Ministry for Primary Industries
Manatū Ahu Matua

CONFIDENTIAL

2013 Compliance Risks (Update)
Sub-Antarctic Southern Blue Whiting Fisheries

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1. Executive Summary

In line with the National Fisheries Plan for Deepwater and Middle-depth Fisheries the Ministry for Primary Industries (MPI) Operational Coordination Maritime team (OCM) was tasked to deliver an updated risk profile for the Sub-Antarctic Southern Blue Whiting (SBW) fisheries for the 2013-14 season. This update is intended to provide MPI Fisheries Management, MPI Compliance and the Deep Water Group with an assessment of compliance risks identified for that season.

The main areas of risk identified in 2012 related to: head cut compliance for the dressed (DRE) state; the declaration of greenweight associated with DRE product; and the under-reporting of SBW to fishmeal. In 2013 OCM co-ordinated at sea and in-port operations to gather, examine and analyse data relating to these areas of concern. The primary source of information however was obtained by MPI Observers aboard vessels fishing for SBW. MPI Observers were tasked to collect specific information relating to SBW head cuts, unit weights and sources of SBW to meal from the factory. In conjunction with this, information was also obtained by Fishery Officers from at-sea boarding's conducted with the assistance of RNZN, and through in-port inspections. In line with the VADE model industry was advised that MPI would be monitoring compliance with the DRE state definition with a view to amending the definition and/or DRE state conversion factor (CF).

Many of the risks raised in the 2012 profile still exist and are included in this report for completeness. In general head cut compliance and the declaration of greenweight, associated with DRE product landed, has improved across the fleet. Many risks have been identified in this report relating to the quantification and reporting of whole and processed SBW to meal. Both whole and processed fish to meal should be accurately quantified however many vessels appear to have weakness in their onboard procedures which would lead to the under-reporting of SBW to meal.

As a result of analysis completed by OCM a number of changes were implemented prior to the commencement of the 2014-15 fishing year, they included:

1. A new gazetted definition for SBW DRE to allow for head cuts up to anterior insertion of the first dorsal fin.
2. The official CF gazetted for DRE state amended to 1.65 (reduced from 1.7).
3. Notification to industry, by Fisheries Management, that any fish cut beyond anterior insertion of first dorsal fin must be packed separately from DRE product and declared as FIL with a CF of 2.5 applied.

2. Introduction

In 2013 OCM completed a compliance risk profile for the 2012-13 Sub-Antarctic SBW fishery. As a result of this profile three main risks identified:

1. Non-compliant head cuts for the DRE state.
2. The under-reporting of carton weights.
3. The under-reporting of whole and processed SBW to meal.

In order to obtain a more comprehensive assessment of these risk areas, an updated risk profile has been completed for the 2013-14 fishery. This report should be read in conjunction with the 2012 profile for information relating specifically to the fishery and vessel operations.

Analysis has been restricted to SBW and no attempt has been made to identify compliance risks associated with by-catch species. It is recognised that the risks identified in this report are not exhaustive.

Analysis documented in this report is based on information collected by: MPI Observers; Fishery Officers, conducting both in-port inspections and at-sea boardings; vessel trip unload schedules and furnished fishing returns.

MPI observers were tasked with collecting specific information in addition to their normal duties. The key tasks requested of observers were:

- Carry out more detailed conversion factor testing, including classifying the position of DRE cuts to allow for assessment of adherence to the defined state;
- Carry out pre-glaze and post-glaze block weight testing to enable both accurate block weight calculations and glaze percentage calculations;
- Identify all sources of fish to meal and, where possible quantify by source. Record vessel procedures for quantification and reporting of whole and processed SBW to meal;
- Describe vessel operations, processing practices and record keeping;
- Identify risk areas from which fish may be inadvertently lost or intentionally diverted from the main processing line.

In line with the compliance VADE model, letters were sent to SBW operators in early August 2013 explaining the monitoring programme being implemented by MPI and requesting that full co-operation be given to MPI Observers in carrying out the duties required of them. Industry were further advised that consideration would be given to: re-declaration of product; amending the DRE state definition; amending the DRE conversion factor or adding new conversion factors for states processed between DRE and FIL. For copies of these letters, refer to appendix one and two.

Fishery Officers were tasked, during the at sea phase, to board all vessels in the SBW fleet. The main objectives were to:

- Create a deterrent effect;
- Collect information relevant to the processing and reporting of SBW;
- Support MPI Observers; and
- Report any offending back to O/C for appropriate action

During in-port inspections, Fishery Officers were required to:

- Obtain copies of documentation pertaining to product on board;
- Establish vessel procedures relating to compliance of cuts, quantification of whole and processed fish to meal and calculation of glaze factor; and
- Liaise directly with MPI observers, where possible, to establish level of co-operation provided to observer by vessel crew and whether or not there were any issues that needed immediate addressing.

3. 2013/14 Risk Profile Analysis

3.1 General Information

For the 2013-14 fishing year the TACC for Tier 1 SBW was set at 41,760t. However, a shelving arrangement was in place for SBW6B whereby no more than 4,000 t of the TACC (6,860 t) was to be caught. Therefore the total catch allowance for Tier 1 SBW was reduced to 38,900t for the 2013 season.

Table 1 compares reported landings for 2012 and 2013 to the available TACC. In the 2013-14 fishing year the available TACC in SBW6B (after shelving) was 105% caught (i.e. over-caught by 5%) whilst the SBW6I TACC was 97% caught. For SBW6R less than 1% of the TACC was caught, significantly less than what was reported in 2012.

Landing data for the 2013-14 season shows that 84% of the combined TACC for Tier 1 SBW (after shelving in SBW6B) was caught.

	Tonnes			
	SBW6B	**SBW6I**	**SBW6R**	**Total**
TACC 2012-13&2013-14	4,000 (6,860)	29,400	5,500	38,900 (41,760)
2012 reported landings	6,750	21,235	1,657	29,642
2013 reported landings	4,213	28,525	14	32,752

Table 1 – Comparison of TACC to reported landings, where destination type code (dtc) = L on CLRs, by fishstock.

During the period August to October 2013, approximately 32,752 t of SBW was landed by vessels targeting SBW within FMA6, an increase of 3,110 t from the previous year. This increase was attributable to SBW6I only, as reported landings in both SBW6B and SBW6R decreased in 2013.

Ten factory trawlers operated in the SBW fishery in 2013. Of these, seven were foreign charter vessels (FCV's), with the remaining three being NZ vessels. This is summarised in table 2 below. All seven FCVs were the same vessels that had fished SBW in the previous year, and were operated by four fishing companies. All three NZ vessels were owned and operated by one company.

	Number of Vessels		Total SBW Landings (tonnes)	
Vessel Nationality	**2012**	**2013**	**2012**	**2013**
Japanese	1	1	4,799	4,886
Ukrainian	6	6	19,169	24,259
New Zealand	6	3	5,675	3,606
Total	**13**	**10**	**29,643**	**32,751**

Table 2 - Summary of foreign charter and NZ vessels operating in the SBW fishery (destination type 'L' only)

Eighty nine percent of landed catch in 2013 was reported by FCV's, with the remaining 11% reported by NZ vessels. By comparison, in 2012 81% was reported by FCV's and 19% by NZ vessels.

The decrease in reported catch by NZ vessels in 2013 is largely due to fewer vessels operating in the fishery in 2013. The Japanese FCV reported a similar amount of SBW in both 2012 and 2013, while catch reported by Ukrainian FCV's increased in 2013 despite no change in vessels.

3.2 Data Collection Phases

Observer Phase

All 19 trips in the SBW fishery in 2013 carried MPI Observers. Eight trips carried two observers ("paired trips"), with the remaining 11 being solo trips. All paired observer trips were on FCVs. The four trips by NZ vessels all carried solo observers.

Twelve of the observed trips fished exclusively SBW in FMA6. The remaining seven trips spent part of the trip fishing SBW in FMA6, as well as other target species in FMAs 3, 5, 7, 8 and 9.

At-Sea Phase

Fishery Officers boarded six vessels operating in the SBW fishery. Three vessels (1 UKR, 1 JAP, and 1 NZ) were boarded in SBW6B between the 19th and 20th August. The other three vessels (all UKR) were boarded in SBW6I between the 22nd and 23rd of August.

In-Port Phase

Fishery Officers completed seven in-port inspections of vessels that had fished in sub-Antarctic SBW fisheries during the 2013 season. Five inspections took place in Dunedin with one each in Lyttelton and Bluff. Five inspections were undertaken on Ukrainian vessels, with two on NZ vessels.

3.3 Areas Fished

Fishing activity predominantly occurred within statistical areas 607 and 608 (SBW6B) and 618 and 619 (SBW6I) during the 2013 SBW season. Vessel movements are plotted in figures 1a-1d below. Each dot represents a vessel's automatic location communicator (ALC) position and over the course of a trip gives an indication of area fished.

Vessels tend to fish the Bounty Platform first followed by concentrated effort on the Campbell Plateau, with the majority of effort on the northern section of the Campbell Island rise.

Figure 1a illustrates activity by vessels of all three nationalities during the 2013 SBW season.

