the welfare of target and non-target species. These

factors included appropriateness of capture gear for the target species, distress caused by the capture method, humane killing after capture, and the effect of capture gear on escapees and non-target species.

Borderias and Sanchez-Alonso (2011) reviewed the literature on processing of fish from both aquaculture and wild capture fisheries, including the influence of stress on flesh quality, stunning and killing methods, gutting, and packaging of fish. These authors recommended the use of capture methods that minimise exhaustion of fish during capture, the use of slaughtering methods that result in a rapid loss of consciousness and rapid chilling of fish after slaughter to maintain flesh quality.

3.5 Harvesting techniques

One of the main factors affecting the welfare of fish in wild capture fisheries is stress and exhaustion associated with capture prior to slaughter. This is largely related to the harvesting technique used and the length of time that fish are allowed to struggle prior to being brought onboard, which in turn is often dictated by commercial considerations related to a particular fishery (see Borderias and Sanchez-Alonso 2011). For example, the capture technique necessary for a particular species and the time constraints associated with that technique may result in increased stress compared to fish caught by other methods.

Botta *et al.* (1987) assessed the effect of four capture methods and the time of year (when captured) on raw flesh quality in Atlantic cod (*Ghadus morhua*). These authors reported that the discolouration/bruising grade and overall grade were both significantly lower in fish that were caught by gillnet or by trap compared to fish that were caught by longline or handline. Muscle pH was found to be affected by both capture methods, and the time of year that fish were caught. It was suggested that this reduction in flesh quality was likely related to the degree of struggling after capture and prior to being brought onboard.

Pankhurst and Sharples (1992) examined plasma cortisol levels in snapper (*Pagrus aurata*) immediately after capture by divers underwater, longline, otter trawl, or rod and line. Measurement of plasma cortisol levels were repeated at intervals up to 96 hours post capture after holding in underwater nets or onboard livewell. These authors reported that plasma cortisol levels in fish captured by longline were up to tenfold higher than those captured by diver underwater. Cortisol levels were observed to increase at 60 min post-capture after holding either underwater or onboard. Plasma cortisol levels were similarly high for fish caught on longlines set for 1.5 h or for 12 h, suggesting no reduction in stress in fish left on the longline. Fish that were taken back to the laboratory and held in 3000-L tanks showed a reduction in cortisol levels after 48 h. The authors noted that trawling was associated with considerable damage to the fish and a subsequently high mortality rate. A similar latency in the increase in plasma cortisol level was observed in fish caught by rod and line, which were not significantly elevated until 60 min post-capture.

Addis *et al.* (2012) investigated changes in plasma cortisol, lactate, and glucose in bluefin tuna (*Thunnus thynnus*) before and after capture during the annual *mattanza* in Sardinia, in which tuna are directed into a trap system culminating in a “*camera della morte*” (death chamber) where they are killed. Plasma cortisol, lactate, and glucose were all significantly higher in tuna killed during the *mattanza*, compared to those killed with a “strike-dead shot” by divers using a speargun.

The results from these studies indicate that stress levels in captured fish are lower when harvesting

techniques that reduce the time between when fish are captured and when they are brought onboard are used.

3.6 Killing method

There are several killing methods commonly used by commercial fishermen to dispatch fish. One of the main factors affecting the welfare of fish is the time taken for loss of consciousness to occur. Struggling prior to death has been shown by several studies to cause increases in cortisol and lactate, and decreases in ATP levels and muscle pH. While these changes occur in response to stress and exertion prior to death, physiological changes continue to occur after death and are associated with a reduction in flesh quality.

Amano *et al.* (1953) investigated the biochemical changes occurring in frigate mackerel (*Auxis tapeinosoma*) killed by destroying the motor nerve with a slender knife, beheading, or asphyxiation in a seawater hold, but it was not clear from this paper how fish were caught. Lactic acid and ammonia were found to be highest in fish killed by asphyxiation, and lowest in fish killed by motor nerve destruction. Similarly, muscle pH was lowest in fish killed by asphyxiation and highest in fish killed by motor nerve destruction.

Boyd *et al.* (1984) examined two killing methods (ice water slurry and brain spike) in Kahawai (*Arripis trutta*) caught by trolling. The lowest pH observed in fish killed by brain spike (5.87) was observed at 1500 minutes post-mortem, compared to 500 minutes in fish that were killed by ice water (5.92). Brain spike was also shown to delay the decline in muscle ATP levels, and significantly delayed the onset of rigor mortis by over 1 hr compared to fish killed by ice water slurry.

Lowe *et al.* (1993) measured rigor mortis development and physiological changes in snapper (*Pagrus auratus*) killed by iki jime immediately after capture by longline, or after acclimation in laboratory tanks with or without exercise. Exercise resulted in an increase in cortisol levels but did not produce a significant change in lactate levels. Cortisol levels were higher in fish captured on long-lines set for 2 hr than those captured on long-lines set for 12 hr. ATP depletion and rigor mortis development were more rapid in line-captured fish than in exercised fish.

Mishima *et al.* (2005) investigated post-mortem changes in horse mackerel (*Trachurus japonicus*) killed by four methods: cutting the brain, struggling in air for 10 min followed by cutting the brain, dipping in ice water for 10 min followed by cutting the brain, and cutting the brain followed by destroying the spinal cord. Cutting the brain followed by spinal cord destruction was found to be the most effective at delaying post-mortem changes (reduction in ATP, increase in lactic acid, and decrease in pH) compared to the other killing methods.

There are also many references investigating killing methods in fish that are farmed. A number of these are discussed here as they investigate killing methods that are also used in the commercial capture fishing sector.

Morzel *et al.* (2002) assessed three killing methods (percussion, bleeding in ice, or electrocution) in turbot (*Psetta maxima*). Percussion was found to be the most effective killing method, with fish losing consciousness immediately and remaining unconscious 90 min later. Bleeding was the least effective method, with fish bled by cutting the caudal vein still alive after 90 min, and those bled by cutting the gill arches still responsive after 30 min. Bleeding was also associated with gasping and thrashing. Electrocution resulted in immediate loss of responses, but some fish recovered after the

electrical stimulus ceased. Fish killed by percussion had a higher pH and delayed onset of rigor mortis compared to fish killed by bleeding or electrocution.

Lambooij *et al.* (2008) evaluated electrical stunning and killing by chilling in seabass (*Dicentrarchus labrax*). Stunning by electrocution followed by chilling in ice-water slurry was found to be an effective killing method in this species. The authors noted that fish that were not stunned by electricity showed vigorous movements when placed in ice-water slurry, and recommended a combination of electrical stunning and ice-water chilling as a killing method for the commercial setting.

Roth *et al.* (2009) investigated the effect of chilling turbot (*Scophthalmus maximus*) held at 14°C in an ice-water slurry at around -1°C. Fish showed a flight response immediately after being placed into the ice-water, and by 40 – 60 min were completely immobile. Stiffening and muscle contraction with mouth gaping, similar to rigor mortis, were observed when fish body temperature was 1°C, but all fish recovered within 30 min when returned to water at 14°C.

Scherer *et al.* (2005) compared two killing methods, ice-water slurry and electrocution, in grass carp (*Ctenopharyngodon idella*). Fish showed strong aversive behaviour for up to 10 min when exposed to ice-water, but at two hours post-mortem ATP levels were significantly higher in fish killed by ice-water than in fish killed by electrocution. Fish killed by electrocution ceased movement immediately, but entered rigor mortis significantly sooner (8 hr post-mortem) than fish killed by ice-water slurry (15 hr post-mortem).

Tejada and Huidobro (2002) assessed the effect of different storage conditions on flesh quality in gilthead seabream (*Sparus aurata*) killed by ice-water slurry, asphyxiation in air, or percussive stunning followed by ice-water slurry. Onset of rigor mortis was delayed in fish killed by percussive stunning compared to the other killing methods, and flavour of cooked fillets was reported to be higher in fish killed by percussion or ice-water slurry than those killed by asphyxiation. The authors noted that in this species the percussive force required to effectively stun the fish resulted in damage to the skull, rendering it unfit for market.

3.7 Catch handling and processing

How handling and processing affects shelf life and how to maximise the time that fish can be stored after capture with minimal effect on quality is important in commercial capture fishing. It is of course also important with fish being farmed, where there is also a considerable amount of research that has relevance to the commercial capture sector. The following discusses some of the relevant scientific papers in this area.

Careche *et al.* (2002) examined the differences between anchovies (*Engraulis encrasicolus*) that were captured and then transported in traditional wooden boxes containing freshwater ice versus those captured and then transported in a water and ice mix, using insulated boxes. Anchovies transported in water and ice showed generally showed lower spoilage rates, better maintained temperature through the cold chain and kept a better external appearance than those transported in just ice.

Erkan (2007) assessed sensory, chemical, and microbiological changes in sea bream (*Sparus aurata*) stored on ice and kept whole or gutted and washed or unwashed. Daily washing of whole or gutted fish with tap water was found to significantly reduce microbiological contamination compared to

unwashed fish. Sensory quality began to decline after 9 days storage, and fish were unsuitable for human consumption after 12 days.

Jerret *et al.* (1996) assessed the tensile properties, pH, and lactate of flesh from Chinook salmon (*Oncorhynchus tshawytscha*) that were rested (anaesthetised and killed by pithing) or exhausted (anaesthetised and exposed to intramuscular electrical stimulation then killed by pithing). Tensile strength of muscle from the rested fish was found to be significantly higher at 40 hr post-mortem than in the exhausted group. Immediately post-mortem the muscle from the rested fish had significantly lower lactate levels and a significantly higher pH than muscle from the exhausted fish, but after 40 hr post-mortem there was no difference in muscle lactate levels or pH between the rested or exhausted groups.

