Maritime Safety Queensland

Safety equipment trials

Queensland commercial fishing industry

Queensland Government

Acknowledgments

Maritime Safety Queensland would like to acknowledge the support and contribution of all participants including:

- Lifesaving and safety equipment manufacturers
- Performance Flotation Developments, Marine Safe Australia, and Chemring for the provision of inflatable life jackets and personal EPIRBs to ensure commercial fishers had access to the most current technology
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- Commercial fishers for participation in the safety equipment trial
- B. Henebery for providing photos.

Executive summary

Maritime Safety Queensland conducted a trial of safety equipment in conjunction with the Queensland commercial fishing industry.

The objective of the trial was to identify opportunities to improve the safety and survivability of commercial fishers at sea and introduce commercial fishers to new technology that would assist in this regard.

Globally, commercial fishing is one of the most dangerous occupations. A large number of injuries and fatalities result from vessel capsize or persons falling overboard. Some fishing ship owners and operators view the dangers as an accepted part of commercial fishing operations and rely on traditional approaches to safety management. Lifejackets carried by most commercial fishers are bulky, unsuitable for wearing while working, and considered too hot to wear in the hot and humid Queensland climate.

The safety equipment trial conducted by Maritime Safety Queensland exposed commercial fishers to a new range of lifesaving equipment, personal safety devices, and recent technological advances in these areas. The trial dispelled initial concerns by commercial fishers that wearing lifejackets, in the workplace at sea, would increase the risk of injury to crew through entrapment in machinery, trawl or fishing gear. The diversity of new technology improves the wearability and comfort of lifejackets when worn in the workplace in most climatic conditions.

The safety equipment trial assessed a range of inflatable Personal Flotation Devices (PFDs) and Personal Locator Beacons (PLBs). This equipment was provided to commercial fishers in two regions – south east Queensland and north Queensland, including the Torres Strait. The trial gathered information from participants who wore the equipment in a diverse range of operational, climatic and environmental conditions.

On completion of the trial, in-water tests were conducted to assess the performance of the PFDs. A ‘wear and tear’ analysis was conducted by two equipment suppliers to provide an informed assessment of the durability of the equipment.

The trial confirmed there is no singular brand or type of PFD that would suit the diversity of commercial fishing operations. The choice of PFD is affected by factors such as climate; operational area; the industry sector, that is, trawl, fishing, crabbing; and a fisher’s physical characteristics and personal preferences.

The trial of PFDs and PLBs by participants identified a number of opportunities to enhance equipment design and improve the safe wearability of the equipment. One PFD manufacturer acted immediately to introduce a range of PFDs that include a separate pocket for carriage of the PLB.

Looking forward, the preferred approach is to ensure commercial fishing ship owners and operators conduct an informed risk assessment to identify high risk situations at sea when PFDs will be worn. It is the responsibility of ship owners and operators to ensure the risk assessment and management strategy is recorded and documented as a safety procedure within the ship's safety management system and subsequently implemented by their ships.

A workshop with the commercial fishing industry aims to assist commercial fishers to carry out the PFD risk assessment. The outcomes will benefit other commercial fishing operations.

There is a limited range of inflatable PFDs available for purchase that meet Coastal and Safety of Life at Sea (SOLAS) requirements. Maritime Safety Queensland is investigating the availability of inflatable PFDs that satisfy Coastal and SOLAS requirements and will establish a list of suitable equipment in direct consultation with equipment manufacturers and suppliers.

It is also important that commercial fishers are fully conversant with the maintenance and servicing of safety equipment. Maritime Safety Queensland in partnership with equipment manufacturers/suppliers has and will continue to coordinate information sessions to assist in this regard.

The safety equipment trial has been a major success. It has increased the industry's exposure to new safety technology; encouraged commercial fishers to invest in the new technology; and promoted a safety culture within the industry. Another significant development is the cooperative working relationship established with the industry sector and the Queensland Seafood Industry Association (the peak industry association).

The safety equipment trial confirms ownership comes from participation.

Maritime Safety Queensland is committed to pursuing opportunities to work collaboratively with the commercial fishing sector to establish a safety culture as the accepted benchmark for performance.

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1. Introduction

Life at sea exposes fishers to a hostile and a life-threatening environment that can change radically within moments. Globally, the commercial fishing industry is one of the most dangerous occupations and despite modernisation continues to experience high rates of fatal and serious injuries (McDonald & Kucera 2007).

Queensland fishers are not immune to the inherent risks associated with commercial fishing. State records indicate that in the eleven year period, 1998 to 2008, the Queensland commercial fishing industry experienced 23 fatalities, 8 serious injuries and lost 62 fishing vessels as a result of vessel capsize and persons overboard. Fifty percent of deaths that occurred in the commercial fishing industry in the last eight years, may have been prevented if the person had been wearing a Personal Flotation Device (PFD) at the time of the incident.

Lifejackets carried on board commercial fishing vessels need to comply with the Uniform Shipping Laws (USL) Code; or Safety of Life at Sea (SOLAS) requirements. Traditional lifejackets, due to their bulk, are not suitable for wearing while at work. Most traditional lifejacket models are considered too hot for use during the Queensland summer.

Anecdotal information suggests that safety equipment is often stowed in inaccessible places and, in the event of capsize or person overboard, the equipment is not readily available for emergency access or deployment. Recent coronial inquests proposed recommendations to reduce the likelihood and consequence of commercial fishing vessel incidents. A number of coronial reports make recommendations on the use of inflatable PFDs and Personal Locator Beacons (PLBs).

Significant obstacles to the use of safety equipment by the commercial fishing industry are perceptions within the industry that wearing PFDs is unnecessary; that they interfere with onboard activities and could expose crew to risk of entrapment in nets or machinery. Anecdotal information suggests that individual fishers rely on personal skill and experience to manage safety risks onboard their vessels.

Manufacturers claim that inflatable PFDs can provide equivalent safety benefits without the bulkiness and discomfort of traditional lifejackets. Inflatable PFDs may provide a more practical means for commercial fishers to wear flotation devices while working.

The purpose of the trial was to determine the wearability of a range of PFDs and PLBs using commercial fishers as the trial group. The objective was to increase use of safety equipment within the industry and provide commercial fishers with a greater awareness of new products available.

Recommendations are offered in relation to safety equipment design along with policy options to increase the use of safety equipment in Queensland's commercial fishing industry. The status of initiatives being developed by Maritime Safety Queensland to implement trial recommendations concludes this report.

2. Scope of the trial

Maritime Safety Queensland coordinated the safety equipment trial within the commercial fishing industry over a two year period from late 2006 to late 2008. The purpose of the trial was to evaluate the performance of safety equipment in the working environment at sea.

The trial was conducted in two regions – south east and northern Queensland including the Torres Strait. The south east trial involved 19 vessels across five different types of operations. The northern trial involved 29 vessels across five different types of operations. The involvement of different types of commercial fishing operations ensured the range of equipment was worn and tested in a variety of working and climatic conditions.

The following types of operations were included in the trial:

- trawl (including offshore trawl and inshore trawl)
- net fishing
- line fishing
- line tuna fishing
- sand crabbing.