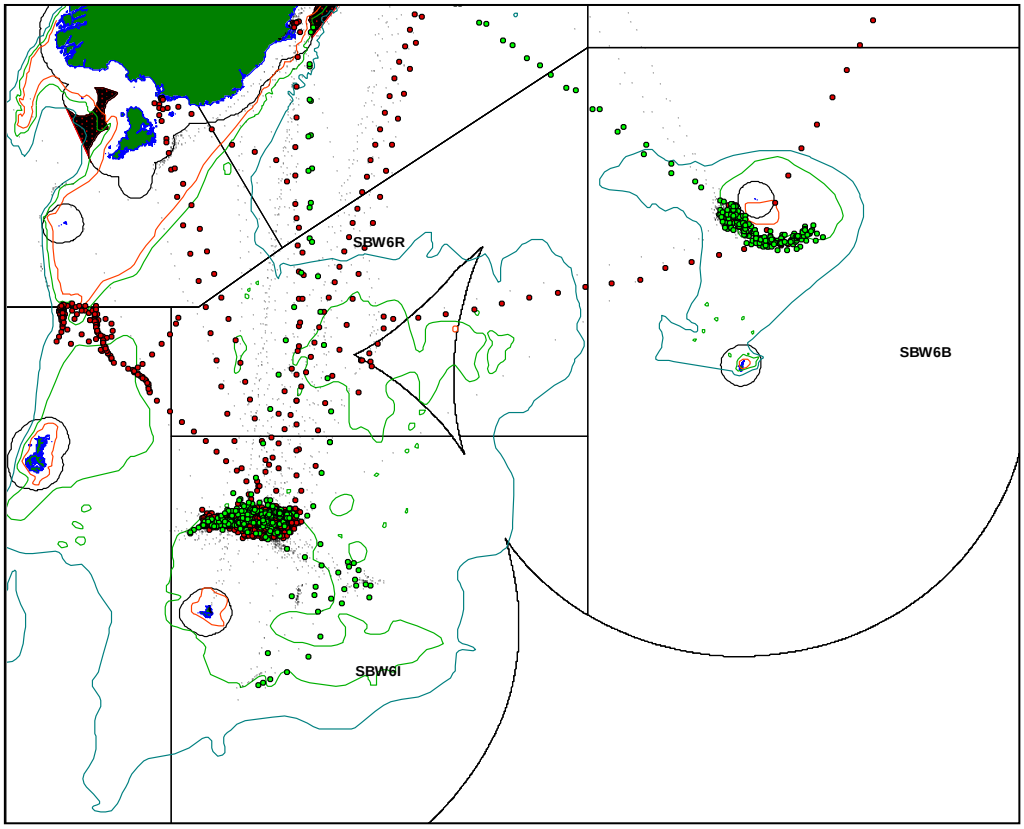


Figure 1a – activity in SBW fishery - all vessels [8/8 to 1/10/13. Key: Black dots – UKR, Red – NZ and Green-JAP]

Five vessels (3 Ukrainian, 1 NZ and 1 Japanese vessel) fished the Bounty Platform. The area fished was approximately 90nm long by 14nm wide, typically fishing between 245 m and 572 m in depth.

All ten vessels operating in the SBW fishery (6 Ukrainian, 3 NZ and 1 Japanese vessel) fished the Campbell Island Rise. Four distinct areas were fished with the majority of effort concentrated on the northern part of the Rise and dispersed fishing in the other three locations. The northern area fished was approximately 65 nm long by 28 nm wide, the eastern area fished was approximately 20 nm long by 10 nm wide, the central area fished was approximately 16 nm long by 2 nm wide, and the southern area fished was approximately 20 nm long by 1 nm wide. Fishing on the Campbell Island Rise was typically between 250 m and 575 m in depth.

Four vessels (3 Ukrainian and 1 NZ) fished the Pukaki Rise. The area fished was approximately 19 nm long by 4 nm wide, typically fishing between 274 m and 424 m in depth.

Figure 1b illustrates activity by Ukrainian vessels during the 2013 SBW season. Ukrainian vessels fished all three fishstock areas, but with minimal effort in the Pukaki area.

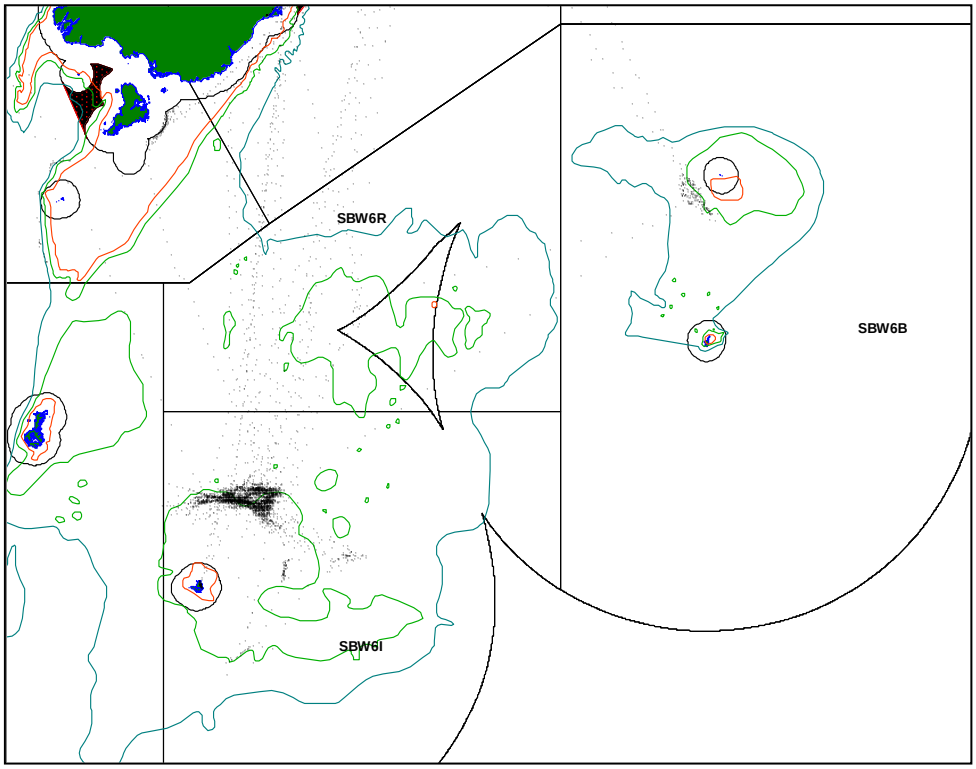


Figure 1b– activity in SBW fishery - Ukraine vessels only

Figure 1c illustrates activity by New Zealand vessels during the 2013 season. NZ vessels fished all three fishstocks. Fishing was predominantly in SBW6B and SBW6I, with very little effort in SBW6R.

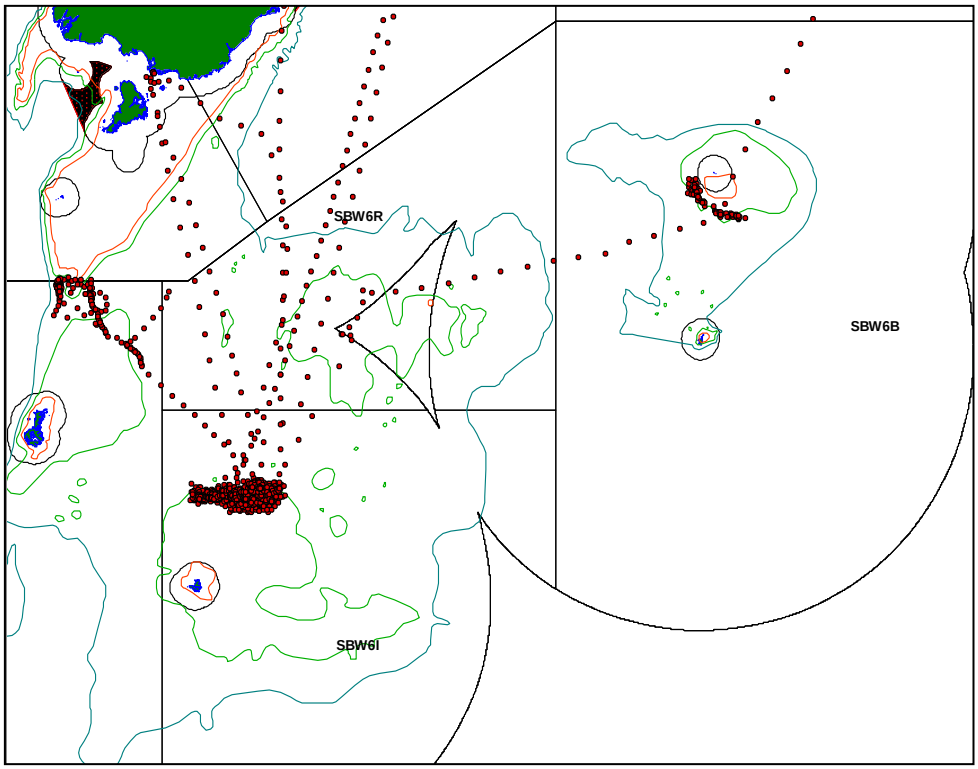


Figure 1c– activity in SBW fishery - NZ vessels only

Figure 1d illustrates activity by the Japanese vessel during the 2013 SBW season. This vessel fished the Bounty and Campbell areas only.