Scott *et al.* (1986) assessed sensory, chemical, and microbiological properties of orange roughy (*Hoplostethus atlanticus*) caught by bottom trawling at 950-1050 m depth. Shelf life as assessed by sensory quality was 11-13 days in whole fish, and 13-16 days in headed and gutted fish. These authors determined that the shelf life of the fish assessed was 13-16 days, with a slight increase in fish that were headed and gutted, likely due to the removal of autolytic enzymes from the gut.

Sigholt *et al.* (1996) assessed the effect of handling stress on flesh quality in farm-raised Atlantic salmon (*Salmo salar*). Flesh from fish that were stunned with CO₂ then killed by bleeding (control) had firmer flesh, higher muscle ATP levels, and a longer time before onset of rigor mortis than fish that were stressed by crowding in a stagnant tank for 10 min prior to being killed. A comparison was also made between two storage temperatures (0.4 and 3.3°C). The authors suggest that gentle handling, rapid stunning and killing, and effective cold-storage should be used to maximise flesh quality in fish.

4 Methodology

The Aquatic Animal Welfare Working Group of the Australian Animal Welfare Strategy (AAWS) successfully developed the Overarching Welfare Principles. These Principles were applied when developing generic fish welfare Guidelines across the commercial capture fishing sector based on the capture technique used i.e. purse seining, beach seining, mesh netting, trapping, trawling and line fishing. These generic fish welfare Guidelines have now had Industry Association endorsement.

This Project details the next critical step in this process which has been to use the endorsed fish welfare Guidelines and develop specific operator (boat) Guidelines that are applied at the individual operator level. That is, 'ground truth' the guidelines at the vessel level where fish are being caught and handled (and generally killed).

The methodology used for this Project was as follows:

1. Suitable commercial capture fishers were identified that would be willing to assist in the development of their own specific boat fish welfare Guidelines. A mixture of industry associations (e.g. Seafood Industry Victoria), not for profit associations (e.g. Oceanwatch Australia) and personal contacts of members of the AAWS Aquatic Animal Welfare Working Group were used to identify such persons;
2. For four of the Guidelines, the lead writer accompanied the operator while fishing commercially to gain a better understanding of the techniques used in the catching of fish through that specific type of fishing;
3. For the other two Guidelines, the lead writer initially visited and spent time with the Compliance and Programs Manager of the company who operate the two boats conducting trawling operations. The lead writer then visited and spent time on both boats at a later date when those boats were in port in north Western Australia;
4. Draft fish welfare Guidelines were prepared for each operator (boat) and forwarded to each operator for review;
5. A final version of the fish welfare Guidelines for each operator was then produced which incorporated any comments made by the operator during their review.

Working with these Operators showed the applicability and sustainability of being able to successfully capture fish and do it in a manner that considers the welfare of those fish as a priority.

This process was also important to allow ownership of the process by the commercial capture fishing sector.

5 Outcomes – six operator (boat) commercial capture fishing welfare Guidelines

5.1 Fishing welfare Guidelines for Fishing Vessel FV Karen Anne II: Fishing type - Haul Seine

The Fishing Vessel (FV) Karen Anne II is an 8m aluminium net boat operating as a commercial fishing vessel in Corner Inlet, Victoria. The owner of FV Karen Anne II, Neville Clarke, is a member of the Victorian Bays and Inlets Fisheries Association (VBIFA). It is a family business.

The type of fishing practiced from this boat is haul seining (the term “haul seine” is generic and refers to several seining techniques, including ring seining which is used on the FV Karen Anne II).

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic beach seining Guidelines were used as a template for the operator specific fish welfare guidelines, developed with Neville Clark himself.

The outcome is a specific set of guidelines for the FV Karen Anne II which set out principles of best practice. It is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for FV Karen Anne II, please contact the author of this report⁸.

5.2 Fishing welfare Guidelines for Fishing Vessel operating under license GL25: Fishing type – mesh netting

The Fishing Vessel operating under license GL25 is a 17' (5.18m) aluminium boat fishing in the Gippsland Lakes, Victoria.

The owner of the vessel is Gary Leonard. It is a family business. Gary is the President of the East Gippsland Fisherman’s Association Inc. and Chairman of the Victorian Bays and Inlets Fisheries Association.

The type of fishing practiced from Gary’s vessel is set mesh netting.

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic mesh netting Guidelines were used as a template for the operator specific fish welfare guidelines, developed with Gary Leonard himself.

The outcome is a specific set of guidelines which set out principles of best practice for Gary’s operation. It is a living document meaning the Guidelines will be reviewed regularly and

⁸ Dr Hardy-Smith can be contacted by email: paul@panaquatic.com

improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for Gary's vessel, please contact the author of this report⁸.

5.3 Fishing welfare Guidelines for Fishing Vessel operating under license GL1: Fishing type – mesh netting

The Fishing Vessel operating under license GL1 is a 17' (5.18m) fibreglass net boat fishing in the Gippsland Lakes, Victoria.

The owner of the vessel is Arthur Allen. It is a family business. Arthur is a member of the East Gippsland Fisherman's Association Inc. and the Victorian Bays and Inlets Fisheries Association.

The type of fishing practiced from Arthur's vessel is set mesh netting.

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic mesh netting Guidelines were used as a template for the operator specific fish welfare guidelines, developed with Arthur Allen himself.

The outcome is a specific set of guidelines which set out principles of best practice for Arthur's operation. It is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for Arthur's vessel, please contact the author of this report⁸.

5.4 Fishing welfare Guidelines for Fishing Vessel and tenders operating with registration FXWG: Fishing type – hand lining

The Fishing Vessel with registration FXWG is a 6m aluminium boat operating as a commercial fishing vessel with tenders on the Great Barrier Reef off Innisfail, Queensland. The owner of the vessel, Steve Howe, is a member of the Queensland seafood industry association (QSIA). It is a family business.

The type of fishing practiced from this boat is hand lining for reef fish.

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic line fishing Guidelines were used as a template for the operator specific fish welfare guidelines, developed with Steve Howe himself.

The outcome is a specific set of guidelines which set out principles of best practice for Steve's operation. It is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for Steve's vessel and its tenders, please contact the author of this report⁸.

5.5 Fishing welfare Guidelines for MG Kailis Fishing Vessel Torbay: Fishing type – trawl

The Fishing Vessel FV Torbay, owned and operated by MG Kailis, is a commercial 24.5m steel trawler operating in the Pilbara Fish Trawl Interim Managed Fishery.

The type of fishing conducted from this vessel is trawling.

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic trawl Guidelines were used as a template for the operator specific fish welfare guidelines, developed with MG Kailis.

The outcome is a specific set of guidelines which set out principles of best practice for trawling as practiced by FV Torbay. It is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for FV Torbay, please contact the author of this report⁸.

5.6 Fishing welfare Guidelines for MG Kailis Fishing Vessel Raconteur II: Fishing type – trawl

The Fishing Vessel FV Raconteur II, owned and operated by MG Kailis, is a commercial 24.5m steel trawler operating in the Pilbara Fish Trawl Interim Managed Fishery.

The type of fishing conducted from this vessel is trawling.

The initial generic fish welfare Guidelines, which were method specific, had been developed in consultation with the Australian commercial fishing sector as discussed in Section 1.6. The generic trawl Guidelines were used as a template for the operator specific fish welfare guidelines, developed with MG Kailis.

The outcome is a specific set of guidelines which set out principles of best practice for trawling as practiced by FV Raconteur II. It is a living document meaning the Guidelines will be reviewed regularly and improved as capture techniques evolve and understanding of fish welfare increases.

For further details, including any requests for a copy of the fish welfare Guidelines for FV Raconteur II, please contact the author of this report⁸.

6 Discussion

The Australian commercial capture fishing sector includes operations in all states and the Northern Territory, and targets a wide range of species. It is well recognised that there is a close relationship between animal welfare and quality of seafood products.

The main commercial capture fishing sector methods in Australia are:

- Line - hand, drop, longline;
- Trawl - otter, beam, stern;
- Pot and trap;
- Seine – haul, beach, purse; and
- Gill (mesh) net.

In 2007, the Aquatic Animal Welfare Working Group (AAWWG) of the Australian Animal Welfare Strategy (AAWS) held a successful aquatic animal welfare workshop where a number of commercial capture fishers came together to discuss welfare issues.

Following this workshop (and workshops held for the aquaculture and ornamental sectors), a key initiative of the AAWWG was the development of “*Overarching Welfare Principles*” that were applicable to fish⁹ whether they were farmed, transported, captured from the wild by both commercial and recreational fishers, or kept in aquaria in restaurants or private homes. The specific Overarching Welfare Principles that apply to the commercial capture fishing sector and to this project were as follows:

5. *During any handling of live fish:*
 - *care should be taken to avoid any damage to the fish*
 - *fish intended to remain alive should be returned to the water promptly*
6. *Any fish selected for harvest should be killed as rapidly as possible, by humane means suitable for the species*
7. *For fish harvested from the wild timely handling from capture to death is essential to minimise suffering*
8. *Capture methods should be designed to minimise the capture of unwanted fish*

After development of the Overarching Welfare Principles, the AAWWG then oversaw a project to develop a series of generic aquatic animal welfare codes of practice (“Guidelines”) for a number of the fishing techniques used in the Australian commercial capture fishing sector. The final output of this project, completed in 2009, were five generic ‘draft’ welfare Guidelines (one per fishing method), developed in consultation with a nominated body representative of the industry using that fishing method.