Safety equipment tested in the trial included three types of inflatable PFDs: bum bags, jackets and yokes and PLBs. The following PFD types and brands were included in the trial:

- Hutchwilco Manual Yoke
- PFD Ultra Yoke Manual and Automatic
- Hutchwilco bum bag
- Stormy seas jacket
- Stormy seas manual yoke.

Illustrations of some of the safety equipment that was trialled are pictured below..

Hutchwilco – Yoke and Bum Bag

Stormy Seas – Jacket and Yoke

Ultra Manual Yoke

A large range of safety equipment was made available to trial participants and complemented other equipment donated by a number of PFD manufacturers/suppliers. This ensured that commercial fishers were able to trial a broad range of safety equipment and determine what equipment best suited their particular work environment.

The primary focus of the trial was the high risk offshore trawl operations. The sector is considered most at risk by the Coroner and Maritime Safety Queensland.

A number of commercial fishers from other sectors of the industry expressed a willingness to participate and the trial was expanded accordingly. In the majority of cases more than one type of PFD was trialled on each vessel and usually by different crew members. This served to

maximise exposure to the diverse range of available safety equipment. Participants were asked to wear the equipment during normal working conditions duties over a period of three to four months.

Inflatable PFDs have the advantage of being less cumbersome than traditional life jackets; however, are considerably more expensive. The cost of the PFDs used in the trial ranged from $100 to $425. PLBs currently on the market range in price from $230 to over $1000. Inflatable PFDs require regular servicing to ensure the pressurised canisters that inflate the PFDs and the mechanism that triggers inflation are appropriately maintained. Once a PFD has been discharged the canister needs to be replaced. Prices for replacing a canister range from $30 to $50.

Feedback was received from trial participants via safety equipment evaluation forms and a debrief session held in each region. These provided participants an opportunity for additional input and to consider proposed recommendations. A wear and tear assessment of the equipment was conducted by the distributors and in-water performance tests conducted with a small group of commercial fishers in a salt-water pool.

By gathering and analysing feedback from participants and studying the wear and tear on the safety equipment itself, the trials provided the opportunity for innovative developments in the design and use of safety equipment.

The trial represents a clear commitment from industry and government to work together to identify practical solutions that improve and protect the safety of life at sea.

3. Trial results

Trial participants recorded the 'weather comfort' and 'work suitability' of the PFD when it was worn. Weather comfort rates the comfort the participants experienced while wearing the PFD in different weather conditions: that is hot, warm, cold, and wet weather. Work suitability rates the comfort the participants experienced while wearing the PFD and performing usual work activities, and the extent to which the PFD interfered with their usual work activities. Participants provided with PLBs were also asked to provide comments on the equipment when worn in conjunction with the PFD.

The main concern registered by participants prior to the commencement of the trial was that safety equipment would get caught in the ship's equipment/machinery or restrict their ability to go about their duties freely.

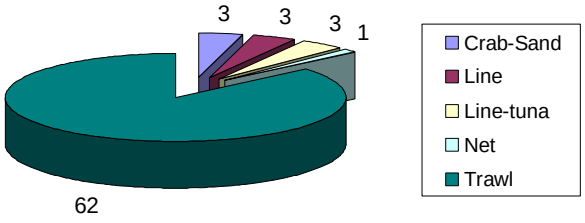
The advantage of automatic inflatable PFDs is that if a person falls overboard and is rendered unconscious, an automatic inflatable PFD will inflate when the device is submerged in water and improve their survivability provided emergency response is timely. A large number of participants were reluctant to trial automatic inflatable PFDs as they feared the devices could inflate and trap them inside a vessel during a vessel roll-over or inflate unexpectedly and jeopardise their personal safety while working on deck.

The concerns of commercial fishers were acknowledged and the option for participants to trial automatic inflatable PFDs was purely voluntary. Only a very small number of participants chose to trial automatic inflatable PFDs.

3.1 South east trial

Seventy-two participants were involved in the south east safety equipment trial. The majority of participants were involved in trawl operations. The break-down of participants and the type of operations are illustrated in figure 1.

Figure 1. South east inflatable PFD trial: survey responses by types of operation

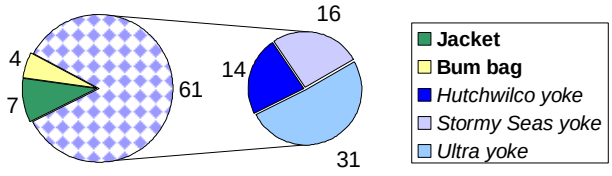


PFDs trialled

Three types of PFDs were trialled: jacket, bum bag, and yoke. Three different brands of yokes were offered in the trial; the Hutchwilco yoke, the Stormy Seas yoke and the Ultra yoke.

The majority of PFDs trialled were manual yokes, of which the majority were the Ultra yoke brand. The different types of PFDs trialled are illustrated in figure 2.

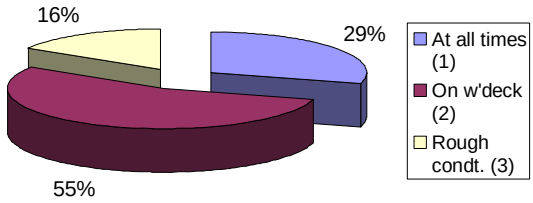
Figure 2. South east inflatable PFD trial: all survey responses by type (jacket, bum bag, yoke) and brand of yoke



When PFDs worn

Approximately half of the participants wore their PFD only when they were on the weather deck. Almost a third of participants wore their PFDs at all times. A small percentage wore their PFDs only during rough conditions as illustrated in figure 3.

Figure 3. South east inflatable PFD trial: when PFD worn



Weather comfort

A rating scale of 1 to 5 was used for weather comfort in each weather condition: 1 - uncomfortable; 2 - slightly less than comfortable; 3 - comfortable; 4 - slightly more than comfortable; 5 - very comfortable.

On average all three types of PFDs were rated as comfortable. Of the three PFD types, bum bags rated slightly higher than yokes, followed by jackets.

In the individual weather conditions, bum bags rated highest in hot/warm weather relative to the other PFD types.

Jackets rated higher in cold weather, and yokes rated the highest in wet weather.

Work suitability

In terms of work suitability, jackets rated the highest, followed by yokes and then bum bags. Note that this result is opposite to the results for weather comfort. Some trial participants commented that bum bags got in the way when working.

Overall indicator

The overall rating by PFD type was created by combining the ratings for both weather comfort and work suitability. Using this indicator all PFDs were rated similarly. No PFD was clearly preferred in all weather conditions and work situations.

The greater variability in the results for weather conditions, relative to work suitability, implies that PFD usage might be increased by having more than one type of PFD available to the crew. This allows the selected PFD to suit the daily conditions or the predominant type of weather conditions during the trip/season.

An analysis of yokes by brand indicates that particular brands are more suited to different weather conditions. The Hutchwilco yoke rated the highest of the yoke brands in hot/warm conditions, followed by the Ultra yoke. Conversely, the Stormy Seas yoke rated the highest in cold and wet weather. The Hutchwilco yoke rated slightly lower than the other two yoke brands in terms of overall weather comfort.

In terms of work suitability, the Stormy Seas yoke was the highest rating yoke followed by Hutchwilco and Ultra. Overall, combining the weather comfort and work suitability ratings, the Stormy Seas yokes rated higher than the Ultra yoke, followed by the Hutchwilco yoke.