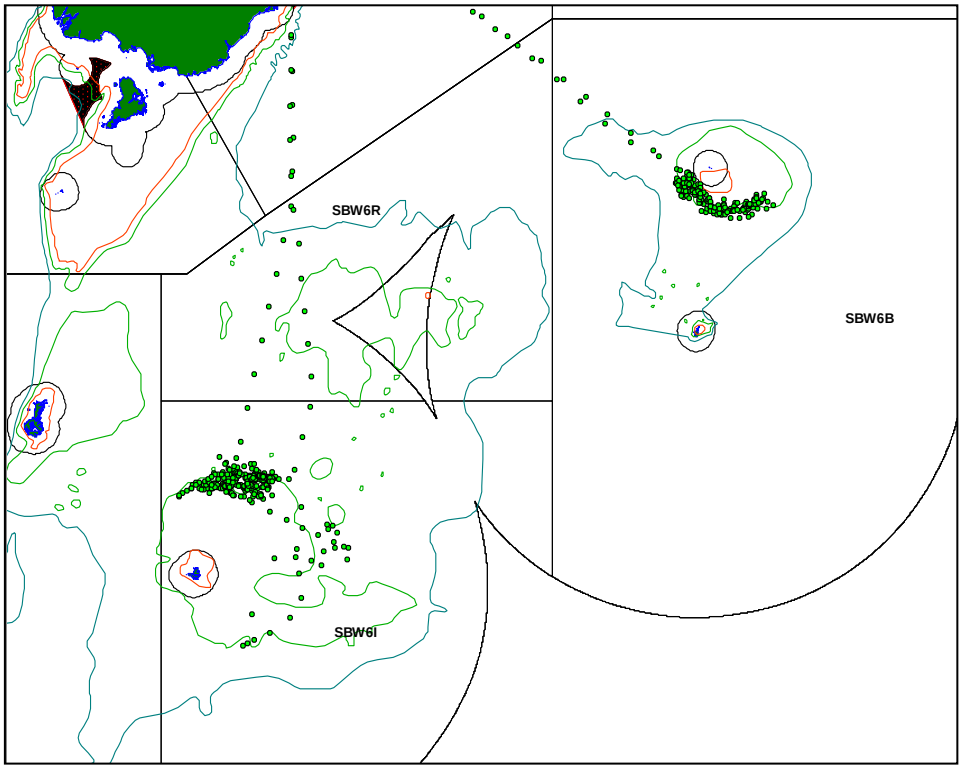


Figure 1d– activity in SBW fishery - Japanese vessel only

3.4 Completion of MPI Returns

The Fisheries (Reporting) Regulations 2001 allow for MPI Returns to be completed and filed using either electronic data transmission (EDT) or manually on paper. Vessels using EDT do this via their on-board Cedric[1] system. A total of nine vessels (Ukrainian and NZ) fishing SBW in 2013 used EDT for submitting returns. The Japanese vessel used paper returns. The following section addresses issues relating to the timeliness of return completion.

3.4 (a) TCEPR estimated catch

Regulation 11(2)(a) of the Reporting Regulations states that *"a person required to provide Trawl Catch, Effort, and Processing Returns for a vessel must complete a return on each day or part-day that the vessel is on a fishing trip"*. Section 2 (10 & 11) of the Explanatory Notes to the TCEPR describe how the section *"estimated catch by species in order of quantity"* should be completed. However, neither the regulations nor explanatory notes provide clarification about **when** this information should be entered into the TCEPR. As such, operators use a variety of methods for capturing this data. Table 3 provides a summary of reporting methods utilised by the fleet.

[1] A tool that enables permit holders to submit catch effort returns electronically to Fishserve.

At time of tow	Once per day
Three vessels (all EDT)	Seven vessels (6 EDT, 1 paper)

Table 3 – Method of completing TCEPR estimated catch.

Completion of effort data is described in categories (a) and (b) below:

(a) Real-time – fields are completed at time of tow. All three NZ vessels reported in this manner.

(b) Entered once per day – data is recorded on vessel source documents and is later transferred to MPI Returns. All FCVs (Ukrainian and Japanese) reported in this manner[2].

Results of this analysis indicate that vessels are, at the very least, reporting effort data on each day that fishing occurs. However it is OCM's belief that catch estimations should be made as soon as possible after hauling in order to 'lock in' the quantity of catch taken for that tow.

OCM recommend that the Fisheries (Reporting) Regulations 2001 and associated explanatory notes are reviewed in order to clarify reporting requirements. The requirement for the timely entry of effort and estimated catch data is paramount (e.g. "...as soon as practicable once the trawl net has been landed on the vessel...").

3.4 (b) TCEPR daily processing summary

Regulation 11(2) (a) of the Reporting Regulations is silent on the manner in which the daily processing summary should be completed. Section 3(1) of the Explanatory Notes to the TCEPR describes how the processed catch should be completed and instructs permit holders to *"Fill out this section for the fish taken on the day written at the top of the form, whether or not it was processed on that day"*.

In 2012 Industry advised that to report processing data in this way would cause serious disruption to on-board reporting processes. Analysis of reporting methodologies in previous years showed that the majority of vessels reported processed product for a set 24 hour period regardless of when the catch was taken. In 2013 both NZ and Ukranian vessels reported in this manner. The only exception was the Japanese vessel which recorded TCEPR processing summary data in relation to the day on which the tow began, regardless of when processing finished. Furthermore, NZ and Ukrainian vessels typically entered processing data into Cedric once per day at the same time each day.

It is clear from current reporting practices that the requirements of the explanatory notes are not practicable. For compliance auditing purposes it is preferable for reporting to correlate with product flow through the factory which is consistent with the way in which most operators report.

[2] The method in which one Ukrainian vessel reported varied according to whether or not the Captain was on shift. For the purposes of this analysis, the vessel has been categorised as entering once per day.

OCM recommend that the Fisheries (Reporting) Regulations 2001 and associated explanatory notes are reviewed in order to clarify reporting requirements. It is imperative that reporting requirements allow deepwater vessels to report in a way that reflects product flow onboard. In doing so, this will enable compliance to conduct product flow analysis.

3.4 (c) Catch Effort Electronic Data Transfer

During the 2013 SBW season, 9 of the 10 vessels operating in the fishery were using EDT to furnish returns. The Japanese vessel was the only vessel still using paper returns.

The use of Catch Effort EDT should provide Compliance with a unique opportunity to monitor the timeliness of return completion; and to potentially identify false declarations including area mis-reporting, under-reporting and discarding. Accurate date/time stamping of each individual field populated is imperative for Compliance auditing purposes. However, as the current audit log does not accurately reflect time of entry, this data is of little use. For this reason, no analysis of the EDT audit data has been conducted.

OCM previously recommended that:

1. The manner in which dates and times are written out to the CEEDT event fields needs to be amended to accurately record when the data was entered, in-accordance with the original CEEDT specifications.
2. An analysis tool to process the CEEDT audit history data exported from the FishServe system is developed to enable prompt and accurate data analysis.
3. The analysis tool to process the Compliance Management Tool (CMT) exported CEEDT audit history data needs to be further developed as only an early draft version of an analysis tool has been prepared at this stage.

As part of the Catch Effort System Upgrade Project questions were raised with Fishserve in relation to the Cedric system and in particular the capture of date/time stamps. Fishserve stated that a 15-minute autosave feature would be added to the Cedric system in March 2014. This function would provide an audit record of fields entered and/or updated with an associated date/time stamp. Providing the autosave feature is implemented successfully then recommendation 1 as listed above has been met. However a weakness inherent in the system is that it only identifies the user logged on, not the individual who entered the data.

It is understood that currently no progress has been made in respect of recommendations 2 and 3 listed above.

OCM recommend that implementation of the autosave feature is verified and tested to ensure that it satisfies recommendation 1.

OCM recommend that progress is made regarding recommendations 2 and 3 to enable for the accurate and timely analysis of CEEDT data.

3.5 Fishing Operations

3.5 (a) Fishing strategy

In 2013 there were 13% fewer tows reported as targeting SBW than were reported in 2012. Ninety percent of reported tows in 2013 occurred in SBW6I, compared to 67% in 2012. Ten percent of tows in 2013 were reported in SBW6B, compared to 19% in 2012. In 2013 0.5% of tows were reported in SBW6R, compared to 14% in 2012. Increased effort reported in 6I is very likely a direct consequence of reduced availability of ACE in 6B (due to industry shelving arrangement). Reduced effort in SBW6B and 6R, and increased effort in SBW6I, are consistent with changes in landed catch in those areas as illustrated in table 1 (refer to section 3.1 above).

Table 4a provides a summary of the number of tows, categorised by depth range, for each fishstock area, where SBW was targeted.

	Number of Tows					
	SBW6B		SBW6I		SBW6R	
Depth of Groundrope	**2012**	**2013**	**2012**	**2013**	**2012**	**2013**
On seabed	135 (81%)	66 (86%)	213 (36%)	312 (45%)	95 (74%)	3 (75%)
Between 1-50m off seabed	27 (16%)	9 (12%)	105 (18%)	166 (24%)	19 (15%)	1 (25%)
Between 51-100m off seabed	2 (1%)	2 (3%)	75 (13%)	115 (17%)	8 (6%)	0
More than 100m off seabed	2 (1%)	0	197 (33%)	99 (14%)	6 (5%)	0
Total Number of Tows	***167***	***77***	***591***	***692***	***128***	***4***

Table 4a – Distance tows fished off seabed in SBW fishery in 2012 & 2013.

The data shows that the majority of tows were conducted in area 6I, which is consistent with this area having the largest TACC. Approximately half the tows in this area occurred on the seabed, as did the majority of tows in SBW6B and SBW6R.

Table 4b summarises fishing strategy for each fishstock area where SBW was targeted.

		SBW6B		SBW6I		SBW6R	
Nationality	**Method**	**Num Tows**	**Average Distance off Seabed (m)**	**Num Tows**	**Average Distance off Seabed (m)**	**Num Tows**	**Average Distance off Seabed (m)**
Japanese	MW	18	0	38	39		
NZ	BT			1	0		
	MW	13	18	135	51	1	0
Ukrainian	MW	46	2	518	36	3	8
		77	**4**	**692**	**39**	**4**	**6**

Table 4b – Fishing strategy summarised by fishstock area, and vessel nationality for 2013.

In 2013 fewer tows were reported by the Japanese FCV and the NZ fleet in each of the three SBW fishstock areas compared to 2012[3]. By contrast, the Ukrainian fleet reported more tows overall in 2013 than in 2012 which was the result of increased effort in SBW6I.

[3] Refer to section 6.5 (a) of the 2012 Compliance Risk Profile of the Sub-Antarctic SBW Fisheries.