A subsequent project distributed the original generic welfare Guidelines to all peak fishing industry bodies with members operating in all States, Territories and Commonwealth commercial fisheries and all government jurisdictions managing fisheries.

⁹ In this report, the word “fish” refers only to vertebrate finfish and not to invertebrates such as molluscs or crustaceans.

By working through the peak fishing industry bodies the project made use of the longstanding and trusted networks established by these bodies. This approach built on the successful model applied within the commercial fishing industry for issues of similar national significance in workplace safety, marine safety and environmental management issues. These networks ensured contact with every licenced commercial fisher in Australia through publications and websites.

The generic welfare guidelines were supported through the Australian Fisheries Management Forum consisting of the CEO's of all State and Commonwealth fisheries management agencies and have appeared on their websites and publications.

New networks were created between the commercial fishing industry, the animal welfare government jurisdictions and the animal welfare NGOs through these projects and the AAWS. The animal welfare guidelines for use by the commercial fishing industry have assisted in broader welfare education to producers, retailers and consumers and are now published online¹⁰. The guidelines act as a benchmark for future assessments of animal welfare in the commercial fishing industry

The project detailed in this report takes the outputs from these earlier projects as described above back to the individual operator (boat) level, essentially to “ground truth” the generic welfare Guidelines.

This project has worked with five operators in three States using four of the capture methods – haul seining, mesh netting, trawling and line fishing - to develop specific fish welfare guidelines for the individual operator (boat) to show the practical applicability and sustainability of the generic fish welfare guidelines at this level.

This project was not about changing fundamental fishing practices or techniques. It was about working closely with commercial fishermen to document how fish welfare issues are being addressed by good operators given the constraints of the species targeted and their style of fishing. It is all about incremental change which benefits the fish but also ensure the economic viability of the operations.

¹⁰ Available at <http://www.australiananimalwelfare.com.au/content/aquatic-animals/commercial-capture-fishing-guidelines2>

7 Conclusions

The objective for this project was to develop six operator (boat) specific fish welfare Guidelines across three States using five different capture methods. It aimed to “ground truth” the practicality of the generic fish welfare Guidelines developed in a previous project through the Aquatic Animal Welfare Working Group of the Australian Animal Welfare Strategy.

The project achieved this objective by developing six operator (boat) specific fish welfare Guidelines across three States. Due to constraints on operator’s availability and accessibility, a total of four different fishing methods were covered, rather than five. This though did not detract from achieving the project objective, which fundamentally was about working closely with commercial fishers to document how fish welfare issues are being addressed by good operators given the constraints of their style of fishing.

The specific vessel operator fish welfare guidelines that have been developed through this project demonstrate a successful mix between fish welfare and economics. They are though designed to be living documents. As our understanding of fish welfare grows and as our understanding of methods used to catch fish increases, it is likely that further improvements can be made.

There is a major consideration with all this work and that is the price that members of the general public are willing to pay for the fish they eat. To change a fishing method to ensure improved fish quality and welfare may increase the cost of capture for each fish directly (for example, by the need to purchase additional ice for each fishing trip) or indirectly (for example, by increasing the physical handling time of each individual fish, thereby increasing the total fishing time to catch the same number of fish).

Increasing the cost of capture per fish unit is only sustainable to the fishing operation if the profitability of the enterprise is maintained or improved. If less fish are caught per unit of time, there is the potential for overall profitability to decrease. People may be willing to pay more for the fish they eat due to the superior quality of that fish and if the increase is passed down to the commercial fishers catching the fish it will have the potential to assist in further improving the welfare aspects of that particular style of commercial fishing.

Each specific set of guidelines is designed to assist the individual operator, and the commercial fishing industry in general, to ‘minimise stress’ of aquatic animals within the constraint of fishing practices inherent to each capture method.

By working with these Operators to show the applicability and sustainability of being able to successfully capture fish and do it in a manner that considers the welfare of those fish as a priority is important to allow ownership of the process by the commercial capture sector.

Changing welfare considerations in Australia

The Aquatic Animal Welfare Working Group of the AAWS acknowledged that calls for change of practices to address welfare considerations may have significant impact across the four key sectors in Australia i.e. the ornamental fish trade, commercial wild capture of fish, farming of fish and the recreational fishing community. The working group acknowledged that fish should be afforded the same treatment irrespective of whether they are kept in a tank, farmed in a cage or caught in a net or on a line. A set of Overarching Welfare Principles was developed by the group that could be

applied to fish across all four sectors. These Overarching Welfare Principles embraced a respect for the fish but also included measures that brought together animal welfare and product quality, realising that the two were intimately linked in those sectors where fish are harvested for food. The Overarching Welfare Principles stated clearly that the overall aim of the aquatic sector (fish that are farmed, being transported, kept in aquaria, captured from the wild both commercial and recreational, or in aquaria in restaurants) should be to minimise suffering from capture to slaughter within the constraint of practical application inherent to each sector.

In this way, the application of the Overarching Welfare Principles looked to influence practices in these sectors based on welfare considerations for the fish, but also aimed to improve profitability, quality of seafood and sustainability of the resource. Then, if fish were later found to not be sentient beings and not be able to perceive pain, any changes implemented would still have helped the businesses.

This acknowledges comments made by Rose *et al.* (2014) with respect to the “*benefit of doubt*” issue regarding fish welfare. Rose *et al.* (2014) consider that a consequence of giving fish the “*benefit of the doubt*” regarding pain has been to mandate policy as if the matter was resolved in favour of an interpretation that fish feel pain, a manoeuvre these authors say that exempts valid science from policy and does not increase fish welfare.

This project, whilst not dismissing the potential of fish to be sentient beings capable of perceiving pain, recognises the scientific ambiguity and debate surrounding the issue of perception of pain in fish. It does not mandate policy changes, but has produced Guidelines showing the ways members of the commercial capture fishing sector can and are addressing issues of fish welfare in their day to day operations.

There is, however, unambiguous science regarding stress in fish. There is also a changing social environment relating to fish welfare based on ethical considerations which this project acknowledges. The findings of this project provide practical guidelines for commercial fishers who capture, handle and generally kill fish. It is supported by considerations of optimising fish flesh quality.

It is believed that such guidelines will be acceptable to the broader community as well as to the commercial fishing sector, and may serve as a model for consideration of fish welfare in Australia.

8 Recommendations

This project is the latest in a series of projects which has looked at a pragmatic way to address the issue of fish welfare in the commercial capture fishing sector. It has used the Overarching Welfare Principles developed by the Aquatic Animal Welfare Working Group of the Australian Animal Welfare Strategy (AAWS) as a guide when doing this.

The project was aware of concern shown by some members of the commercial capture fishing sector regarding “fish welfare” and the potential for fish welfare to influence and even mandate commercial fishing policy and regulations to the detriment of the commercial fishing sector.

This project has shown that addressing issues of fish welfare at the boat (operator) level by the development of specific welfare Guidelines can show how the welfare of fish is given consideration during the fishing process.

Whether having such a set of Guidelines will bring a commercial benefit to each of the operators is at this stage uncertain. It is hoped that it will, but that will rely in part on members of the general public being willing to pay more for fish where this is a consequence of catching the fish in a manner that minimises the stress placed on fish during the capture and killing process. This in turn will rely on members of the general public being able to differentiate between good quality fish and poor quality fish.

The project began the process by working initially to develop six welfare Guidelines for five operators. There are many more in Australia fishing using different techniques for whom this process could also be applied.

Unfortunately, funding for AAWS has ceased and hence AAWS no longer exists. AAWS has driven the process through which this project was conceived and funded. AAWS created the momentum in a very positive way.

There is now a real need for the process to continue within the commercial capture fishing sector, but it no longer can rely on funding through AAWS. It is hoped alternative funding will be available to ensure the commercial capture fishing sector can benefit from the work done through these projects and also for there to be better education of the general public showing the link between fish welfare and fish quality.

9 Extension and Adoption

This project has worked willingly with five operators in three States using four commercial fish capture methods – haul seining, mesh netting, trawling and line fishing. It has developed specific fish welfare Guidelines for the individual operator (boat) to show the practical applicability and sustainability of fish welfare at this level.

These six boats now have in place what is quite likely the first specific guidelines that are primarily based on the welfare of the fish they capture. Their specific Guidelines were also developed considering the sustainability and viability of their enterprises. Each of the operators was comfortable with the key author of this report working together with them to develop these Guidelines.

How widely this process is extended and adopted depends on a number of factors, including the perceived need by commercial capture operators to specifically address fish welfare issues within their operations. Extension and adoption will likely increase if members of the general public differentiate fish that has been captured and killed in a manner that minimises unnecessary stress and maximises quality, and are willing to pay a premium for fish handled in this way. Getting a premium for the fish they catch may also mean that commercial capture fishers may not need to capture as many fish each trip to remain profitable.

This would be a very good outcome, for both fish and fishers.

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Appendix A: Executive Summary of Aquatic Animal “Stocktake”

The Australian Animal Welfare Strategy (AAWS) is an agreed blueprint for animal welfare in Australia that aims to enhance welfare outcomes for all animals. Six broad working groups have been established as part of the strategy, one of these being the Aquatic Animal Welfare Working Group (AAWWG). AAWWG has the responsibility to develop and implement the action plan for the aquatic animal sector.