Comparing the ratings for individual brands of yokes to the ratings for the bum bag and jacket revealed that the Stormy Seas yoke was one of the two highest rating PFDs, equal to the bum bag.

The overall ratings for all PFD types and brands were consistently close. The trial reveals that all brands/types could be used safely on the weather deck under working conditions with the comfort levels varying according to the weather conditions.

Trial comments

One of the major concerns of participants was the potential for accidental inflation of a PFD in an enclosed space within the vessel, thereby trapping an individual. South east trial participants suggested that further trials of PFDs with automatic activation would be required in order to:

1. assess the occurrence of accidental activation
2. evaluate the circumstances that contribute to accidental activation
3. further assess the suitability of PFDs with automatic activation in respect of routine activities at sea.

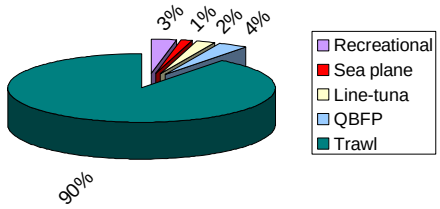
Trial participants expressed a need for further information at point of purchase on the PFD canister replacement and servicing. This issue has been communicated to those PFD manufacturers/retailers who provided equipment for use in the trials. This report will be referred on to other PFD manufacturers/retailers. The increased uptake of the technology by commercial fishers will enhance communication and knowledge within the industry.

While inflatable PFDs generally improved the views, some trial participants maintained that safety was not improved by wearing PFDs at all times at sea. This is a significant safety culture issue.

3.2 Northern trial

The northern trial involved double the number of participants of the south east trial. A total of 137 participants were involved and the majority of participants worked in trawling operations) see figure 4 below).

Figure 4. Northern inflatable PFD trial survey responses by types of operation



PFDs trialled

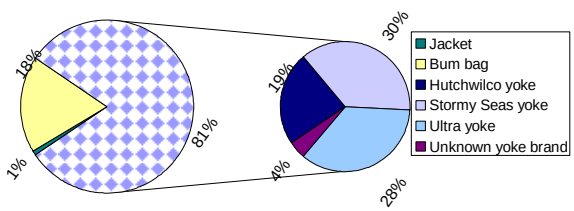
Three types of PFDs were trialled: jacket, bum bag, and yoke.

The same three brands of yokes were offered as in the south east trial: Hutchwilco; Stormy Seas and Ultra yokes.

The trial results included an 'unknown' category for a small number of responses where the brand of yoke was not specified. The majority of PFDs trialled were manual yokes and each of the three brands were fairly evenly represented.

Figure 5 below illustrates the PFDs trialled by type and brand.

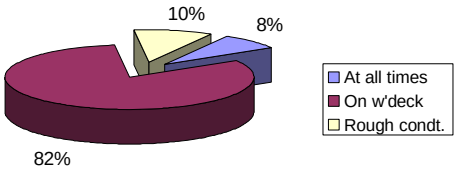
Figure 5. Northern PFD inflatable trial: all survey responses by type (jacket, bum bag, yoke) and brand of yoke



When PFDs worn

The major difference between the two locations is that the large majority of participants in the northern trial wore their PFDs only while on the weather deck; 82% compared to 55% in the south east trial. This difference is most likely due to the hotter and more humid climate experienced in northern Queensland. Figure 6 illustrates when PFDs were worn by trial participants.

Figure 6. Northern inflatable PFD trial: when PFD worn



Weather comfort

Bum bags are the highest rated PFD across the four types of weather conditions. Only one response was received for the jacket PFD. The participant indicated that it was very comfortable in cold and wet weather conditions.

Results are similar to those from the south east trial in terms of ranked PFD types. However, the rating for the bum bag was much higher in the northern trial, indicating that these participants found it to be more comfortable in their climatic conditions.

Work suitability

The same preferences ranked for PFD types in terms of work suitability as recorded for weather comfort. It is thought that the preference for bum bags over jackets and yokes in the northern trial is due to a high comfort rating rather than a high work suitability rating.

Overall indicator

The overall indicator for the northern trial revealed that bum bags are the preferred PFD across weather conditions and work suitability.

An analysis of yoke by brand indicates that in terms of weather comfort, the Ultra brand of yoke rated above the Stormy Seas brand, followed by the Hutchwilco brand.

The ratings for yokes were below the ratings given in the south east trial, indicating that yokes are less acceptable.

In terms of work suitability, Ultra was the highest rating PFD compared to the Stormy Seas brand in the south east trial.

Overall, the indicator revealed that the Ultra brand of yoke was the most highly rated in the northern trial.

Northern trial comments

The inflatable PFDs generally improved the views on wearing PFDs. However, most still felt that wearing a PFD at all times did not improve safety.

Northern trial participants were more concerned that PFDs could get caught in equipment while working.

4. In-water tests

An in-water test was arranged to allow the commercial fishermen to trial PFDs in the water to examine performance specifics. The test was conducted within a controlled environment in a salt water swimming pool at the Aviation Australia Base in Eagle Farm, Brisbane. The test also examined the performance of the safety equipment and its interaction with normal work wear. Commercial fishers were clothed in their pants, shirts or overalls, wet weather gear and wellington boots.

During the in-water test, participants were requested to adopt various floating positions including:

- HELP position which is achieved by drawing knees up.
- Modified 'sitting' position with hands over groin which is more stable and relaxed with legs being further down.
- Upright position with arms spread forward or sideways and legs being straightened and relaxed.

Overall, the in-water tests indicated all PFDs had good positive buoyancy, were easy to inflate and that buoyancy in the jackets could be readily adjusted via the manual inflation mouthpiece and still operate effectively.

Specifically, the following comments were recorded:

- *Ultra manual yoke:*

  'Slightly tight around the neck area; however, the pressure around one's neck could be easily adjusted by using the manual inflation mouth piece to increase or decrease the extent of inflation'.

- *Hutchwilco yoke:*

  *'C*omfortable around the neck area, the mouth piece could be reached easily if any adjustments are required'.

- *Stormy Seas yoke:*

  'Quite comfortable; however, the mouth piece was slightly harder to reach compared to other PFDs'.

- *Hutchwilco bum bag:*

  'Inflation required more time as it was harder to locate the right cord. In rough weather conditions this may represent a hazard. Once inflated, this PFD got quite uncomfortable because of very rough edges of the fabric that 'cut into' the neck and pushed the wearer's head forward'.

- *Stormy Seas flack jacket:*

  'Quite comfortable and holds the wearer well in the upright position. However, due to its specific design, once inflated this PFD started riding up resulting in excessive pressure on the underarm area'.

5. Personal Locator Beacons (PLBs)

The trial of PLBs by participants identified a number of equipment design issues that were an impediment to wearing the equipment. Participants who attached the PLB to a belt found that the equipment was cumbersome to wear and in some cases entangle in the ship's equipment. Commercial fishers identified one means to resolve the problem by carrying the PLB inside the PFD bum bag.