NZ vessels recorded only one tow using BT gear in 2013, a significant reduction from the previous season. Much of this is attributable to the reduction of effort in SBW6R, as most of the BT tows in 2012 were in this area.

In 2013, for fishing in SBW6I, MW gear was towed closer to the seabed throughout the fleet.

3.5 (b) Tow Duration

It is not unusual for tows to be relatively short (< 1 hour) for vessels operating in the SBW fishery. However, average tow times (between 1.4 – 3.7 hours in length) summarised in table 5, do not tend to support this contention. Length of tow is quite variable across the fleet as depicted by the data, ranging from 0.1 hours to 15.4 hours in SBW6I. Length of tow in SBW6R shows much less variability and is likely to be due to the exploratory nature of this fishery often resulting in small catches.

It is important to note here that tow duration includes time associated with soaking, as vessels tend to record end of tow time when the net is finally hauled onboard instead of when the net left target depth. Therefore actual fishing duration is likely to be less than those figures shown here.

		SBW6B		SBW6I		SBW6R	
Nationality	**Method**	**Average Tow Duration (hrs)**	**Tow Duration Range (hrs)**	**Average Tow Duration (hrs)**	**Tow Duration Range (hrs)**	**Average Tow Duration (hrs)**	**Tow Duration Range (hrs)**
Japanese	MW	5.4	1.1-14.0	6.5	0.9-15.4	Nil	Nil
NZ	BT			6.3*			
	MW	0.8	0.2-2.3	3.9	0.1-10.1	2.0*	
Ukrainian	MW	2.7	0.3-9.0	3.4	0.3-10.3	1.2	0.9-1.4
Overall		**3.0**	**0.2-14.0**	**3.7**	**0.1-15.4**	**1.4**	**0.9-2.0**

Table 5 - Summary of tow data reported by vessels operating in SBW fishery in 2013, for tows targeting SBW. * denotes single tow.

Overall the average tow duration in SBW6B, 6I and 6R was 3, 3.7 and 1.4 hours respectively. Average tow duration in 6B and 6R was less than the previous season, while tow duration in 6I was higher. The Japanese vessel typically had longer tows compared to the rest of the fleet which is explained by the larger bags (e.g. 200 tonne plus) required to continuously process surimi.

3.5 (c) Soaking the Net

The practice of 'soaking the net', 'flying the net' or keeping the bag "in the fridge" is typically used by vessels when they have reached their target catch weight and consequently lift the net from the target depth but leave the net in the water until the pounds are cleared. Table 6 summarises use of this practice by nationality, as noted by observers during the 2013 season.

	Did Soak		Didn't Soak		Not verified	
Nationality	**2012**	**2013**	**2012**	**2013**	**2012**	**2013**
Japanese		1			1	
NZ	1	3	2		3	
Ukrainian	5	4	1	1		1
Total	***6***	***8***	***3***	***1***	***4***	***1***

Table 6 – Summary of vessels who were noted as soaking their nets

Eighty percent of vessels fishing in the 2013 season were identified as soaking the net. Use of this practice was variable across the fleet. Three vessels (2 UKR and 1 NZ) tended to soak the net as a matter of course for anywhere between 1-7.5 hours.

Another practice used, when pounds are full, is to hold catch on deck until such time that a pound becomes available. Four Ukrainian vessels were identified as partaking in this practice. One of these vessels soaked the net and retained catch on deck during the course of the season, which is in contrast to the previous season in which the vessel solely retained catch on deck.

The practice of continuing to trawl and catch fish, when the factory and pounds are full, is of concern. This fishing strategy may lead to unnecessary wastage where bulk damaged fish is put to meal instead of packed as a main product line.

OCM recommend that vessel operators are encouraged to catch to capacity thereby eliminating the need to soak the net or retain catch on deck.

3.5 (d) Reported Catch

Table 7a summarises total SBW estimated catch and number of days fished, by nationality and fishstock area.

The Japanese vessel reported 51% of the total catch in SBW6B, with the Ukrainian fleet reporting 39%, and the remaining 10% being reported by NZ vessels. In SBW6I, Ukrainian vessels reported 78% of the total catch, with the NZ fleet reporting 12% and the Japanese vessel reporting 9%. Total reported catch in SBW6R was significantly less than reported in 2012, with only 1% of 2012 catch reported as taken. These uneconomical catches indicate that either there were no spawning aggregations this season or vessels simply missed the spawning event if it had occurred.

	Total estimated catch (kg) and number of days fished							
Nationality	**SBW6B**		**SBW6I**		**SBW6R**		**Total**	
	Total Catch	**No. days**	**Total Catch**	**No. days**	**Total Catch**	**No. days**	**Total Catch**	**No. days**
Japan	1,967,000	12	2,415,000	22			4,382,000	34
New Zealand	393,000	7	3,185,060	57	7,000	1	3,585,060	65
Ukrainian	1,499,530	13	19,914,250	186	2,900	3	21,416,680	202
Grand Total	**3,859,530**	**32**	**25,514,310**	**265**	**9,900**	**4**	**29,383,740**	**301**

Table7a - Total estimated catch of SBW for 2013-14 season, and number of days fished, by fishstock area, where target is SBW.

Table 7b compares average daily SBW catch rates per vessel, by nationality, fishstock area and fishing season.

	Average Daily Catch (kg)					
	SBW6B		SBW6I		SBW6R	
Nationality	**2012**	**2013**	**2012**	**2013**	**2012**	**2013**
Japan	120,806	163,917	108,700	109,773		
New Zealand	46,085	56,143	44,786	55,878	27,518	7,000
Ukrainian	102,841	115,349	110,147	107,066	14,167	967
Total	**92,638**	**120,610**	**88,018**	**96,280**	**25,503**	**2,475**

Table 7b – Average daily catch (kg) per vessel

The data shows that average daily catches by the fleet fishing in SBW6B and 6I increased in 2013 by 30% and 9% respectively. In comparison average daily catches in 6R declined by 90% to that previously reported in 2012. This is largely the result of reduced effort in this area for the 2013 season.

The majority of SBW is processed to a dressed (DRE) state, with surimi (SUR) being the next largest principal state landed. Less than 10% of product landed is made up of whole fish (GRE), fish cut beyond the dressed state (FIL) and fishmeal (MEA). Table 8 below summarises principal states landed for the 2013 season.

State	Total Greenweight landed (kg)	% of total landed
DRE	25,909,391	79.1%
FIL	873,964	2.7%
GRE	426,851	1.3%
MEA	666,779	2.0%
SUR	4,885,963	14.9%
Grand Total	***32,762,948***	***100.00%***

Table 8 - Summary of landed greenweight by principal landed state

3.5 (e) Mechanisms for Disposal of Unwanted Fish

Section 72 of The Fisheries Act 1996 prohibits the dumping of fish and states that commercial fishers cannot "return to the sea or abandon in the sea" any fish subject to a quota management system, except where certain conditions apply.

The illegal disposal of SBW is a significant compliance risk, particularly on vessels with no meal plant. Generally SBW ≤ 28 cm in overall length are not processed to a dressed state as they are too small to process. Large volumes of unwanted (small and/or damaged) SBW can easily be routed via conveyors to discard chutes, macerators and/or hashers and discharged illegally overboard. See figures 2 and 3 for small and damaged fish unsuitable for processing. Illegal discards are not reported in fishing returns resulting in the under-reporting of the actual greenweight extracted from the fishery.

Figure 2 - illustration of fish size composition. Bottom fish < 28 cm considered unsuitable for processing.

Figure 3 - Damaged fish unsuitable for processing.

Of the 10 deepwater factory trawlers operating in the 2013 SBW fishery, vessel 1 and vessel 2 are the only two without a meal plant. On vessel 1, unwanted whole fish and fish waste are discharged overboard, as slurry, via macerator pumps below sea level. Large volumes of authorised discards are typical for vessel 1. This vessel, as do many others, has the ability to easily reconfigure conveyors to direct fish straight to discard chutes without authorisation. Vessel 2 has one discard chute on the starboard side of the factory for batch discarding of offal. Damaged product is usually landed green for on-shore mealing however illegal discards may well occur. The ability for vessels to easily discard unwanted fish is very straight forward. In instances where bulk damaged and/or small fish are present the incentive to illegally discard undermines the integrity of the Quota Management System (QMS).

The remaining eight SBW trawlers (6 UKR and 2 NZ) all have meal plants. The six Ukrainian vessels have no mascerator or hasher onboard, therefore all unwanted wholefish not able to be mealed (e.g. SPD) are discarded via sea doors. Sea doors are located within close proximity to the main sorting conveyor just in front of the pounds. The sorting conveyor can be reversed to discharge fish over board via a chute temporarily positioned at the end of the conveyor to redirect fish out the starboard sea door. Therefore in the event that the meal plant was operating at capacity or broken down, then unwanted fish could easily be illegally

discarded. Of the two NZ vessels with meal plants, one has a hasher for product to meal. NZ vessels also have an outlet in the factory that can be used for discarding whole fish and/or offal overboard.

Vessel 3 and vessel 4 both have a chute leading from the meal auger to a discard sump on the port side of the vessel. A removable plate (see figure 4 below) in the side of the auger casing enables offal to be redirected from the meal stream and discharged overboard. This chute could also be used very easily to illegally discard whole and processed fish overboard. The likelihood of illegal discards occurring increases when production exceeds meal plant capacity. It is also believed that the remaining four Ukrainian vessels have a very similar arrangement.