The first stage of this project was to compile an inventory of current relevant animal welfare documentation and information that has welfare implications and considerations with respect to finfish (‘fish’) sectors in Australia. Relevant animal welfare arrangements for crustaceans and molluscs were not considered in this stage. Panaquatic® Health Solutions Pty Ltd (‘Panaquatic’) was contracted by the Department of Agriculture, Fisheries and Forestry to compile this inventory.

The four key fish sectors in Australia are the aquaculture, ornamental, recreational and wild capture sectors. The movement and handling of live fish for human consumption was also considered in this first stage.

Defining what constitutes fish welfare is difficult. Broadly, animal welfare deals with the humane treatment of animals and most of the principles of animal welfare have emerged primarily through terrestrial animals. Fish on the other hand are complex and importantly are poikilothermic, meaning that their internal body temperature is not maintained at a constant temperature as in terrestrial animals. Fish also occupy a diverse range of habitat and ecological niches.

Fish welfare is being considered internationally at a number of levels and by many organisations and associations. Some of those that are relevant to fish sectors in Australia include:

- The World Animal Health Organisation (OIE). This OIE is important with respect to international trade and the health of animals including aquatic animals. The OIE currently has two ad hoc Working Groups developing guidelines for fish welfare, these being welfare guidelines for live transport of fish and welfare guidelines for the slaughter of fish for consumption. The draft introduction to these guidelines states that there is a critical relationship between aquatic animal health and aquatic animal welfare.
- The Fisheries Department of the Food and Agricultural Organisation (FAO). FAO is the largest autonomous agency within the United Nations system with 180 Member Nations plus the European Community (Member Organisation). The mission of the Fisheries Department of FAO is to facilitate and secure the long-term sustainable development and utilisation of the world’s fisheries and aquaculture. FAO has developed a *Code of Conduct for Responsible Fisheries*. Within the framework of the Code, international plans of action (IPOA’s) have been developed which focus on specific areas of concern. One of these areas is sharks. As far as could be determined there is little reference to welfare issues in either the Code or plans.
- The World Society for the Protection of Animals (WSPA). WSPA is an international animal protection organisation working to raise the standards of animal welfare throughout the world. WSPA believes that an international agreement on welfare standards should become a key goal for the animal welfare movement in the 21st Century. This would include fish in the definition of animals.
- The Royal Society for the Prevention of Cruelty to Animals (RSPCA). RSPCA is active in areas of fish welfare, exemplified by a document it has developed titled ‘Welfare Standards for Farmed Atlantic Salmon’ which gives details as to what standards the Society believe should be adhered to in the farming of Atlantic salmon. These standards include the requirement for each salmon farm to have a written Veterinary Health Plan and access to a designated fish veterinarian.

- People for the Ethical Treatment of Animals (PETA). PETA is an international animal protection organisation and has over a million members. PETA believe that animals are not ours to eat, wear, experiment on, or use for entertainment. This includes fish.
- The Marine Aquarium Council (MAC). MAC is an international, not-for-profit organisation that brings marine aquarium animal collectors, exporters, importers and retailers together with aquarium keepers, public aquariums, conservation organisations and government agencies. MAC's aim is to conserve coral reefs and other marine ecosystems by creating standards and certification for those engaged in the collection and care of ornamental marine life from reef to aquarium.
- Europe. The European Commission approved a five-year plan to improve animal welfare in January 2006. This plan includes the welfare of fish. This five year plan is to cover many aspects of animal welfare and is comprehensive. The establishment of a European Union label for animal welfare is an option being explored.
- United Kingdom (UK). The UK passed the Animal Welfare Bill in October 2005. This Bill brings together and modernises welfare legislation relating to farmed and non-farmed animals. It only applies to inland waters and does not apply to the sea or to anything which occurs 'in the normal course of fishing.'
- United States (US). Existing US health regulations for fish do not directly address welfare, but health is considered one measure of welfare.
- The People's Republic of China (China). China has recently conducted press conferences and issued statements about the country's progress with respect to animal welfare. Specific mention has been made of the restocking of sturgeon fry and of the conservation of sharks. There is no specific mention made of the welfare of fish used for farming or other commercial purposes.

With respect to going forward, a watching brief over these international arrangements and liaison with international stakeholders should be maintained where possible.

Closer to home, there are a number of arrangements with respect to fish welfare in both the private and public sector and in many fish sectors in Australia.

At the national level, 'Model Codes of Practice for Animal Welfare' for the livestock industries are produced and reviewed on behalf of the Primary Industries Ministerial Council by the Animal Welfare Working Group, which reports through Animal Health Committee. Current Model Codes do not though include any that are relevant to the aquatic animal sectors.

The Commonwealth Government (specifically the Minister for the Department of Agriculture, Fisheries and Forestry) is advised by the National Consultative Committee on Animal Welfare (NCCAW). The NCCAW considers and then makes recommendations to the Minister on animal welfare matters of national significance. There is currently no NCCAW position statement that specifically refers to aquaculture, commercial fishing and the ornamental fish sector, but there is a position statement on the animal welfare aspects of recreational fishing.

Responsibility for the management of fisheries in Australia is shared between the Commonwealth and the States. Overall and unless special arrangements are in place, States and Territories are responsible for managing fisheries inside 3 nautical miles, and the Commonwealth is responsible for seas between 3 and 200 nautical miles offshore.

Historically the Commonwealth has limited its jurisdiction to commercial (wild capture) fishing with States and Territories assuming responsibility for recreational fishing. There are only a few sections in Commonwealth Acts relevant to fisheries that indirectly relate to fish welfare. No sections relate directly to fish welfare.

A review of current State and Territory government arrangements with respect to fish welfare indicates the significant variation in different Acts and Regulations pertaining to fish welfare and indeed variation in the definition of 'animal' i.e. whether or not 'fish' are defined as 'animals' under the various legislation.

Perceived gaps identified in government arrangements with respect to fish welfare were the variation between States and Territories' legislation and the uncertainty surrounding what is considered welfare as it pertains to fish.

Welfare groups in Australia with a position on fish welfare include the Royal Society for the Prevention of Cruelty to Animals (RSPCA) and Animals Australia (AA).

- RSPCA Australia develops all RSPCA Policies and Position Papers which are then endorsed by the individual State RSPCA organisations. Under jurisdictional Prevention of Cruelty to Animals (POCTA) or equivalent Acts, full-time officers of the RSPCA are delegated by the responsible Minister in each state and territory to enforce the Act. The bulk of prosecutions are undertaken by RSPCA officers. RSPCA has several Policy Papers with fish sections – Policy A refers to Companion Animals, Policy B which refers to aquaculture, Policy C which refers to recreational fishing and Policy E on Wildlife (which covers wild capture fishing).
- AA is a body representing some 38 animal advocacy organisations. AA has a number of documents and fact sheets referring to fish welfare.

Further research into humane farming of fish was identified as an important need by welfare groups.

The Australian Veterinary Association is the professional organisation representing veterinarians across Australia and has a policy on recreational fishing. The AVA also intends to develop a policy on aquaculture but has no plans for the wild capture fishery or on keeping of fish in the ornamental sector.

With respect to the aquaculture sector, the National Aquaculture Council (NAC) is the peak body representing the aquaculture industry across Australia. NAC has produced the *Fish Welfare Guidelines* which provide guidelines on welfare of fish and crustaceans in aquaculture and in live holding facilities for human consumption. In addition, some of the other fish aquaculture industry sectors either have or are in the process of developing their own Codes of Practices which specifically address fish welfare concerns.

Current practices seen as desirable for reinforcing in this sector include:

- The use of humane killing techniques (e.g. percussion stunning and Aqui-S®)
- The NAC *Fish Welfare Guidelines*
- Specific industry Codes of Practice.

Some perceived gaps and concerns in this sector included:

- The absence of specific welfare guidelines in some of the individual industries
- The extent to which Codes of Practices and guidelines have been disseminated and are known about and are then being used
- The concern regarding Codes of Practices becoming gazetted and then used for regulatory purposes

A need for more scientific research in the area of fish welfare to support the development of minimum standards was also strongly noted by this sector.

The commercial wild capture fishing industry in Australia is diverse and covers many methods of fishing and many species of wild fish. The Australian Fishing Zone (AFZ) extends 200 nautical miles offshore and covers about 10.3 million square kilometres giving an indication of the vastness of area in which wild capture fishers may operate. Some methods of fishing in this sector mean that fish are dead by the time they arrive aboard the fishing vessel.

No guidelines, codes of practice/conduct or management strategies that specifically focus on the welfare aspects of wild captured fish were identified in the preparation of this report. There were two specific issues that the commercial wild capture fisheries are currently focussing on which have welfare implications. These are the reduction of bycatch and the improvement in fish quality. By addressing these issues the wild capture fisheries are, to a certain extent, also addressing some welfare issues.

Documented methods of addressing important issues in different wild capture fisheries include Codes of Conduct (Practice) and Environmental Management Plans or Systems (EMP's or EMS's). Some of

these documents were found to contain reference to how the fishery is tackling welfare issues e.g. the keeping of captured fish healthy until bycatch has successfully been released.

Current practices seen as desirable for reinforcing in this sector include:

- Codes of Practice or Environmental Management Systems which are industry driven, over which industry has ownership and which are dynamic ‘living’ documents
- Addressing of bycatch and fish quality issues where fish welfare is also improved
- Production of manuals that specifically address Best Practices.