PFD manufacturer Stormy Seas noted the feedback from trial participants and moved immediately to design a yoke PFD with an additional pocket in which a PLB could be carried. Discussion at the south east debrief between manufacturers and trial participants concluded that the pocket placed on the Stormy Seas yoke was a positive redesign that did not impede inflation or the wearability of the PFD. However, the current design of the Ultra yoke prevented the addition of a similar PLB pocket. This may or may not be a factor with other yoke brands currently on the market.

Another constraint to the carriage of a PLB is the cost of the equipment. If a vessel owner or master chooses to wear a PLB, it does not replace or negate the regulatory requirement for the vessel to carry an Emergency Positioning Indicating Radio Beacon (EPIRB). This is because the PLBs trialled did not satisfy the design, specifications and performance requirements of an EPIRB. As such the cost of carriage of a PLB would be additional to an EPIRB and a significant factor for commercial fishers in the current economic climate.

6. Wear and tear assessment

Maritime Safety Queensland approached the participating distributors of the safety equipment to perform a wear and tear assessment of the PFDs used in the trial.

This process was completed in accordance with standard requirements and involved the following:

- PFDs dismantled
- chambers pressure tested
- inflator head CO^2 gas cylinder inspected to ensure they were operable
- outer shells inspected
- key structural components inspected
- buckles and zips tested and inspected.

The information included in the wear and tear assessment was indicative of the equipment's durability, performance and potential defects. The following information should be noted:

- The inflation systems were found to be in good working order and complied with Standard AS1512
- One broken buckle was successfully load tested. However, it would need to be replaced
- In some instances the outer shells were found to be significantly worn out with numerous wear spots and minor tears. These features would not be classified as complying with the standard.

Due to the harsh work and weather environment that commercial fishermen operate in, the wear and tear report included recommendations to strengthen the outer shell. A more practical solution is to use a reinforcing shell of Cordura for yokes and jackets. The outer shell blows off when a PFD is inflated; however, it protects the PFD and prolongs its service life. The cost of the PFD outer shell is approximately $30.

When a PFD is due for replacement the inflation system gets serviced, and provided it still complies with the standard, it is possible to have the PFD outer shell replaced without having to replace the PFD itself. This can be done at a cost of 60% to 70% less than the cost of a new PFD of the same type.

It is recommended that the front panels of the PFD jacket version be reinforced to prolong serviceable life.

7. Equipment design improvement opportunities

Trial participants came up with a number of recommendations for improvements to equipment designs which were communicated back to the manufacturers for further design consideration.

Some of these recommendations included:

- steel buckles replaced with plastic ones
- soft fabric to protect the neck from chaffing
- extra padding added to the collar
- an additional pocket for PLBs placed at a comfortable height on the yoke or in a feasible place on the bum bag
- quick release clips amended to enhance their performance
- velcro instead of a zip better on the bum bag (Hutchwilco)
- velcro quality improved
- a soft holder/case to prevent a cylinder from pushing into the chest (Ultra yoke) or the location of the cylinder altered slightly to eliminate this situation
- clips added to the collar to prevent it riding up in strong wind
- the jacket lengthened by up to 5 cm (Stormy Seas jacket)
- a self-igniting light on an inflatable PFD introduced as a standard safety feature
- instructions on how to use a PFD clearly displayed on lifesaving equipment and protected from fading. Instructions need to be on the outer casing not on the underneath of the inflatable jacket.

Trial participants sought clarification from the manufacturer of the Stormy Seas jacket as to the importance of wearing an appropriately fitted jacket. That is, whether a smaller person wearing a larger jacket has a negative impact on the PFD's performance. An authorised distributor of the Stormy Seas range of safety equipment confirmed that the jacket is manufactured in a range of sizes and should be purchased to fit the wearer. The Stormy Seas yoke is 'one size fits all'.

The PFD wear and tear analysis process was an important and unique component of the safety equipment trial. Maritime Safety Queensland facilitated direct feedback from safety equipment users to the manufacturers. This will increase useability, improve performance and enhance safety outcomes.

8. Trial outcomes

The south east and northern PFD and PLB trials demonstrated the following:

- Commercial fishermen realise the importance of wearing a PFD during commercial operations at sea that increase the risk of personal injury, accident or fatality. For example, rough sea conditions, night operations and bar crossings.
- While the inflatable PFDs generally improved the participant's views on wearing, most still felt that it was unnecessary and did not improve safety by wearing a PFD at all times. This is a significant safety culture issue.
- Prior to the trial, commercial fishermen were not fully aware of the significant developments in PFD design, the broad range of inflatable PFDs on the market and the versatility of the equipment to suit different commercial fishing sectors.
- There is no universal PFD that satisfies the needs and personal preferences of the commercial fishermen in all working conditions. The minor discomfort that may be caused by wearing PFDs in hot climates needs to be weighed against the increased level of survivability in a 'person overboard' situation.
- In terms of comfort and suitability, there are a number of opportunities for design improvements.
- Trial participants believed that wearing the trialled equipment did not increase the risk of exposure to workplace accidents.
- The wearing of PLBs in the work environment is constrained at sea in the absence of further and broader PFD redesign to safely accommodate this equipment. Redesign would reduce the risk to commercial fishers of entanglement and personal injury.
- Educational programs and training sessions for commercial fishermen on the types of PFDs and PLBs available and how to use them is likely to increase the industry's ability and willingness to utilise this safety equipment.

9. Recommendations

A number of potential options for the wearing of PFDs on fishing ships at sea were discussed with trial participants at the final debriefing sessions. Two options were considered:

1) Amend the *Transport Operations (Marine Safety) Regulation (TO(MS)R)* 2004 to mandate the wearing of inflatable PFDs and PLBs for offshore trawl operations. If necessary, specify the operating conditions when they will be worn; similar to regulations for recreational craft.

2) Owners and operators to conduct a risk assessment to determine when crew will wear PFDs. Include the procedure for the mandatory wearing of PFDs in a ship's operating documents as one of the key procedures for onboard operations. Consider feasibility of introducing these requirements as part of the implementation of National Standards for Commercial Vessels Part E Operational Practices.

9.1 Other considerations

Feedback received from the majority of trial participants strongly indicated their commitment to fostering a culture of safety.

Participants indicated their willingness to support government initiatives to improve safety of commercial fishermen at sea. The decision by some trial participants to purchase additional inflatable PFDs in the interest of enhancing crew safety was considered evidence of this commitment.

However, participants in both the south east and north Queensland/Torres Strait trials expressed unanimous opposition to legislation changes that would mandate the wearing of PFDs across the board.

PFD requirements

Preliminary enquiries indicate the availability of a suitable range of Coastal and SOLAS compliant inflatable PFDs for use in the commercial fishing sector appears limited. Inflatable PFDs tested as part of this study were all PFD type 1 Australian Standard 1512 (AS 1512) and were carried in addition to the ship's normal safety equipment.

There is a range of inflatable PFDs available which are manufactured in accordance with European Standard (EN 396) that comply with the Coastal lifejacket requirements of TO(MS)R 2004. However, the Coastal rating limits their use to Class 3C commercial fishing ships that operate within 50 nautical miles of the Queensland coast.