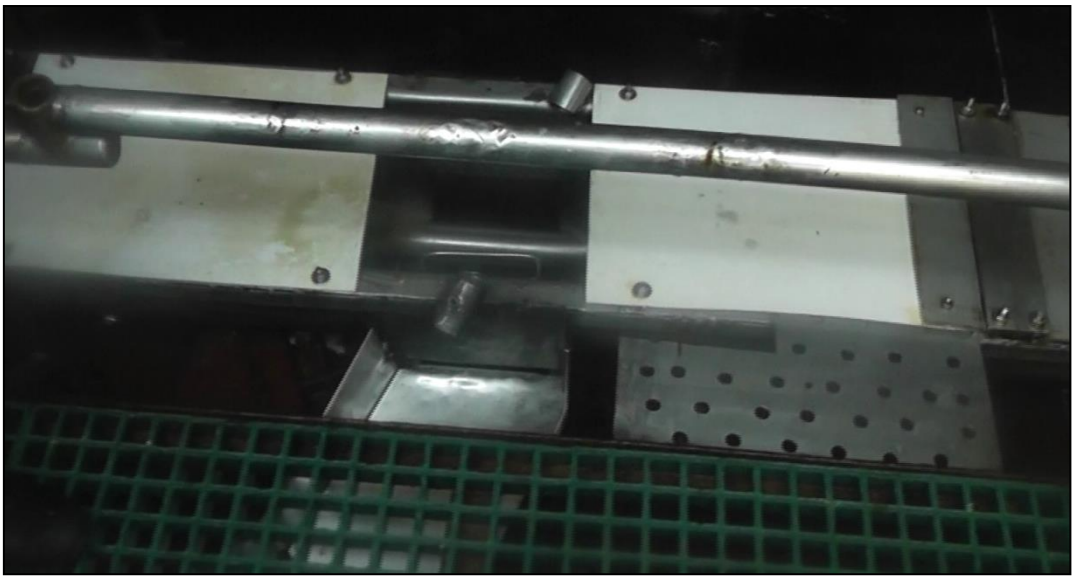


Figure 4 – Shows chute from meal auger with removable plate.

For further detail relating to reporting of meal, see section 3.6 (c).

3.5 (f) Processing Machinery

The bulk of SBW is processed to a dressed (DRE) state as either tail-on or tail-off product. One vessel, vessel 1, produces surimi (SUR), a minced fish product.

A number of different machine types are used to process SBW[4]. Machine type is dependent upon the nationality and processing setup of the vessel. Processing machines vary in efficiency and also the recovery of processed product.

As this is a bulk fishery with small fish and a short window of fishing opportunity, automated machines are used on a number of the vessels operating in this fishery. Automation enables large volumes of fish to be processed within a short time frame.

Table 9 below lists processing machines used by vessels operating in the 2013 fishery.

[4] For a detailed description of machinery refer to section 6.7 (a) of the 2012 Compliance Risk Profile for SBW.

Vessel	IRA	Circular Saw	Custom built Machine	Baader 212	Surimi Specialist Machines
Ukraine					
Vessel 5	1	1			
Vessel 6	1	1			
Vessel 3	2				
Vessel 4	1	1			
Vessel 7	1	1			
Vessel 8	1	1			
NZ					
Vessel 9				1	
Vessel 10				1	
Vessel 2			1		
Japan					
Vessel 1					1

Table 9 – Summary of Processing Machinery used in the 2013 SBW fishery, by vessel

The primary machines used to process SBW aboard UKR vessels are the IRA110, an automated machine, and the circular saw which is operated manually. Fish are usually fed through the circular saw by hand. However one vessel uses a continuous belt with fish body trays feeding into the circular saw (see figure 5), which is a very similar set up to the IRA machine.

Figure 5 – Conveyor with fish body trays for feeding fish into circular saw on vessel 4.

The primary machine used to process SBW aboard two of the NZ vessels is the Baader 212, whilst the third NZ vessel used a custom-built machine designed for bulk processing of SBW to a DRE state.

According to information supplied by MPI Observers no modifications were made to Ukrainian IRA machines to improve head cut compliance or reduce machine losses. For the custom built machine onboard the NZ vessel, adjustable head guides and head trays (which can be set for the average fish size of the catch) were added for the 2013 season to assist with correct head alignment and improve head cut compliance. See Figures 6 and 7 to illustrate adjustable head rail and alignment of fish on NZ custom built machine.

Figure 6 - Adjustable head rail on custom built machine

Figure 7 - Fish alignment on custom built machine

Vessel 1 uses eleven different machine types[5] in the production of surimi. There are numerous locations throughout the factory for product to be lost from the process and end up discarded.

3.6 Greenweight Reporting

Accurate reporting of greenweight is essential to the QMS and the sustainability of NZ fishstocks. Vessels' onboard systems and procedures for capturing and reporting product weight, and subsequently greenweight, vary greatly.

In addition to reliable unit weight data, accurate greenweight reporting requires correct species identification, application of the correct CF for state produced and robust systems capable of quantifying whole and processed fish to meal, where applicable. It is also vital to ensure that on-board systems account for any losses that may occur.

3.6 (a) Adherence to defined state

During the 2012 SBW season, in port inspections of landed SBW dressed product were carried out by Fishery Officers. These inspections, together with reports from Observers aboard vessels, revealed that a significant number of SBW were processed beyond the defined state for DRE fish. This related to the position of the anterior (head) cut being made at varying distances posterior to the pectoral fin into the body of the fish.

For the 2013 season the conversion factor notice defined the anterior cut for SBW (DRE) as *..."a continuous straight line passing **immediately** behind the posterior insertions of both*

[5] For detailed factory diagram refer to section 6.7 (a) of the 2012 Compliance Profile (page 35).

pectoral fins and the forward angle of the cut not less than 90 degrees in relation to the longitudinal axis of the fish".

The processing of SBW to meet the DRE state definition presents a number of difficulties. This is largely due to the automated processing machinery used onboard many of the vessels and an emphasis placed on bulk through-put rather than product recovery. Machinery used should be capable of processing product with compliant cuts provided operators take greater care to align fish and less emphasis is placed on through-put. Other factors affecting compliance of cuts include: number of operators; rate and size of fish being fed into machinery; machinery jams regularly cleared; routine maintenance; sea conditions and fish condition and size.

Given the extent of non-compliant cuts detected during the 2012 season, OCM recommended that a modified CF testing regime be implemented for 2013 to assess the relevancy of the official CF of 1.70 for DRE product, and its flow on effect on reported greenweight. OCM designed an adapted version of the CF testing regime for MPI Observers to conduct whilst at sea. This included the process of classifying the position of head cuts to enable assessment of adherence to the DRE state definition. Two types of testing were conducted as listed below:

(1) Machine Test – this was to establish the conversion factor achieved as it related to individual processing machines and operators. Testing occurred **prior** to any sorting taking place to remove poorly cut fish. For each test 150 fish were required to be sampled.

(2) Box Test – this was to assess the proportion of non-compliant cut fish within packed product. For this reason, testing occurred (where practicable) **after** any sorting/grade-outs to remove poorly cut fish.

For both test types the position of the head cut was classified into one of five pre-defined categories (refer appendix three). Classification of head cuts as "C1" and "C2", where the cut was made forward of the anterior insertion of the first dorsal fin, were deemed compliant for the 2013 season and should be reported as DRE. Classification of head cuts as "C3", "C4" or "C5", where cuts were made behind the anterior insertion of the first dorsal fin, were deemed non-compliant and as such were required to be reported as fillet (FIL) product.

Conversion Factor Testing

A total of 322 "machine" tests were conducted by MPI observers, distributed across all nine vessels producing DRE product, using both random and follow through methods. A total of 48,303 fish were weighed and classified as part of this testing. Table 10 below shows that random testing was the primary method used for CF testing (as instructed), with only 3% of all tests using the follow through methodology.

	Test Method		
Machine Type	**Random**	**Follow Through**	**Total**
Circular Saw	44	4	48

IRA110	210	6	216
Baader 212	33		33
Custom	25		25
			322

Table 10 - Summary of CF testing methods used.

Of the total CF tests conducted, 91 (equating to 28%) contained only fish that were classified as compliant. The remaining 231 CF tests included both compliant and non-compliant cut fish. Tables 11a and 11b (on page 24) show the proportion of tests completed that include non-compliant cut fish (classified as C3-C5), by vessel and machine type.

Of the 216 tests carried out on the IRA machine 175 tests contained one or more fish classified as non-compliant, with the remaining 41 tests containing fish all classified as compliant. Figure 8 provides examples of heads sampled from the IRA machines offal chute. Both compliant and non-compliant cuts are present illustrating machine/operator performance in respect of adherence to the DRE state definition.

Vessel 8 – trip 3849

Vessel 3 - trip 3857

Vessel 7 – trip 3851

Vessel 6 – trip 3853

Figure 8 - Examples of head cuts from the IRA machine - illustrates adherence to state definition.

Of the 48 tests carried out on the circular saw 9 tests contained one or more fish classified as non-compliant, with the remaining 39 tests containing fish all classified as compliant.

Of the 33 tests carried out on the Baader 212, 31 tests contained one or more fish classified as non-compliant, with the remaining 2 tests containing fish all classified as compliant. Of the 25 tests carried out on the custom built machine 16 tests contained one or more fish classified as non-compliant, with the remaining 9 tests containing fish all classified as compliant.

Figure 9 provides examples of heads sampled from the B212 machines offal. Both compliant and non-compliant cuts are present illustrating machine/operator performance in respect of adherence to the DRE state definition.

Vessel 10 (trip 3872)

Vessel 9 (trip 3874)

Figure 9 - Examples of head cuts from the B212 machine - illustrates adherence to state definition.

Results provided in table 11a show that the circular saw is able to produce compliant head cuts more consistently than that achieved by the IRA machine. The difference in machine performance is not unexpected given the known issues associated with fish alignment for the IRA. The only exception to this is for vessel 4 which shows poor head cut compliance for both machine types. The high level of non-compliant cuts produced from the circular saw on this vessel is likely to be associated with the setup of a continuous belt with fish body trays feeding into the saw, similar to that of the IRA.