Some perceived gaps and concerns in this sector included:

- That many fishers perceive ‘fish welfare’ as an issue that is far less important than other issues such as the sustainability of various fisheries.
- That many fishers are not aware that they are actually addressing welfare issues with many of their current practices.

Recreational fishing Australia is the peak national body for recreational and sport fishing in Australia. The *National Code of Practice for Recreational and Sport Fishing* was written in 1995 after much consultation with members of Recreational Fishing Australia and the various State and Commonwealth Fishery agencies. The Code is voluntary and addresses four main areas of fishing responsibility, one of which is ‘treating fish humanely’. Other organisations, individuals and associations are actively involved in research on improving fish welfare in this sector particularly in catch and release techniques that aim to increase survivability of fish after release.

Current practices seen as desirable for reinforcing in this sector include:

- The Recreational Fishing National Code and its awareness
- The continued research into improving survival of fish being released by recreational fishers
- Advertising to raise awareness of issues in the recreational fishing sector
- Tournament accreditation schemes.

Some perceived gaps and concerns in this sector included:

- The problem of disseminating information to anglers due in part to the fact that recreational fishing licences are not required in all States or Territories and hence the opportunity to pass on information at the time of licence purchase is not always available.

The ornamental fish sector primarily uses the Code of Practice for Aquarium Operations developed by Pet Industry Association of Australia (PIAA) as its guidelines. Most retail ornamental fish businesses do not have their own written guidelines.

Current practices seen as desirable for reinforcing in this sector include:

- The National industry Code of Practice (PIAA Code of Practice)
- The increased use of captive bred versus wild caught fish.

Some perceived gaps and concerns in this sector included:

- PIAA Code of Practice lacks detail with regard fish welfare and applies to retail aquarium facilities and not to commercial aquarium producers
- The small size of containers that fish can be sold in and the potential welfare issues associated with this
- The lack of availability of captive bred (aquacultured) fish versus wild caught fish
- The concern regarding fish caught using cyanide coming from overseas.

In general, teaching and research institutions and facilities around Australia have Animal Ethics Committees (AEC’s) monitoring any teaching or research that involves fish. These AEC’s generally follow the Australian Government’s National Health and Medical Research Council’s (NHMRC) guidelines *Australian code of practice for the care and use of animals for scientific purposes* when considering applications.

The Seafood Industry Training Package and the Animal Care and Management Training Package are the two National Training Information Service approved Training Packages with relevance to the fish sector.

Current practices seen as desirable for reinforcing which address fish welfare concerns in teaching and research institutions include:

- Animal Ethics Committees (AEC) overseeing research in fish
- The NHMRC guidelines overall
- Specific guidelines such as the NSW Fisheries *Guide to acceptable procedures for Aquaculture and Fisheries Research*.

Some perceived gaps and concerns in relating to fish welfare in this area included:

- The limited information regarding fish welfare in the NHMRC guidelines
- That with the exception of aquacultures courses, very few TAFE institutions were providing the commercial fishing, recreational fishing or companion animal services courses at their institution.

There are a number of facilities around Australia where fish are held live for human consumption. Restaurants holding live seafood for human consumption were predominately found to be Asian.

Current practices seen as desirable for reinforcing in these facilities include:

- The NAC Fish Welfare Guidelines contain a section on fish and crustaceans in live holding facilities for human consumption
 - The availability of other guidelines such as the Western Australia Department of Fisheries *Guidelines for Restaurant Owners who hold 'live seafood' in Aquaria*.

Some perceived gaps and concerns in this sector included:

- There did not appear to be any guidelines or specific operating procedures being followed by restaurant owners that addressed fish welfare issues
- While facilities are regularly audited on aspects of food safety, these do not include aspects concerning the welfare of fish.

Appendix B: Report on the Australian Animal Welfare Strategy wild capture sector workshop held July 10th – 11th, 2007

October 4th, 2007

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Background

The Australian Animal Welfare Strategy (AAWS) is an Australian Government initiative which aims to protect and promote the welfare of all Australian animals, including aquatic animals. It is a partnership that was developed with extensive stakeholder consultation including government, community and animal industries. This strategy has been adopted and endorsed by all State and Territory governments.

The AAWS provides a more consistent and coordinated national approach to animal welfare by developing, adopting and promoting sound standards and practices and enhancing existing animal welfare arrangements. It has been developed to provide the national and international communities with an appreciation of animal welfare arrangements in Australia and to assist industries and the community in outlining directions for future improvements in the welfare of animals.

Critically, the AAWS provides a framework for sustainable improvement in animal welfare outcomes based on scientific evidence and social, economic and ethical considerations.

Under the AAWS, Working Groups were formed to progress the strategy in each of the six sectors i.e.

- Animals used for work, sport, recreation or on display.
- Animals in the wild.
- Companion animals.

- Livestock/production animals.
- Aquatic animals¹¹.
- Animals in research and teaching.

The Aquatic Animal Welfare Working Group's (AAWWG) action plan included the undertaking of a review of existing fish welfare arrangements in Australia. Panaquatic® Health Solutions Pty Ltd ('Panaquatic') was commissioned by the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) in 2006 to conduct this review. The subsequent report, '*A Review of Current Welfare Arrangements for Finfish in Australia*' ('the Review') is an inventory of current relevant animal welfare documentation and information that has fish welfare implications and considerations.

Following this review Panaquatic was then commissioned by DAFF to organise and conduct, in consultation with the Aquatic Animal Work Group, a workshop for each of the major aquatic sectors. These sectors are -

- Aquaculture
- Commercial wild capture
- Ornamental fish (producers, wholesalers and retailers)
- Recreational fishing

Three workshops were held in June and July, 2007. The Ornamental sector workshop was held on June 18th and 19th, the Aquaculture sector workshop on June 20th and 21st and the Wild Capture sector workshop on July 10th and 11th. A workshop was not held for the recreational fishing sector. This sector has a peak National body - Recfish Australia. In 1995 Recfish Australia developed a *National Code of Practice for Recreational and Sport Fishing* in which a significant section is devoted to welfare issues. Recfish Australia is currently undertaking a major review of its National Code which itself is being separately funded. Recfish Australia will therefore be addressing and updating welfare issues in the National Code as a separate exercise. This process will involve:

- a review of the National Code;
- a communications strategy to promote the revised National Code; and
- a process for evaluating the awareness of the revised National Code in the angling public.

Panaquatic will maintain communication with the recreational sector throughout this process.

Objectives of the sector workshops

The key objective of each workshop was to bring together a representative group of stakeholders to consider and discuss issues of fish welfare relevant to their sector.

Specific aims of the workshop were to:

- Ensure each sector was familiar with the general content of the AAWS;
- Ensure each sector was familiar with the general content of the 2006 '*A Review of Current Welfare Arrangements for Finfish in Australia*' ("The Review");
- Ensure that the specific sections of the Review relating to each sector were comprehensive and accurate and that all relevant existing arrangements pertinent to fish welfare had been identified e.g. Codes of Practice, Guidelines, Environmental Management Systems, food safety programs;

¹¹ For the purpose of discussion on welfare issues the AAWS Aquatic Animal Welfare Working Group have limited the definition of "aquatic animals" to finfish. This definition may be expanded at a later stage to include aquatic molluscs and crustaceans.

- Ensure each sector’s awareness and understanding of current legislation and government arrangements pertaining to fish welfare in Australia;
- Provide a forum for discussion of what each sector considers the risks and opportunities related to fish welfare within the sector;
- Facilitate each sector’s consideration and agreement on a process going forward, if this was considered worthwhile and necessary by the sector.

Consistency between the various fish sectors was a desirable output of the workshop process. This is not only in keeping with the AAWS, but is also based on the underlying principle regarding fish welfare i.e. what constitutes minimum “acceptable” fish welfare should be the same irrespective of whether that fish is farmed or kept in a household aquarium or captured wild from the sea.

Implementing strategies that minimise unnecessary suffering to fish was generally considered a key feature of “acceptable” welfare.

Workshop format

It was decided quite early that the number at each workshop needed to be limited to around 20 participants. Increasing this number would have allowed increased representation in each sector but may have meant there were simply too many participants to arrive at any agreement after the one and a half days of workshop.

This meant that those stakeholders attending needed to effectively represent their sector and ideally be able to make recommendations based on their experience in their sector.

An initial list of key stakeholders was drawn up for each sector based on the consultants’ experience and from those contacted during the preparation of the 2006 Review. This list was circulated to the Aquatic animal welfare working group for consideration. The list was then finalized after consultation with DAFF¹².

Importantly, across the three workshops, the vast majority who were invited were in attendance.

The three sector workshops were conducted in June and July, 2007. A week prior to each workshop a comprehensive Discussion Paper was circulated to all participants. This was to provide important background information for each stakeholder to ensure they arrived at the workshop with a good level of understanding of the relevant issues.

The agenda for the first day was designed to ensure all participants were up to date with the AAWS process and current arrangements in fish welfare. Agenda items addressed the issues outlined in the Discussion Paper, allowing stakeholders to clarify any issues around which there was still uncertainty. The process adopted for the recreational sector was also discussed on the first day.

At both the aquaculture and wild capture workshops the provisional outcomes of the previous workshop(s) were identified.

The agenda for the first day also included discussion on “*minimum regulatory standards*” and “*Codes of Practice or Guidelines*” and how the terrestrial livestock production industries (for example the pig, poultry and cattle industries) were addressing welfare issues.