Maritime Safety Queensland will further investigate the availability of other PFDs that satisfy both Coastal and SOLAS requirements to ensure fishers have access to equipment that is suitable for commercial fishing operations out to 200 nautical miles from the Queensland coast. The availability of equipment will be taken into consideration to inform the implementation of Part E Operational Practices of the National Standard for Commercial Vessels in October 2009.

9.2.Preferred option

Recommendation number two is the preferred option to be adopted and is supported by trial participants. This will require the owners and operators of fishing ships (offshore trawlers) to:

- conduct a risk assessment to identify the high risk operations at sea and when crew will wear PFDs
- document and implement a procedure for the mandatory wearing of PFDs as outlined above

- incorporate the procedure into the ship's operating documents
- ensure the ship's crew are introduced to the procedure as a part of the crew's safety induction to ensure they fully appreciate their responsibilities
- monitor the crew's compliance with the procedure
- regularly review the sufficiency of the procedure in consultation with crew
- be accountable for the sufficiency of all of the above as per their General Safety Obligation under Queensland marine safety legislation.

This requirement is to be included as one of the key procedures for onboard operations commencing 1 October 2009 under the implementation of National Standards for Commercial Vessels (NSCV): Part E Operational Practices. This will be introduced over 12 months as registrations are renewed.

Proposed safety equipment options for commercial fishers are as follows:

- Carry/wear PFD Type 1 inflatables that meets EN 396 (Coastal requirements) for operations within coastal waters (within 50 nautical miles of the coast).
- Carry/wear inflatable PFDs that satisfy the SOLAS requirements for operating limits that fall between 50 and 200 nautical miles from the Queensland Coast.
- Carry/wear PFD Type 1 inflatables that satisfy AS 1512 in addition to existing non inflatable Coastal and SOLAS compliant life jackets in circumstances where they are unable to purchase Coastal or SOLAS compliant inflatable PFDs.

10. Progress to date

Maritime Safety Queensland has commenced work on the implementation of the preferred option. Further investigation is required on the availability of inflatable PFDs that satisfy Coastal and SOLAS requirements and will establish a list of suitable equipment in direct consultation with equipment manufacturers and suppliers. The investigation of available safety equipment will help to determine the feasibility of the proposed 1 October 2009 implementation date.

Workshops are being coordinated to assist commercial fishers to carry out risk assessment for the wearing of PFDs at sea. This will help commercial fishers to identify high risk situations at sea when PFDs are to be worn by crew and will assist ship owners and operators to implement a procedure to ensure compliance. The outcomes from the workshops will be used to develop generic guidelines for inclusion in Commercial and Fishing Ships Operating Guidelines. This will benefit commercial fishers across the State.

Further, it will ensure commercial fishers have access to additional guidance materials to assist them to discharge their responsibilities following implementation of NSCV: Part E Operational Practices on 1 October 2009.

Amendments to legislation are also being considered to strengthen the role of ships' operating documentation required under NSCV Part E. The proposed changes aim to clarify and promote increased compliance amongst ship owners and operators with the General Safety Obligations of the Act.

11. Conclusion

The trial has shown there is no universal PFD to fit the diverse needs of the commercial fishing industry. The choice of PFD is affected by factors such as differences in commercial fishing operations, climatic conditions, daily activities, physical characteristics and personal preferences in respect to PFD style, fabric and features. Many of the commercial fishers were unaware of the new inflatable PFD technology available to them which is less cumbersome than traditional life jackets.

The safety equipment trial shows that initial concerns expressed by participants, that wearing PFDs increase the risk of workplace injury, were unfounded.

Maritime Safety Queensland acknowledges that a one size fits all approach to mandating the wearing of PFDs at sea is not the answer. Industry compliance will grow from involvement in the decision making process and marine safety legislation/policy that fits with the practical realities of commercial fishing operations. The risk-based approach to the wearing of PFDs at sea is considered a responsible and informed management strategy.

The safety equipment trial conducted in conjunction with Queensland commercial fishers and the manufacturers of safety equipment was a major step forward for safety in the fishing industry. The trial provides valuable feedback on the safety culture within the industry and confirms the benefits to be derived from cooperative working relationships between government and industry that serve to inform marine safety policy development.

Maritime Safety Queensland's safety equipment trial has gone a long way in changing perceptions of PFD use within the Queensland commercial fishing industry. The marine safety regulator is committed to pursuing other opportunities to establish safety culture as the accepted benchmark for performance within the commercial fishing sector.

References

Australian Standard AS 1512—1996—Personal Flotation Devices—Type 1

European Standard EN396–1993 Lifejackets–150N

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Stormy, *Stormy Homepage,* Available online at: http://www.inflatablelifejackets.com.au/stormypfd.aspx

Ultra PFD, *Ultra PFD Homepage,* Available online at: http://www.ultrapfd.com.au/default.asp?PageID=45

Appendix A Survey Form

PFD EVALUATION SHEET - TRIAL INFORMATION

Information to be recorded by each wearer on every voyage during trial

Vessel Name: ……..

Industry Sector (inshore/offshore trawl, tuna, crab, line)……

PFD wearer's name……

Month ……

Total days at sea ……**Personal EPIRB supplied** Yes No

PFD Brand…… **PFD Type** Yoke Bum Bag Jacket
(Please circle type worn)

PFD worn 1. at all times
2. at all times while on the weather deck
(Please circle the one that applies to your PFD use)

also applies to EPIRB **if** provide

If not worn as per one of the above - please record the total number of days worn and the reason/s for the more limited use:

……

Weather Comfort Rating

Hot Weather	Warm Weather	Cold Weather	Wet Weather
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Please rate on a scale of 1 – 5 for each weather condition you have experienced
1 being uncomfortable - 5 being very comfortable