Vessel	IRA		Circular Saw	
	Total Number CF Machine Tests	% Tests containing 1 or more fish classified as C3-C5	Total Number CF Machine Tests	% Tests containing 1 or more fish classified as C3-C5
Vessel 5	57	81%	18	6%
Vessel 6	35	60%	13	0%
Vessel 3	21	97%		
Vessel 4	56	91%	9	89%
Vessel 7	34	85%	3	0%
Vessel 8	13	62%	5	0%
Total	**216**		**48**	

Table 11a - Summary of CF tests conducted for Ukraine fleet.

Results provided in table 11b indicate that the frequency of non-compliant head cuts was high for all three NZ vessels, with the custom built machine producing compliant head cuts more consistently than the Baader 212.

Vessel	Custom		Baader 212	
	Total Number CF Machine Tests	% Tests containing 1 or more fish classified as C3-C5	Total Number CF Machine Tests	% Tests containing 1 or more fish classified as C3-C5
Vessel 9			15	87%
Vessel 10			18	100%
Vessel 2	25	64%		
Total	**25**		**33**	

Table 11b - Summary of CF tests conducted for NZ fleet.

Table 12 shows the distribution across the five cut categories, as classified by MPI Observers during CF machine tests. Non-compliant fish, classified as C3-C5, account for 5% (or 2,413

fish) of the total fish tested. This means that 95% (or 45,890 fish) of fish tested were classified as C1 or C2, and therefore deemed as having compliant cuts for the 2013 season.

			% of fish with compliant cuts			% of fish with non-compliant cuts			
Vessel name	**Machine**	**Total # fish tested**	**C1**	**C2**	**Total**	**C3**	**C4**	**C5**	**Total**
Vessel 5	C. Saw	2700	45.1%	54.9%	**100.0%**	0.0%	0.0%	0.0%	**0.0%**
	IRA	8550	26.9%	70.6%	**97.5%**	2.5%	0.0%	0.0%	**2.5%**
Vessel 6	C. Saw	1950	67.5%	32.5%	**100.0%**	0.0%	0.0%	0.0%	**0.0%**
	IRA	5250	32.9%	64.6%	**97.5%**	2.5%	0.0%	0.0%	**2.5%**
Vessel 3	IRA	3150	11.9%	72.0%	**83.9%**	14.7%	1.4%	0.0%	**16.2%**
Vessel 4	C. Saw	1350	22.2%	73.0%	**95.1%**	4.7%	0.2%	0.0%	**4.9%**
	IRA	8400	16.9%	72.2%	**89.1%**	10.5%	0.4%	0.0%	**10.9%**
Vessel 7	C. Saw	452	50.9%	49.1%	**100.0%**	0.0%	0.0%	0.0%	**0.0%**
	IRA	5101	32.9%	64.9%	**97.8%**	2.2%	0.0%	0.0%	**2.2%**
Vessel 8	C. Saw	750	69.9%	30.1%	**100.0%**	0.0%	0.0%	0.0%	**0.0%**
	IRA	1950	27.8%	69.8%	**97.6%**	2.4%	0.1%	0.0%	**2.4%**
Vessel 9	Baader 212	2250	26.6%	68.5%	**95.1%**	3.8%	1.0%	0.0%	**4.9%**
Vessel 10	Baader 212	2700	26.5%	63.3%	**89.8%**	9.1%	0.7%	0.4%	**10.2%**
Vessel 2	Custom	3750	34.9%	64.0%	**98.9%**	0.8%	0.3%	0.0%	**1.2%**
Grand Total		**48,303**	**29.6%**	**65.4%**	**95.0%**	**4.7%**	**0.3%**	**0.0%**	**5.0%**

Table 12 - Summary of MPI Observer head cut classification.

Conversion Factor Results

The average CF achieved across all 322 tests was 1.63, which includes both compliant and non-compliant cut fish.

Table 13 below provides a summary of calculated CFs for each vessel and machine type on which tests were conducted. Results for the circular saw and IRA machine, used onboard the Ukraine fleet, indicate a higher average CF across all tests than those CFs achieved for the Baader 212 and custom built machine used by NZ vessels. For tests which contained only fish classified as compliant, calculated CFs are lower across all machine types.

Vessel	Circular Saw	IRA	Baader 212	Custom
Vessel 5	1.65	1.64		
Vessel 6	1.66	1.54		
Vessel 3		1.76		
Vessel 4	1.66	1.70		
Vessel 7	1.47	1.60		
Vessel 8	1.60	1.57		
Vessel 9			1.49	
Vessel 10			1.69	
Vessel 2				1.58
Average across all tests	***1.64***	***1.64***	***1.60***	***1.58***
Average across compliant tests only	***1.63***	***1.58***	***1.34****	***1.57****

Table 13 - Average CF calculated for vessel and machine type.
**** relates to only 2 tests and ** relates to 9 tests.***

Losses of whole and processed fish direct into the meal stream from the IRA machine have been identified by MPI observers (see section 3.6 (c) for details). When conducting random CF tests on the IRA machine there is no way of accounting for these losses and therefore calculated CFs may not accurately reflect machine performance.

Cuts beyond state definition

The Fisheries (Conversion Factors) Notice 2005 states that "*where any fish is processed to more than 1 defined state but less than another defined state, the numerically larger of the conversion factors specified in respect of those defined states is to be applied in respect of that fish*". In the case of SBW processed beyond the dressed state, the next numerically larger conversion factor is 2.5, which relates to the FIL state.

Where fish is cut beyond the intended state there are two possible courses of action, either the fish is sent to meal or packed as frozen product (either mixed with DRE product or packed separately). In both instances accurate quantification using the appropriate CF is essential. Where packed product is still reported as DRE then the under-reporting of greenweight occurs.

Where vessels opted to mix non-compliant cut fish with DRE product, robust procedures should have been in place to assess this proportion for quantification of FIL. Four out of the six Ukrainian vessels routinely tested the cut compliance of processed SBW destined for packing in order to apportion to processed states. Testing methodologies varied, the reliability of which is not assessed here. NZ vessels did not test for non-compliant cuts as this fish was packed separately and marked accordingly.

To assess compliance of cuts in packed product MPI Observers carried out 'Box tests'. Fish cuts were classified C1-C5 as per 'machine tests'. Results of this assessment provide information about the proportion of packed product containing non-compliant head cuts.

In line with the CF notice, fish classified as C3-C5 should have been reported as FIL state on CLRs in the 2013 season thereby attracting a CF of 2.5. Table 14 below compares the

proportion of non-compliant cuts packed, as assessed by MPI Observers, with SBW reported as FIL on CLRs.

Vessel	Landing Date	Observer Box Test % C3-C5	CLR reported FIL as % of FIL&DRE	% Difference Observer Box Test minus CLR FIL
Vessel 5	5/09/2013	2.2%	1.1%	1.1%
	28/09/2013	0.9%	1.4%	-0.5%
Vessel 6	9/09/2013	2.1%	9.1%	-7.0%
	4/10/2013	0.4%	5.2%	-4.8%
Vessel 9	1/10/2013	3.0%	5.2%	-2.2%
Vessel 10	16/10/2013	6.1%	2.5%	3.6%
Vessel 2	6/09/2013	0.7%	2.7%	-2.0%
	28/09/2013	0.7%	2.2%	-1.5%
Vessel 3	12/09/2013	16.3%	0.8%	15.5%
	7/10/2013	16.3%	0.5%	15.8%
Vessel 4	29/08/2013	11.9%	0.0%	11.9%
	23/09/2013	11.9%	0.0%	11.9%
Vessel 7	10/09/2013	4.1%	1.7%	2.4%
	1/10/2013	2.2%	5.6%	-3.4%
Vessel 8	5/09/2013	1.4%	8.9%	-7.5%
	28/09/2013	0.5%	5.7%	-5.2%

Table 14 – Comparison of % FIL reported on CLR with % recorded by observers

On seven out of 16 trips (44%) five vessels reported less FIL product landed than the proportion identified by observers as packed. These instances are highlighted in pink in the table above. Vessel 3 and vessel 4 had the most significant under-reporting of FIL product. Vessel 3 reported less than 1% FIL and vessel 4 reported none, while observer tests showed that 16.3% and 11.9% respectively was packed in frozen product. These results are consistent with observations recorded by MPI Observers that little to no grading of non-compliant fish occurred onboard these vessels. Furthermore these two vessels did not appear to conduct any form of head cut compliance testing of product prior to packing.

Table 15a illustrates the calculated greenweight of non-compliant fish mis-reported as DRE, that should have been reported as FIL, for each of the seven trips identified above.

Vessel	Landing Date	FIL Reported on CLR	Calculated FIL from Observer box test %	Mis-reported Greenweight (kg)
Vessel 5	5/09/2013	20,930	43,229	22,299
Vessel 10	16/10/2103	16,224	39,808	23,584*
Vessel 3	12/09/2013	17,019	331,259	314,240
	7/10/2013	4,596	144,452	139,856
Vessel 4	29/08/2013	0	229,083	229,083
	23/09/2013	0	269,351	269,351
Vessel 7	10/09/2013	37,639	90,993	53,354

Table 15a – Mis-reported greenweight associated with insufficient FIL reporting.

**** Box testing may not have been after final gradeouts which may not accurately reflect "FIL" product.***

Table 15b calculates the under reported greenweight that results from the difference in the conversion factor applied as DRE instead of the numerically larger CF of FIL for fish cut beyond the DRE state. Under-reported greenweight is summarised by company and fishstock. A total of nearly 500 tonne was calculated as under-reported due to use of incorrect state and CF.