Day 1 concluded with a brief discussion on the options available for the sector to address welfare issues, ranging from high-level government intervention with mandatory minimum regulatory standards (with legislation and enforcement) through “codes of practice” and industry guidelines to the “do nothing” option.

¹² Panaquatic believes that the final participants list for each workshop achieved a balance between ensuring reasonable representation of the sector without having an unwieldy number of participants. Panaquatic would, however, welcome the view of the stakeholders who attended. The list of participants and their affiliation is provided in the Appendix to this document.

Day 2 allowed the sector to determine its preferred strategy for addressing welfare issues in the future. This day allowed participants to explore the opportunities and risks (to their industry or enterprises) related to fish welfare, their existing processes and activities which addressed fish welfare and the options and models available for industry to develop and promote to fill any gaps identified (eg codes and/or regulatory standards). Participants then developed a strategy and process going forward for the sector to achieve the identified objectives and agreed outcomes.

All sectors agreed that “do nothing” was not an acceptable option.

Key fish welfare issues in the commercial wild capture sector

Prior to the workshop, the consultants developed a set of key features that specifically related to fish welfare in this sector. A set of features had also been drawn up for the other three sectors.

This set of features has been developed to complement the outcomes from this workshop, and allow those who are not as familiar with the specific sector to understand the salient features of the sector that pertain to fish welfare and fish welfare outcomes.

The features of the commercial wild capture sector that relate directly to fish welfare are:

1. Quality of fish captured is paramount and the influence of time between initial capture to slaughter and processing on quality is well understood. The commercial imperatives surrounding product quality is very important in this sector.
2. Except for wild fish that are caught and kept live for export, the restaurant trade or those caught to grow out through aquaculture, there is no direct involvement into the growth or husbandry of fish in this sector.
3. The key areas applicable to fish welfare begin at the point when the fish is captured.
4. The capture method varies considerably within the sector and fish may be captured:
 - Individually e.g.
 - In the line fishing sector fish are caught individually using a line and a hook;
 - In some cases fish are captured individually but on lines which may have multiple hooks (e.g. long lines).
 - In multiples e.g.
 - trawling - a net is towed behind a boat to capture a proportion of a school of fish;
 - set nets - set in place for capture of fish swimming through an area;
 - seine net - used to encircle a proportion of a school of fish;
 - traps – attract fish into a container and holds them through use of bait.
5. The time between when fish are initially captured and when they are removed from the water varies between methods.
6. Many capture methods have been modified to ensure there is minimum bycatch.
7. Most capture methods allow fish that are not required for resource sustainability or market reasons (eg. undersize/non target species) to escape capture or be released alive (exclusion devices built into nets/traps).
8. The method of slaughter of live fish varies and is dependent on the capture method.
9. Where fish are shipped live to the market place the responsibility for welfare often passes outside the industry once landed ashore (eg wholesalers, processors, retailers, restaurants).
10. Fish that are kept live in restaurants are often on public display. This brings a high public profile to this sector.

11. There is a significant array of wild fish species captured throughout this sector.

Outcomes of the commercial wild capture sector workshop

The following provides detail of what was discussed at the workshop. It also provides the context for the agreed process going forward.

Workshop participants identified the following options for going forward on issues of fish welfare in the wild capture sector:

1. Nothing
2. Guidelines
3. Codes of Practice
4. Regulatory Standards

As discussed earlier, “doing nothing” was not considered a reasonable option by participants and hence discussion focused on developing processes by which this sector could satisfy the general principles necessary to minimise the suffering to fish.

The wild capture sector is a vast and diverse sector. There are over 350 fisheries in this sector in Australia using a number of different capture methods. It would be difficult to develop an individual welfare document for each fishery, although this does not exclude a fishery from doing so, should it be considered desirable.

The key welfare issues in the wild capture sector relate to the *capture, slaughter* and the *transport and holding* of live fish.

Participants noted that many practices have already been adopted in this sector to improve overall product quality and to satisfy the general principles necessary to minimise the suffering of fish.

In the ornamental sector there is the Pet Industry Association of Australia’s (PIAA) *National Code of Practice* which has been identified as a starting point in the development of fish welfare documentation at a national level in this sector. The aquaculture sector has the National Aquaculture Council’s (NAC) *Aquatic Animal Welfare Guidelines* to serve as a valuable reference in the development of national fish welfare documentation in this sector.

The wild capture industry already has a considerable number of Codes of Conduct, Best Practice Manuals and Environmental Management Plans/Systems (EMP/EMS) which include both direct and indirect reference to fish welfare that with minimal amendment would capture the general principles necessary to minimise the suffering to fish.

There was considerable discussion regarding definitions of *minimum regulatory standards* (which would be developed by Government legislative authorities and are enforceable) and *Australian Standards*[®] which are developed by *Standards Australia*. *Standards Australia* is a private sector organisation and is recognised by the Government as Australia’s peak standards body. *Australian Standards*[®] may be incorporated into legislation by Governments. The wild capture sector is familiar with both types of standards.

Participants agreed that:

- At this stage the wild capture sector did not require the development of legislated and enforceable *minimum regulatory standards* through the AAWS process though these may be desirable in the future. Likewise, participants did not see a need to develop *Australian Standards*[®] through the private sector.
- A worthwhile aim is to reduce any unnecessary suffering of fish during the capture, slaughter and holding of fish, acknowledging that it is not possible to eliminate all pain and suffering when capturing wild fish.

Animal welfare advocates attending agreed with this acknowledgment.

- Developing a generic template with animal welfare principles based on the different methods of fishing would be manageable. The different methods discussed were:
 - hook and line fishing
 - pot / trap
 - gillnet
 - trawling
 - seine fishing
 - spear fishing
 - dip net

Slaughter is one of the three key activities in which the wild capture industry can impact favorably from the perspectives of fish welfare and product quality.

It was recognized that some differences exist between handling large numbers of small fish and handling a smaller number of larger fish - it is easier to humanely slaughter a smaller number of larger fish than a large number of small fish. Participants identified “ice slurry” as a technique used within the industry that should address any concerns in relation to small fish but there is no research supporting this method (or others) as the most desirable from a product quality and welfare point of view.

It is now well established that improvements in fish quality can occur with improved handling and slaughter techniques. These techniques can result in a better financial return while maintaining benefits through reduction in unnecessary suffering in the fish.

Training and competency standards were highlighted as vital to the whole process.

Practical communication channels for information need to be developed to ensure those actually at the ‘coal face’ obtain the necessary assistance in a useable and accessible manner.

The way forward

The process going forward to develop animal welfare arrangements in the commercial wild capture industry, as identified and agreed to by participants was as follows:

- A) The primary process for progressing fish welfare in this sector should be through the AAWS *Aquatic animal welfare working group* engaging with a *National Aquatic Animal Welfare Reference Group* which is specific to the wild capture sector.
- B) The wild capture *Reference Group* would consist of:
 - representatives from each State/National fishing industry representative bodies covering the various wild capture fishing methods;
 - Department of Agriculture, Fisheries and Forestry (DAFF) Animal Welfare Unit;
 - Australian Fisheries Management Authority (AFMA);
 - representatives from State /Territory fisheries management agencies;
 - representatives from Animal Welfare groups (eg RSPCA, Animals Australia).
- C) The wild capture *Reference Group* would establish a generic set of ***Overarching Welfare Principles (“Obligations”)*** applicable to all wild capture fishing sectors. The development of a *template* will allow consistent assessment across different sectors.
- D) A “*driver*” would be nominated for each capture method to co-ordinate the specific requirements for fish welfare in that sector. This *driver* may be a State, Territory or National Association (e.g. Qld Seafood Industry Association may be the driver for the line fishing capture method). The driver would facilitate an assessment of the sector using the generic welfare template as a guide. Any documentation such as an EMS or Food Safety Protocol would also be assessed for

consistency with the *Overarching Principles*. A short *Code of Practice* or set of *guidelines* may be developed for the sector if deemed desirable or necessary.

- E) Further research necessary to achieve continuous improvement in compliance with the general principles required to minimise the suffering of fish in that sector (e.g. research on the suitability of a slaughter method) would be coordinated through to the *National Aquatic Animal Welfare Reference Group* to minimise duplication of effort and improve consistency between sectors.
- F) The fishing industry sector body representatives would be capable of auditing sectors for compliance with principles through existing Environmental Management Systems (EMS)/ Food Safety Systems where QA systems are involved.

Figure 1 describes this process.

The workshop agreed that at this stage the wild capture sector did not require the development of *minimum regulatory standards*, though these may be desirable in the future.