Work Suitability Rating

Was the PFD comfortable 1 2 3 4 5

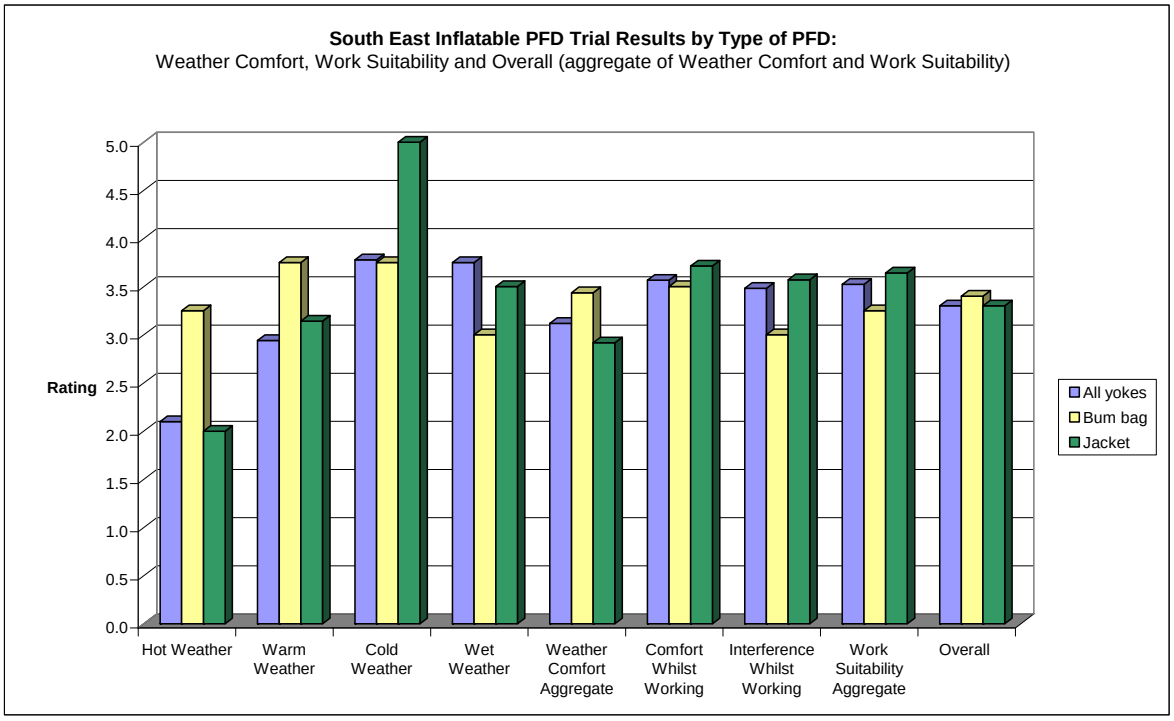
Did the PFD get in the way 1 2 3 4 5

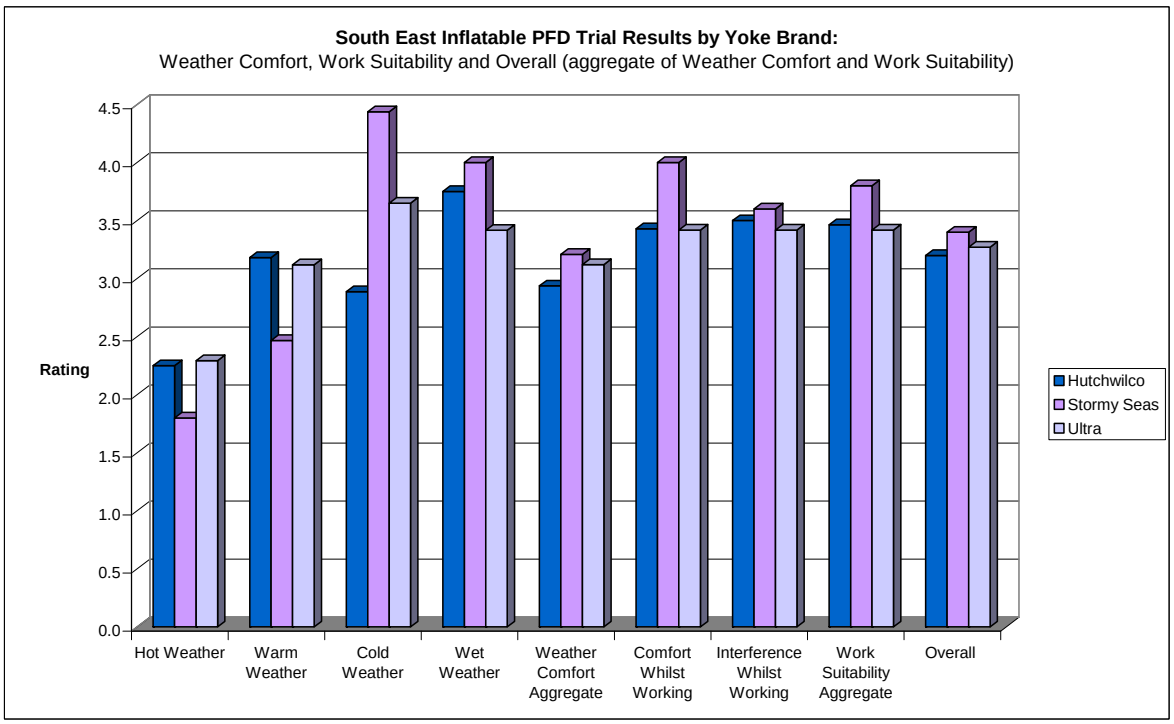
(Please rate both of the above on a scale of 1 – 5)
1 meaning unsatisfactory - 5 meaning very satisfactory