Company	Fishstock	Total Mis-reported GW (kg)	Under-reported Greenweight (kg)
Company A	SBW6I	22,299	10,494
Company B	SBW6I	23,584	11,098
Company C	SBW6B	133,032	42,570
	SBW6I	861,913	405,605
	SBW6R	228	73
Company D	SBW6B	6,485	3,052
	SBW6I	46,869	22,056
Total			***494,948***

Table 15b – Under-reported greenweight by company

Recommendations

OCM recommend that correct alignment of fish into processing machines is constantly monitored to enable precision of DRE cuts. Size grading and adjustment of machine settings should be used for optimal performance.

OCM recommend that where non-compliant cuts regularly occur, action is taken to mitigate these circumstances by way of regular maintenance and/or modification to machinery, where practicable.

OCM recommend that vessel operators consider re-designing SBW body holders and belts on IRA machines to ensure small grade SBW are cut compliantly.

OCM recommends that vessels put in place robust systems for assessing cut compliance of DRE product to ensure that any product cut beyond this state, and not destined for meal, is reported appropriately.

OCM recommend that as part MPI Observer CF testing two types of CF tests are carried out:

1. Setting CF test - Fish tested are cut to state definition only (i.e. non-compliant cuts must not be included in these tests[6]). This data can then be used for purposes of setting the official CF.

2. Machine/Operator Performance test - Fish tested may include both compliant and non-compliant cuts. This type of test enables machine and operator performance to be tested in respect of achieving defined state. This data can be used to compare each vessels trip derived CF against the official CF, highlighting instances of non-compliance and inaccuracy of reported greenweight.

When conducting random CF tests, on machine and operator performance, there is no way of accounting for dropouts that fall directly into the meal stream (this is especially relevant to the IRA machine). Consequently results do not accurately reflect machine output despite losses being a normal part of processing. Where losses are suspected OCM recommend that follow through tests are undertaken in order to account for these.

As a result of analysis completed by OCM a number of recommendations were enacted for the 2014 season (prior to this report being finalised). These recommendations included:

4. Redefine definition for SBW DRE to allow for head cuts up to anterior insertion of the first dorsal fin. Albeit operators should be encouraged to cut as close to pectoral fin as possible to maximise economic value.

5. Amend official CF to 1.65 in line with results of CF testing carried out by MPI Observers during the 2013 season.

6. Advise industry that any fish cut beyond new definition of DRE, and not mealed, must be packed separately from DRE product and declared as FIL with a CF of 2.5 applied.

Industry was advised in writing on 1 August 2014 of these changes and associated requirements for the 2014-15 fishing year (refer to appendix four for a copy of the letter sent out to industry).

3.6 (b) Unit Weight Testing

In order to have assurance about the accuracy of greenweight declarations on CLRs we need accurate, independent and reliable unit weight data to compare it against. One way to do this is to conduct product weight examinations on shore. Such examinations are resource intensive and have inherent problems associated with the application of glaze[7] and packaging for which legitimate deductions are made. A more reliable way to determine

[6] Investigation in 2012 into head cut compliance on vessel 8 faltered, in part, when it became evident that the gazetted CF had been based on non-compliant head cuts in the first place.

[7] Glaze is applied by immersing frozen blocks in a water bath, or conveyance through a spray system, in which a thin film of ice adheres to the block. Glaze is used to protect the product against the effects of dehydration due to freezing. Glaze may account for between 1%-4% of the block weight.

actual processed unit weight, and therefore greenweight, is to weigh product prior to the application of glaze and/or packaging.

MPI Observers collect unit weight data to inform the processing summary of the Catch Effort Log book (CELB) for each day of processing. When this data is obtained pre-glaze then this can be used to calculate average net unit weights for comparative purposes.

In 2012 OCM found that there was a lack of consistency in the way in which MPI observers conducted unit weight testing. In many instances it was unclear whether or not unit weights were obtained before or after glaze application and as such the data was unable to be used with confidence. Furthermore, there was little information available regarding the quantity of glaze applied. OCM recommended in the 2012 profile that modified unit weight testing be conducted by MPI Observers for the 2013 season. To achieve this OCM designed a revised block weight sampling regime, for the 2013 season, to obtain unit weights before and after glaze application (where applicable). Results from this testing would allow for calculation of average units weights and quantification of glaze, to enable assessment of greenweight reporting.

Unit Weight Comparison

Unit weight data obtained by MPI Observers was compared with unit weights derived from CLR reported greenweights. Results indicate that the majority of vessels reported sufficient greenweight for both DRE and FIL states in 2013. Table 16 shows that a total of approximately 32t was under-reported.

Vessel Name	CLR Landing Date	Processed State	Observer Average block Weight (kg)	Vessel Nominal block weight (kg)	CLR calculated block weight (kg)	CLR # cartons	Difference (per unit)	Under reported GW
Vessel 5	30-Sep-13	DRE	10.27	10.00	10.18	56,808	-0.192	-18,536
		FIL				558	-0.192	-268
Vessel 10	17-Oct-13	DRE	7.73	7.50	7.59	16,398	-0.418	-11,664
		FIL				285	-0.418	-298
Vessel 4	16-Oct-13	DRE	10.19	10.00	10.10	3,551	-0.180	-1,085
Grand Total								***-31,851***

Table 16 - Summary of underreported greenweight (kgs) resulting from unit weight comparison.

Glaze Weights

All six Ukrainian vessels applied glaze to their frozen SBW product in 2013. Three used a spray glaze and three used a dip/bath glaze. Only one of the three NZ vessels applied glaze (via a spray system), while the other two packed product into inner cartons prior to freezing.

Table 17 provides a summary of the average glaze applied for each vessel as tested by MPI Observers.

Nationality	Vessel	% glaze
NZ	Vessel 2	1.55%
	Average	***1.55%***

Ukrainian	Vessel 6	3.02%
	Vessel 5	2.40%
	Vessel 3	2.40%
	Vessel 4	2.30%
	Vessel 7	3.23%
	Vessel 8	3.56%
	Average	***2.58%***

Table 17 – Glaze percentages calculated from pre- and post-glaze block weight data recorded by Observers

Vessel On-board Unit Weight and Glaze Testing

In the 2013 SBW fishery, systems for reporting of processed product (excluding meal) typically fell into one or more of the following three categories:

1. The vessel has automated weighing and recording systems capable of capturing greenweight and the permit holder/LFR uses this data to report greenweight.
2. The vessel does not have automated weighing and recording systems capable of capturing greenweight, but conducts and documents onboard weight checks which are used to calculate greenweight. Onshore weight checks may or may not be conducted in combination with this.
3. The vessel does not have automated weighing and recording systems capable of capturing greenweight, but may conduct and document onboard weight checks. These checks are not used to calculate greenweight. Onshore weight checks are conducted for calculation of greenweight.

Table 18 documents systems available for use when reporting greenweight on CLRs, for each vessel.

Vessel Name	Automated Product Weighing	Unit Weight Testing (onboard)	Unit Weight Testing (onshore)	Glaze Testing
Vessel 5	No	Yes*	unknown	Yes
Vessel 6	Yes	No	No	Yes
Vessel 3	No	Yes	Yes	No
Vessel 4	No	Yes	Yes	Yes
Vessel 7	Yes	No	No	Yes
Vessel 8	Yes	No	No	Yes
Vessel 9	No	Yes	No	N/A
Vessel 10	No	Yes	No	N/A
Vessel 2	No	Yes*	No	Yes
Vessel 1	No	Yes*	Yes	N/A

Table 18 - Summary of onboard testing conducted by vessel.
**** Cartons weighed – no individual units.***

Testing methodologies for unit weight and glaze application vary across the fleet. In general sample sizes tested appear to be inadequate for the purposes of calculating greenweight. In a number of instances information supplied by MPI Observers indicated a lack of standard practice for that vessel. Weaknesses identified in testing included: inadequate sample size; absence of random sampling; insufficient frequency of tests; limiting testing to one product grade and no testing conducted at all.

OCM recommend that in the absence of automated on-board weighing systems (such as Marel/Innova) vessels must conduct robust and reliable product weight testing to calculate average unit weights for declaration of greenweight on CLRs.

OCM recommend that all vessels applying glaze must conduct robust and reliable glaze testing to support legitimate deductions made in respect of greenweight declarations on CLRs.

OCM recommend that documented procedures for unit weight and glaze testing are provided to MPI including any deductions made for glaze for purposes of calculating unit weights on CLRs.

OCM recommend that MPI Observers verify vessel unit weight and glaze testing procedures at sea, identifying where procedures are not being followed and recording any weaknesses and/or variation to vessel's documented procedures.

3.6 (c) Meal

Fish meal is a commercial product made from whole fish, and the bones and offal from processed fish, which is first cooked, then ground and finally dried to less than 10% moisture content before being packed into 30 kg sacks. It is primarily used as feed for animals and is usually deemed unsuitable for human consumption. The reporting of meal by fishing vessels has been fraught with ambiguity.

Section 36 (2) of the Fisheries (Reporting) Regulations 2001 state that *"if fish is landed in two or more states, - (a) the landed state that has the greatest landed weight is the principal landed state, and its weight must be recorded in kilograms; and (b) all other landed states are additional landed states, and their weight must be recorded as the actual weight of the fish in that landed state"*.

Meal produced from whole and damaged fish is required to be reported as MEA, a principal landed state, while meal produced from offal is reported as MEB, a secondary state. In an attempt to clarify reporting procedures for the number of bags of fishmeal (both MEA and MEB) produced a letter was distributed to industry in 2008 (refer to appendix 5 for copy of letter) which directed the way in which these states must be recorded on TCEPRs and CLRs. It was acknowledged that the greenweight of fish destined for MEA is calculated prior to the process of rendering into fishmeal. It identifies that a number of methods are used for this purpose including time sampling and weighing fish bins. Many factory trawler manuals purportedly include fishmeal estimation methods as documented in appendix 6.