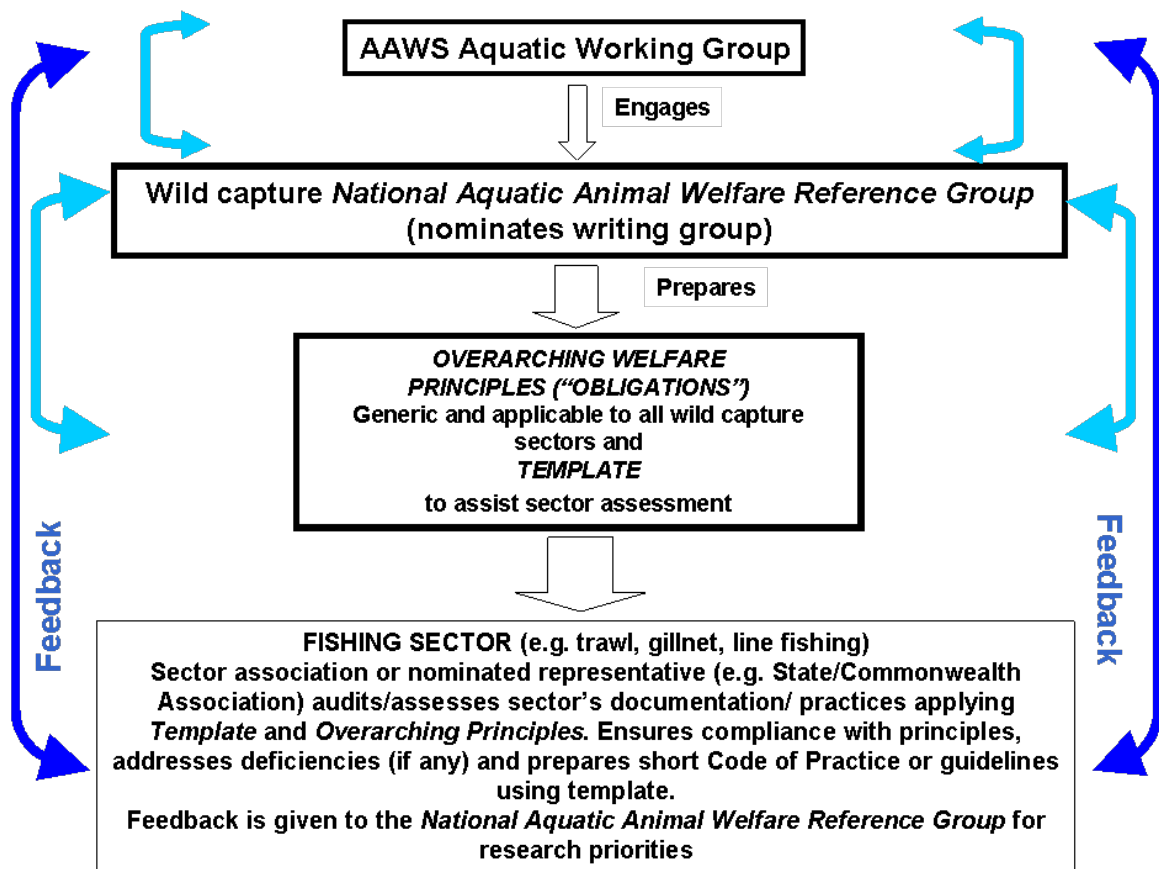


Figure 1 - The process going forward in the wild capture sector

Appendix A: List of participants at the Wild Capture Sector Workshop held July 10th/11th, 2007

Name	Organisation
Onn Ben David	RSPCA
Shane Fava (Wed only)	Tasmanian Fishing Industry Council
Todd Francis	Tasmanian Scalefish Fisherman's Association (TSFA)
Paul Hardy-Smith	Panaquatic Health Solutions (PHS)
Martin Hicks	Queensland Seafood Industry Association
Robert Jones	PHS
Murray Knight	TSFA
Rebecca Lathbury	Australian Government Department of Agriculture, Fisheries and Forestry (DAFF)
Ted Loveday	Seafood Services Australia
Robert Milner (Tues only)	Tasmanian Fishing Industry Council
Kate Milner	Oceanwatch/Seafood Industry of Victoria
Brett McCallum	Western Australian Fishing Industry Council
Ross McGowan	Seafood Industry Victoria
Glenys Oogjes	Animals Australia
Colleen Osborne	TSFA
David Osborne	TSFA
Eve Robinson	Northern Territory Seafood Council
Veronica Silberschneider	NSW Department of Primary Industries
Scott Turner	DAFF
Anne Whalley	Women's Industry Network Seafood Community (WINSNC) and Wild Harvest Fishing Partner
Claire VanderGeest	South Australia Fishing Industry Council
Robin Vandergraaff (Chair)	PHS/Animal Health and Welfare Systems

Appendix B: Agenda for the Wild Capture Sector Workshop held July 10th/11th, 2007

Day One – Tuesday July 10th

1.00pm	Stakeholders arrive, light lunch available if needed
1.30pm	Welcome and Introductions Objectives of the workshop Brief background on the process so far
1.45pm	The Australian Animal Welfare Strategy (AAWS)
2.15pm	Panaquatic’s <i>Review of Current Welfare Arrangements for Finfish in Australia</i> – general summary
2.45pm	Fish welfare in Australia– legislation, inconsistencies.
3.00pm	Afternoon Tea
3.20pm	The Recreational, Ornamental and Aquaculture sectors – what they’re up to
3.30pm	“ <i>Review of Current Welfare Arrangements for Finfish in Australia</i> ” –summary specific to the wild capture sector
4.15pm	Minimum regulatory standards versus Codes of Practice
4.45pm	General comments on the Wild Capture Discussion Paper
5.00pm	Close for the Day
6.30pm	Dinner at the Airport Motel and Convention Centre

Day Two– Wednesday, July 11th

9.00 am	Review of first day.
9.15am	The Wild Capture sector’s wants and needs: <ol style="list-style-type: none">1. Minimum regulatory standards, guidelines or both?2. Stand alone welfare regulatory standards/guidelines or standards/guidelines incorporated into an industry “best practice” document (e.g. Recfish Australia’s Code) or quality assurance system?
10.00am	Brainstorming Session: <ul style="list-style-type: none">• Where are the risks in the wild capture sector?• Are these risks related to specific management activities?• Are the other risks that are unmanaged?• Industry quality assurance system into which welfare guidelines can be

audited.

- How much does the industry want to bite off in this process?
- What does the industry want to bite off in this process?

10.30am

Morning tea

11.00am

Brainstorming Session (cont.)

12.30pm

Lunch

1.15pm

Action plan:

- How will industry achieve what it wants/needs?
- What structure will it take (see AHA Business plan)?
- Will there be a writing group/management team

Timelines?

3.00pm

Conclusions and wrap up

3.30 pm

Afternoon tea – Workshop ends

Appendix C - Overarching Welfare Principles

In the context of Aquatic Sector of the Aquatic Animal Welfare Working Group under the Australian Animal Welfare Strategy (AAWS), only vertebrate finfish are considered Aquatic Animals; other aquatic vertebrates are considered under other Sectors of AAWS. **(Note 1)**

The approach taken with animal welfare to date within the Aquatic Animal sector has been to establish overarching Principles against which sub-sectors can build their specific best practice guidelines to achieve animal welfare. **(Note 2)**

The overall aim of the aquatic sector (fish that are farmed, being transported, kept in aquaria, captured from the wild both commercial and recreational, or in aquaria in restaurants) should be to minimise suffering within the constraint of practices inherent to that sub-sector. **(Note 3)**

Specific measures include:

1. For fish held in captivity, the key parameters (temperature, salinity, pH, dissolved oxygen, & metabolites) of the aquatic environment in which fish are maintained should be within the species' natural range of tolerance.
2. For fish held in captivity, the holding unit in which they are normally housed should provide
 - safety from predators,
 - refuge from environmental extremes beyond their natural range of tolerance,
 - appropriate space,
 - appropriate space and/or water flow to avoid chronic degradation of water quality parameters referred to in point 1 above. **(Note 4)**
3. For fish held in captivity the feed supplied should meet known nutritional requirements, and be distributed in a manner and frequency which avoids starvation for periods longer than the species natural range of tolerance.
4. For fish held in captivity, any visibly damaged or sick fish should be assessed and either treated appropriately or promptly removed for killing by humane means suitable for the species.
5. During any handling of live fish,
 - care should be taken to avoid any damage to the fish

- for prolonged handling of fish out of water (e.g. health checks, vet treatment, artificial reproduction, etc), an anaesthetic appropriate for the species and frequent irrigation of skin and gills is essential
 - fish intended to remain alive should be returned to the water promptly.
6. Any fish selected for harvest should be killed as rapidly as possible, by humane means suitable for the species
 7. For fish harvested from the wild timely handling from capture to death is essential to minimise suffering. **(Note 5)**
 8. Capture methods should be designed to minimise the capture of unwanted fish.

Explanatory Notes

Note 1: The duty of care principles are couched within the Australian Animal Welfare Strategy under which these specific aquatic animal principles will be applied.

Note 2: As a code there is no legislative basis. Words such as ‘must’ hold no relevance. Animal Welfare legislation is the place for definitives and the code assists operators to meet those definitives through words such as ‘should’.

Note 3: Suffering is inclusive of pain and other issues of animal welfare.

Note 4: This principle when read with principle 1 covers all aspects. The detail of parameters such as water flow, stocking density, behavioural aspects and space will be in the sub-sector code themselves depending on operational method and species.

Note 5: ‘Capture’ as defined in sub-sector codes.

Appendix D: Australian Animal Welfare Strategy - Development of Aquatic Animal Welfare Codes of Practice for the Australian Commercial Capture Fishing Sector

March 17th, 2010

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Background

This project was initiated by the Aquatic Animal Welfare Working Group (AAWWG), through the Department of Agriculture Fisheries & Forestry (DAFF). Following on from a series of successful aquatic animal welfare workshops in the various sectors (aquaculture, ornamental, commercial capture), the AAWWG requested Expressions of Interest to develop a series of aquatic animal welfare codes of practice for the various sectors of Australian commercial capture fishing industry. The Australian commercial capture fishing sector includes operations in all states and the Northern Territory, and targets a wide range of species. There is a close relationship between animal welfare and quality of seafood products

The main commercial capture fishing sector methods are:

- Line - hand, drop, longline
- Trawl - otter, beam, stern
- Pot & Trap
- Seine - beach, purse
- Gill (mesh) net

Panaquatic Health Solutions Pty Ltd (“Panaquatic”) was successful in its Expression of Interest for this Project.