Additional comments/suggested improvements:
……
……

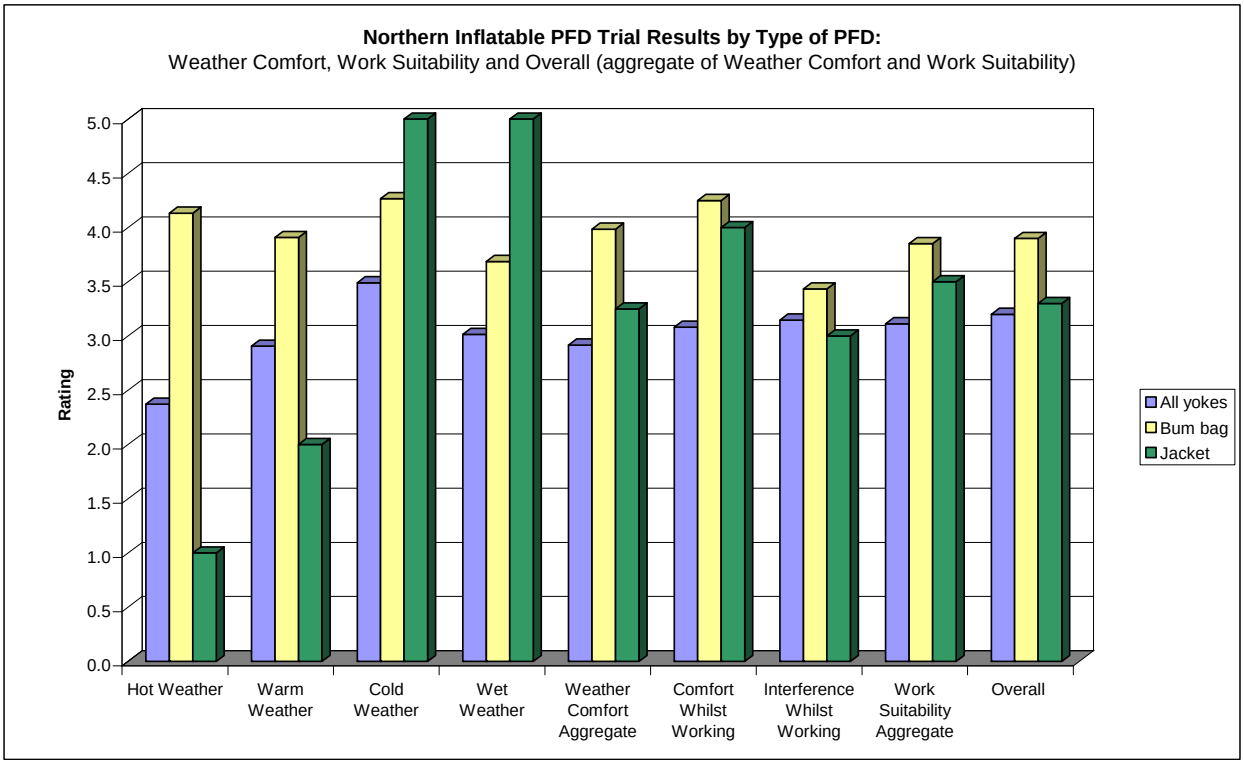
Appendix B Summary of trial results

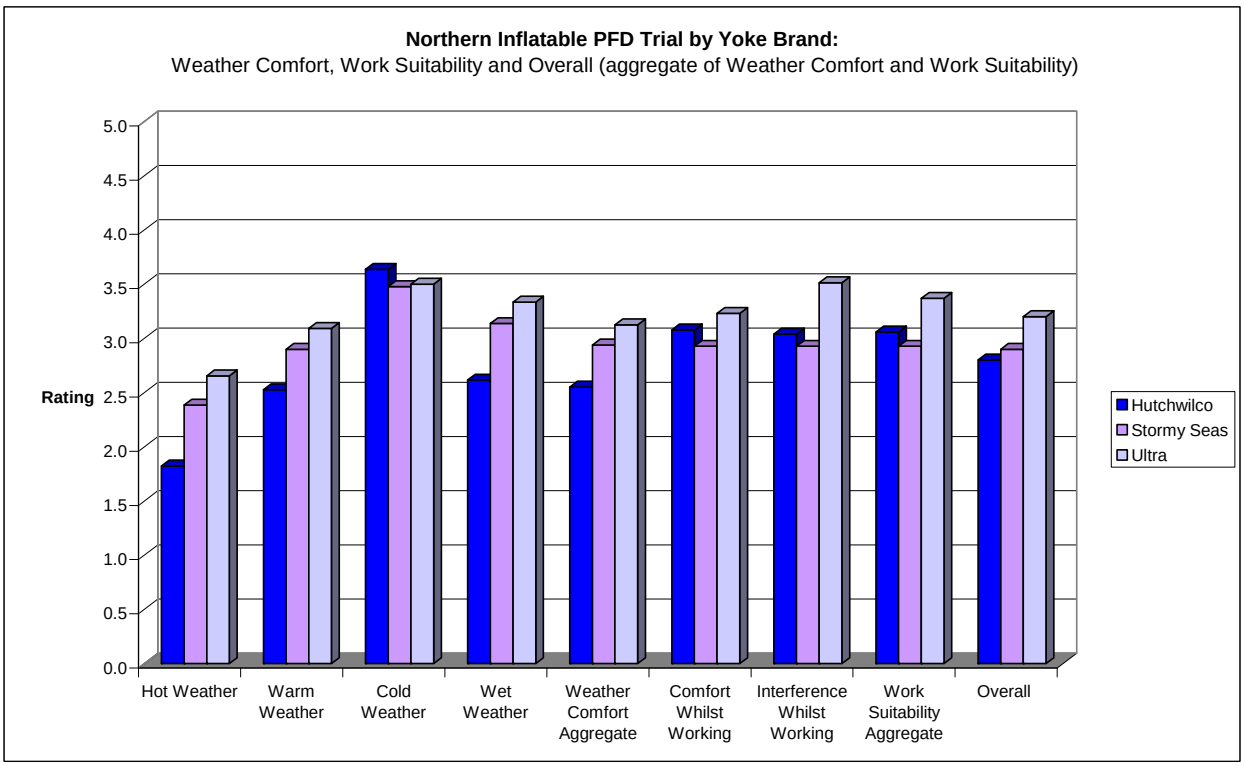
South east trial results





Northern trial results





Appendix C Trial participant comments (PFD type/brand)

Hutchwilco Bum Bag

Positive feedback

- Bum bag PFD is an ideal alternative when working single-handed
- Does not get in the way while processing and working on deck
- No problems, easy to wear and use
- Does not interfere with work at all
- Easy to clean the strap and outer casing
- Compared to the yoke, the bum bag is the most practical idea I have ever seen
- Bum bag is far more comfortable than the jacket
- Much better than jackets
- Good hot weather PFD
- PFD good for working on weather deck
- Only noticeable when doing something difficult
- Can see that it would be good in some places like hooking up boards out on arms
- Fully recommend
- Nice and compact, good idea
- Easily accessible hanging on wheelhouse
- All crew drilled for use in case of emergency

Negative feedback

- Chaffing of the neck when PFD inflated and worn
- Due to being a big guy and being on the piano, the PFD did rub on the belly
- Not worn at all as there is no Australian Standard label
- No donning instructions
- It would be hard to inflate if the wearer got hit on the head or had any injuries
- Would prefer a different PFD
- The only way to winch the nets at the winch controls was to put the bag at the back
- Velcro opening would be preferable over zip
- Wearer has to slide bum bag to the side to avoid interference with seat belt
- Got in the way working on booms and boards
- Not suitable for night time work
- Crew need practice at putting it on (e.g. with their eyes closed=night) to minimise fumbling
- PFD in the way at times e.g. catching on ladders, trays and so on.
- Shark repellent would be nice
- Very hard to use with bib and brace wet weather gear, better if worn on the outside

- If worn on the inside and when in water would be hard to get rid of the boots and wet gear to use
- Got caught on the rope once
- Only got in the way with raincoat

Stormy Seas Jacket

Negative feedback

- Rather sweaty on hot nights and caused rash around neck
- The PLB made it a little bulky

Hutchwilco Yoke

Positive feedback

- Good in cool weather
- Ok while working on sorting tray
- Almost unnoticeable most of the time
- Not too bad to wear
- Jumped in water and set off air - very buoyant but gas canister poked in face

Negative feedback

- Best worn with a collared shirt
- Bum bags would be more comfortable
- Rubbed on the stainless steel, was annoying, got in the way while working on the belt
- Inadvertently inflated when toggle caught in prawn basket
- Very uncomfortable in freezer room
- Yoke tended to snag on rigging when working the deck single-handed
- Too hard to remove if tangled in ropes or nets because of buckle
- Not to be worn while cooking prawns
- Skipper set this one off - buckles went very tight and could not get the jacket off
- Restricted arm movement across chest
- Not appropriate for hot weather at all
- Too small for him
- Not good for hot weather
- Uncomfortable on hot steamy days while doing manual work
- Got in the way while working on deck apart from sorting
- Prefer clip instead of stainless steel buckle
- Seemed to rash up a bit on hot days and nights
- Uncomfortable with work apron on

Stormy Seas Yoke

Positive feedback

- Storage pocket is a good feature
- Good PFD (with additional pocket for PLB)

- This is an excellent idea to wear when on booms or hooked up
- Good PFD but did hurt ribs a bit when inflated
- PLB was a good feature
- Compact and easy to store on hook in wheelhouse
- Much better than old type
- All crew drilled for use in case of emergency

Negative feedback

- Awkward to adjust waist strap for petite females
- Uncomfortable around shoulders
- No attachment ring for safety line
- Shoulder square edge is a distraction for vision
- Instructions are hard to read inside belt strap
- Engineer had to take jacket off to go down to engine room from working on deck
- Totally unsuitable especially for larger men wearing layers of clothes/raincoat in cold
- Very uncomfortable running up and down steps/doing normal work routines, riding up the back
- Too small for large men
- Unreasonable to wear at all times
- Should not be worn while cooking prawns, cylinder could explode or jacket could melt
- Should be worn while working out on booms and should have on hand if net becomes stuck
- CO2 activation needs to be more robust
- Inadequate penetration of gas cylinders
- Gets in the way when sorting and grading
- Tight and uncomfortable around neck
- Gets caught when using cooker and boxing up
- At times the PFD got in the way while sorting on the belt but otherwise good
- Being shorter, the PFD rubbed on the chest and got in the way a little
- Crew refused to wear them due to being too hot (don't wear shirts)
- Strong material is dangerous if hooked
- Too cumbersome and annoying
- Possibly prefer vest or bum bag
- Always worried about damaging PLB (2)
- Very bulky with wet weather gear
- Very hot when doing something difficult
- Worried about damaging it
- Makes the wearer sweat a lot which is uncomfortable
- Hard to clean with apron