The final output of this project is five ‘draft’ Codes (one per fishing method), developed in consultation with a nominated body representative of the industry using that fishing method. Wider consultation, endorsement and dissemination of the draft codes by the industry around the nation will be undertaken as a separate project, at a later date.

Once developed, the Codes are to be living documents, reviewed regularly by industry and state agencies for improvements in knowledge on animal welfare or improvements in capture methods for aquatic species.

Methodology

The specific output of this project was initially to produce five ‘draft’ Codes for the commercial wild capture finfish industry. These five codes were to address the following commercial capture fishing sector methods:

- Line - hand, drop, longline
- Trawl - otter, beam, stern
- Pot and trap
- Seine - beach, purse, Danish
- Gill (mesh) net

A total of six draft codes have actually been produced, due to the fact that two draft Codes were produced in the seining sector – one draft Code addressing beach seining and the other addressing purse seining.

The approach to developing each draft Code was similar.

7. The initial contact for preparation of the draft Code in each sector was with the Coordinating State Council for that particular fishing method – for example, Seafood Industry Victoria (SIV) were contacted initially when preparing for the purse seining draft.
8. A request was made to the Coordinating State Council to nominate a commercial fisher who regularly used that particular fishing method and who would be willing to assist Panaquatic in the initial drafting of the Code.
9. Panaquatic then contacted that fisher, and for five of the six Codes organised to meet the fisher in person to discuss the project and also discuss fishing methods employed when fishing using that particular method.
10. In preparation for three of the draft Codes (purse seining, beach seining, line fishing) Panaquatic actually accompanied the fisher on a fishing trip. For the trawl draft code, Panaquatic met up with a number of the actual skippers who trawl in the Great Australian Bight, and spent time with them on their boats. For the gill (mesh) net draft, Panaquatic journeyed to Tasmania to meet up with a meshnet fisher there. For the final draft Code, pot/trap, Panaquatic corresponded with a commercial fisher operating out of the Kimberley region in Western Australia. Unfortunately Panaquatic did not actually go out on this fishers vessel.
11. At the same time, Panaquatic requested any other industry Codes of Practice that may be in existence for that sector. This was to ensure that the content of the draft Welfare Code of Practice did not contradict anything that the industry already had in another Code. Knowledge of any other Codes also allowed Panaquatic to use a similar format and where possible reinforce methods or practices mentioned in these other Codes in the draft Welfare Code.
12. A critical aspect of the draft Codes was that they aligned with the AAAWWG Aquatic Animal Welfare – Overarching Principles – these are provided in Appendix A.

13. Once the initial draft Code was developed, Panaquatic sent a copy of the draft to the fisher who had assisted in its development for review and comment. The draft was then forwarded to the Coordinating Council for that particular fishing method.
14. All draft Codes have followed a similar format.

Draft Welfare Codes of Practice

Appendix B contains the six draft welfare Codes of Practice.

The following summarises additional information including specific comments from Associations and individuals gained through this consultancy with regard to each draft Code.

Purse seining draft Welfare Code of Practice

The Coordinating State Council for this draft Code was Victoria who provided considerable assistance with drafting the Code. Panaquatic was fortunate to accompany a commercial purse seine fisher on a fishing trip out of Lakes Entrance, Victoria.

This draft was circulated to a number of organisations and to the Department of Agriculture, Fisheries and Forestry's (DAFF) Fisheries section. Comments from these organisations and DAFF have been acknowledged. Some discretion has been used by the consultant as to whether any suggested changes have been included.

Beach seining draft Welfare Code of Practice

The Coordinating State Council for this draft Code was South Australia but due to Panaquatic being based in Melbourne Panaquatic worked initially with Seafood Industry Victoria to identify fishers using this technique. This was agreed with South Australia. Hence Panaquatic went out with a beach seiner operating in Port Phillip Bay prior to preparing the first draft.

This first draft of the beach seining Welfare Code was reviewed by Maria Manias, Executive Officer - Victorian Fishery into Resource Management inc (VFARM), Port Phillip & Westernport Bay Commercial Wildharvest Fishery on behalf of the fisher. Maria requested in their review that a number of changes be made which has been done. In addition she made the following suggestion:

Further to your last email please note that we are planning to develop our own code of practice which will cover all aspects of fishing operations in the future.

In regards to your drafts, we appreciate your time constraints, however at the same time these are very important documents and the fact that we were able to arrange for you to go out on one of the fishing boats would cover one aspect of the need to develop your codes. There needs to be further discussions regarding the contents as most of the information in the drafts are covered in other documents, such as codes of practices and Food safety manuals. It would be beneficial to meet at the office of Seafood Industry Victoria in the new year so that we can discuss these codes, how they can compliment existing documents and to assist you in finalising this issue. Our organisation would be interested in attending.

Panaquatic has informed Ms Manias that attending a meeting as she suggested would be a very good idea but would form part of the second stage to this project.

There are also two projects that are relevant to this draft Code:

Tim Leibolt, SeaNet Extension Officer for Victoria is drafting a "Code of Practice for Commercial Haul Seine fishing in Port Phillip Bay" for VFARM. The current Code is in draft

format. This would be a good resource for the second stage of this project. Tim has kindly sent Panaquatic a copy of this Thesis.

Michael Wooden, SeaNet Extension Officer for New South Wales, has also done extensive work in the area of beach seining, including his Master of Applied Sciences (Research) Thesis titled *“Reducing the capture of juvenile bream, luderick and sea mullet in NSW beach seine fisheries”*. Michael has kindly sent Panaquatic a copy of this Thesis. Michael was also a co-author on the research paper titled: “Isolating selection mechanisms in beach seines¹³”.

There is also another excellent document produced which specifically investigated beach seining methods in Victoria. This document, *“The effects of haul seining in Victorian bays and inlets”* by Ian Knuckey was Project No. 1997/210 of the Fisheries Research Development Corporation (FRDC) and can be obtained from the FRDC free of charge¹⁴. Panaquatic has a copy of this report.

Mesh Netting draft Welfare Code of Practice

The Coordinating State Council for this draft Code was Tasmania who provided assistance with drafting the Code including identifying a suitable commercial mesh-netter to work with. This mesh-netter practices a form of mesh-netting where fish are captured alive. This mesh netter has reviewed the Mesh netting draft Welfare Code of Practice and after a few minor changes were made is happy with it.

Not all mesh-netters capture fish alive hence the variation in styles of mesh-netting may mean that the current draft will not be applicable to all styles.

Trawl draft Welfare Code of Practice

The Coordinating State Council for this draft Code was the Commonwealth (Great Australian Bight Industry Association - GABIA) who provided assistance with drafting the Code including identifying a suitable commercial trawler to work with. Panaquatic spent time with this trawler and some of his skippers. Unfortunately, Panaquatic did not accompany the trawl fishers on a fishing trip due in part to the long period of time trawlers can spend at sea.

GABIA has reviewed the trawl draft Welfare Code of Practice and after a few minor changes is happy with it.

There is much in the literature regarding trawling and particularly by-catch reduction. Reducing the amount of fish by-catch in this fishery (as in all fisheries) will indirectly assist in reducing unnecessary stress on fish simply as they won't be caught in the first place. One such report is by Geoffrey Liggins and is titled *“Discarded catch in a multi-species trawl fisheries”* produced in July 2001¹⁵. Another paper is titled *“Effects of an increase in mesh size on the catches of fish trawls off New South Wales, Australia”* which was published in 1995¹⁶.

Line Fishing draft Welfare Code of Practice

¹³ Broadhurst MK, Wooden MEL, Millar RB (2007). Isolating selection mechanisms in beach seines. Fisheries Research 88 (2007) 56–69

¹⁴ The FRDC website is available at www.frdc.com.au/

¹⁵ Liggins GW (2001). Discarded catch in a multi-species trawl fisheries. A thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy in the Marine Studies Centre, University of Sydney, New South Wales, Australia.

¹⁶ Broadhurst MK and Kennelly SJ (1995). Effects of an increase in mesh size on the catches of fish trawls off New South Wales, Australia. Marine and Freshwater Research 46 (4): 745-750

The Coordinating State Council for this draft Code was South Australia who provided assistance with drafting the Code including identifying a suitable commercial line fisher to work with. Panaquatic accompanied a line fisher in Spencer Gulf as preparation for the line fishing draft Welfare Code of Practice. The line fisher has reviewed this draft and after a few minor changes were made is happy with it. It is important to note that this draft refers to hand-lining and not to long-lining.

Pot/Trap draft Welfare Code of Practice

The Coordinating State Council for this draft Code was the Queensland Seafood Industry Association. Unfortunately a suitable pot/trap fisher was not identified by QSIA. Brett McCallum identified a pot/trap fisher in Western Australia who provided valuable information to Panaquatic on which the Pot/Trap draft Welfare Code of Practice was based. The fisher circulated the draft and received back a number of comments, which have been acknowledged.

Appendix A – Aquatic Animal Welfare – Overarching Principles

In the context of Aquatic Sector of the Aquatic Animal Welfare Working Group under the Australian Animal Welfare Strategy (AAWS), only vertebrate finfish are considered Aquatic Animals; other aquatic vertebrates are considered under other Sectors of AAWS. **(Note 1)**

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16. Capture methods should be designed to minimise the capture of unwanted fish.

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