- PFD continuously gets in the way
- Would not recommend the PFD

PFD Ultra Yoke

Positive feedback

- Light to wear and flotation good
- Easy to remove if entangled
- Construction of the buckle is heavy duty, so it is a definite plus
- Buckle construction is better for quick deployment as opposed to the auto model
- Good PFD
- Compact and not too bad while sorting on the belt and winching up
- Better than Hutchwilco and Stormy Seas yoke
- It is OK once you get used to it
- Jacket was light weight
- Quick drying jacket
- Recommendable over Stormy Seas PFD
- Very functional
- Instructions well described
- Compact and easy to store on hook in wheelhouse
- Much better than old type
- All crew drilled for use in case of emergency
- Ok if not in full work environment

Negative feedback

- Heavy to wear
- Pocket for PLB required (2)
- Buckle hard to do up
- A handling strap is required
- Uncomfortable at the back while sitting at helm seat
- Very clumsy when sorting on tray and doing other activities on deck
- Why is apparatus supplied not guaranteed in rough conditions as stated on it
- The buckle is slightly time consuming to use
- Sometimes it catches on ropes
- When inflated it is quite constrictive around the neck
- Causes rashes
- Not necessary for calm weather during usual activities on board
- Needs light fitted for night use
- Tag got caught on edge of tray and self inflated while working at the tray
- Not happy with buckle set up

- Stormy Seas PFD the best
- Gets in way of apron
- A pocket required for small items
- Chaffing of the neck
- Reflective stripes required
- Bum bag is more comfortable than Ultra yoke
- Bum bag is a better option (2)
- Softer neck area would be a bonus
- Storage pocket required
- No good while sorting or on booms
- No attachment for safety line

Unknown yoke - brand not specified in survey sheet

Positive feedback

- Quite comfortable and would be ideal for solo sailing
- No problem wearing the gear

Negative feedback

- Uncomfortable around the neck for small people
- With the sea or wet gear the PFD did get in the way
- Interfered with work while sorting /grading procedures

General comments on usage

Hutchwilco Bum Bag

Positive feedback

- Impressed and bought 2 for himself

Negative feedback

- Slides down hips especially for people with smaller hips (2)
- Tends to get more uncomfortable the longer you use it

Stormy Seas Jacket

Positive feedback

- More confident with PFD's now
- Jacket is really good and preferable to yoke

Negative feedback

- A little warm in summer
- Better when not wearing a spray jacket
- Longer (by 5 cm) jacket could be a better option (2)
- Too hot and bulky for summer
- Overall quite comfortable but some discomfort around neck - chaffing

- Discomfort travelling at a speed/facing strong wind as PFD collar starts riding up - needs clip to hold it down

Hutchwilco Yoke

Positive feedback

- Minimal restriction
- PLB worn in rough weather, over 30kn, and rated it as a 4 for comfort and 3 for being in the way

Negative feedback

- PLB in the way most of the time
- Clip or pocket to hold PLB required
- Better quick release clips are needed
- Accidental inflation concern re: manual inflation type
- Slightly uncomfortable
- Impossible to wear at all times
- Extra wear straps required on front to get extra life out of vest
- Hard to put on and remove
- Snap belt required

Stormy Seas yoke

Positive feedback

- Ok when worn on deck with apron over the top
- Comfortable and easy to wear
- Good PFD (with additional pocket for PLB)
- Best PFD
- PLB rating was 3 in wet weather and 4 for comfort and 2 for being in the way

Negative feedback

- Should be made as a jacket as weather jackets are worn at all times while working
- Not very comfortable to wear over the rain coat
- Hot to wear during the day (2)
- Straps excessive
- Neck chaffed
- Velcro comes apart (3) on shoulder
- Pocket required for PLB (4) on right chest
- Belly pockets are too low
- Hanging straps/hook required (2)
- All PFD's get uncomfortable in hot conditions

PFD Ultra Yoke

Positive feedback

- Works well and very easy to work with
- Plastic clips are good

Negative feedback

- Pocket required for PLB (5)
- Awkward
- Cylinder pushes into the chest
- PFD gets more uncomfortable the more you wear it
- Chaffing around the neck especially in hot conditions
- Heavy to wear (3)
- Hard to don
- Not a favourite (2)
- Accidental inflation
- A handling strap is required
- Uncomfortable at the back while sitting at helm seat

General PFD non specific comments on usage

- The most important thing is getting used to wearing PFD's
- PFD's are good to have on board for dangerous times for example, hook ups and bad weather
- Hard to convince crew to wear PFD's in good weather conditions
- Not used to wearing PFD
- Impossible to wear at all times
- More confident with PFD's
- Only worn for 30 days due to good weather condition (2)
- Crew reluctant to wear PFD in good/calm weather (2)
- Not required in good conditions
- Should only be restricted to rough weather conditions
- Devices unnecessary for smooth, partially smooth waters, ok for rough weather

Additional comments/suggestions - face to face debrief with participants in the south east trail

- Ship owners and masters to determine when PFD's should be worn, no mandatory wearing via regulation
- Should be further trials of PFDs with automatic activation in the workplace at sea to assess the incidence of accidental activation,
- The contributing circumstances and the suitability of their application in fishing ship workplace.
- Suggested the installation of a lighter fabric lining (cotton, something that breathes) in the Stormy Sea "Vest" would make the jacket cooler to wear
- Self igniting lights should be fitted as a standard feature on PFDs as it would make it easier to locate a person if they were lost overboard
- Will assist with search and rescue.
- One 406PLB failed the manufacturer's pre-use test. MSQ to return product for assessment/replacement
- Net Fishing Sector representative supported MSQ mandating the wearing of PFDs at night, at times of poor visibility and when underway
- Concern that accidental activation of a PFD within an enclosed space on the vessel during a roll over situation

could trap

- The person is trapped inside the vessel and could lead to drowning
- Now that some safety equipment manufacturers are putting pockets on the inflatable PFDs to hold the Personal EPIRB (PLB) does this impede inflation
- How important is it to have the right size Stormy Seas "Vest" i.e. would a larger vest on a small person still perform as intended
- Trial participants and equipment manufacturers/distributors supported the controlled in water test of trialled safety equipment to test
- It's performance and interaction with their normal work wear
- Ultra automatic trigger devices needed to be replaced every 12 months in order to eliminate the risk of accidental discharge to moisture build up
- It's important that MSQ recognises the differences between commercial fishing operations across the State and does not apply a "one size fits all" approach to the mandatory wearing of PFDs
- Commercial fishers are best placed to decide when PFDs must be worn at sea. MSQ should take this into account when making its final decision.