The volume of whole and processed SBW to meal is significant for a number of reasons, including:

- Fish damaged and unfit for processing
- Fish processed outside of defined state
- Small fish below minimum piece weight specifications
- Fish lost from processing machinery into the meal stream

Accurate quantification of whole and processed fish to meal is essential as, unlike frozen product, meal cannot be easily calculated from processed weight to green weight.

Operators must ensure correct use of conversion factor for the state of the processed fish sent to meal.

Whole and processed fish is directed to the meal plant from several sources throughout the factory, both before and after processing. The main sources[8] are:

1. Deck – stickers and other deck damaged fish;
2. Main Sorting Station – damaged fish from the pounds;
3. Processing Machines – includes both sorting pre-processing and machine drop-outs;
4. Grade outs post-processing - fish graded out due to size, damage and non-compliant cuts;
5. Quality Control rejects.

It is believed that the volume of whole and processed fish that is directed to meal is far greater than that reported, with the difference being reported as MEB. A number of issues were identified during the 2012 season (see 2012 Profile for details) relating to inaccurate reporting of whole and processed fish to meal. As a result, OCM tasked MPI Observers in 2013 to identify all sources of whole and processed SBW to meal and, where possible, to assess accuracy of meal reporting.

Typically meal plant capacity is designed to process all offal produced during the production of frozen product, as well as limited volumes of whole fish unsuitable for processing to frozen product. Meal plants on vessels operating in the fishery have the capacity to produce approximately 7-9 t of fishmeal per day. Eight of the ten vessels (six UKR, two NZ) operating in the fishery in 2013 had meal plants on-board, with the remaining two (one NZ, one JAP) relying solely on authorised discards for the disposal of unwanted fish.

Tables 19a and 19b below summarise by source, the proportion of whole and processed fish to meal. It is important to note here that data is indicative only as the majority of observers believed it was not possible to accurately assess fish to meal, especially on solo trips.
For the Ukraine fleet data in table 19a indicates that the main source of fish to meal is from the main sorting station and deck, accounting for approximately 68% of fish sent to meal. This is followed by gradeouts accounting on average for 17%, IRA dropouts accounting on average for 8%, sorting by machine operators and QC rejects accounting for approximately 6%.

Vessel	Main sorting station + Deck	IRA sorting	IRA dropouts	Circular Saw	Grade-outs	QC Rejects	Other
Vessel 5	80.2%	10.8%	0.1%	0.0%	3.6%	3.4%	1.8%
Vessel 6	47.8%	6.1%	3.5%	6.9%	35.7%	0.0%	0.0%
Vessel 3	55.8%	6.7%	0.0%	0.0%	35.8%	0.0%	1.7%
Vessel 4	91.5%	0.0%	0.0%	0.0%	8.5%	0.0%	0.0%
Vessel 7	69.8%	0.0%	15.5%	0.0%	14.8%	0.0%	0.0%
Vessel 8	61.0%	2.0%	21.0%	0.0%	16.0%	0.0%	0.0%
Average Ukraine	**68.4%**	**4.8%**	**7.7%**	**0.9%**	**16.8%**	**0.9%**	**0.7%**

[8] For further information regarding sources of fish to meal refer to 2012 SBW Compliance Risk Profile 6.7 (c).

Table 19a - Summary of sources of SBW to meal on Ukrainian vessels

Losses from IRA direct to the meal stream appear to be extremely high on vessel 8 and vessel 7 compared to all other vessels. This is a concern given questionable time sampling methods.

It was noted by MPI Observers onboard vessel 4 that the offal conveyor from the IRA was not easily accessible and therefore no testing of this source was undertaken by Observers. As a result it is very unlikely that the vessel makes any attempt to quantify this fish which is supported by MPI Observer feedback.

For the NZ fleet, table 19b indicates that the main source of fish to meal is from grade-outs accounting for approximately 55% of fish sent to meal. This is followed by 'other' sources accounting for 20% of fish to meal[9], which includes sorting at the Baader 212 (B212) accounting for 12%, B212 dropouts accounting for 9% and QC rejects accounting for 4%.

Vessel	B212 sorting	B212 dropouts	Grade-outs	QC Rejects	Other
Vessel 9	11.5%	0.0%	52.6%	0.0%	35.9%
Vessel 10	12.1%	17.9%	57.9%	7.4%	4.7%
Average NZ	**11.8%**	**8.9%**	**55.2%**	**3.7%**	**20.3%**

Table 19b - Summary of sources of SBW to meal on NZ vessels

MPI observers have provided valuable information regarding the procedures used by vessels for the quantification and recording of whole and processed fish to meal. Through their observations a number of risks have been identified relating to the accuracy of recording systems used by many of the vessels operating in the SBW fishery.

The risks listed in tables 20a and 20b relate to the quantification and recording of whole and processed fish to meal for the Ukraine and NZ fleet, respectively.

The risks identified in these two tables are the result of qualitative assessment of information supplied by MPI Observers and Fishery Officers. For a more detailed summary of vessel procedures and risks specific to each vessel refer to Appendix 7.

[9] This average is skewed by the way in which the observer collected fish to meal data on vessel 9.

Source	Risks
Main sorting station (hopper/s) & stickers	• Use of inaccurate hopper weight for wholefish to meal (e.g. On vessel 4 nominal weight of 100 kg used instead of actual hopper holding capacity of 140kg). • Inaccurate quantification of over filled hoppers. • Inaccurate quantification of partial releases. • Inconsistent recording of hopper releases (both full and partial loads). • Hopper sliding base plate remaining open with fish direct to meal without quantification. Greater risk where hopper has small capacity (e.g. vessel 5 – 40 kg main sorting hopper). • Inconsistent use of vessel procedures for transcribing fish to meal (particularly where 2 sorting hoppers in use e.g. vessel 6). • Inappropriate use of time sampling where bulk small fish diverted to meal. • Nominal amount per shift recorded to account for wholefish to meal (vessel 4). • No written records of stickers to meal. Reliant on information being relayed verbally. • Use of nominal bin weights for stickers. • Stickers direct to meal via trawl deck chute without quantification (vessel 5, vessel 6 and vessel 7).
IRA sorting	• Small and damaged whole fish unsuitable for processing through the IRA are removed and binned for mealing. Lack of clarity regarding quantification and recording of fish to meal from this source. • Use of inaccurate nominal bin weights for whole fish removed for mealing • Use of nominal bin weights for whole fish removed for mealing. • Use of trough to collect fish removed by IRA operators onboard vessel 6. Trough has chute direct to meal auger. Potential for chute to remain open and fish directed to meal auger without quantification. • No quantification of whole damaged and small fish deliberately diverted to meal via IRA central chute or head section of feeding belt to offal (vessel 8, vessel 3, vessel 4).
IRA dropouts	• No quantification of whole and processed fish that has dropped out of machine. • Unreliable and inconsistent use of time sampling for quantification of whole and processed fish to meal. • Fish cut beyond state definition not accounted for.
Grade outs	• No attempt made to quantify processed fish to meal until raised by MPI Observer (vessel 4, vessel 3). • Lack of clarity regarding vessel systems for assessing head cut compliance of processed fish to meal. Absence of reliable systems likely to result in incorrect application of CF for processed fish to meal. In some instances state of processed fish not assessed and only official DRE CF applied. • Appropriate CF (i.e. DRE or FIL) not applied for processed fish to meal. Many instances of DRE CF used for all processed fish including fish cut beyond state. • No written records of processed fish to meal. Reliant on information being relayed verbally.

	• Use of inaccurate bin weight for rejected processed fish to meal (e.g. On vessel 3 used 45 kg bin weight instead of 50 kg). • Use of nominal weights for bins of graded out processed fish (e.g. On vessel 3 50 kg bins filled to 65 kgs) leading to underreporting where overfilling of bins occurs. • Bins not provided at gutting stations for grading out of processed fish, may lead to deliberate diversion to meal without quantification (vessel 8, vessel 5). • Deliberate diversion of DRE fish to meal via offal chute at gutting/grading station without quantification (vessel 3) • Mixing of whole and processed fish in bins/hoppers. Incorrect quantification where no CF applied for processed fish.

Table 20a - Summary of Risks for FCVs

Source	Risks
B212 dropouts	• Lack of clarity regarding time sampling of machine dropouts. Potential for under-reporting of fish to meal if testing is unreliable. Testing should also account for processed state of fish to ensure appropriate CFs is applied (vessel 10).
Gradeouts	• Use of nominal weights for bins of graded out processed fish leading to underreporting where overfilling of bins occurs (vessel 10).
Time sampling of all fish to meal	• Greater risk of under-reporting greenweight as vessel solely relies on time sampling for quantification of all whole and processed fish to meal. (vessel 9).

Table 20b - Summary of Risks for New Zealand Vessels

Risks identified in tables 20a and 20b above highlight many weaknesses relating to the way in which SBW destined for meal is quantified and recorded by vessels across the fleet. All whole and processed fish sent to meal must be accurately quantified and recorded, including the correct CF applied for processed fish to ensure accuracy of greenweight. In many instances however vessels have weaknesses in their onboard procedures for quantifying SBW to fishmeal that would ultimately lead to the underreporting of MEA greenweight.

Inaccurate quantification of whole and processed fish to meal is due to one or more of the following:

- Vessel procedures not being adhered to;
- Inadequate vessel procedures for quantifying and recording all sources of fish to meal;
- Systems for recording quantities of fish to meal reliant on information being relayed person to person e.g. machine operators and/or graders advising shift supervisor of fish to meal;
- Single points of failure such as poundsman failing to record all hopper releases;
- Inaccurate use of hopper and bin capacities (with little or no regard for overfilling or partial releases);
- Hopper sliding base remaining open with fish direct to meal without quantification;

- Absence of records documenting all sources of fish to meal, thereby rendering auditing of fish to meal futile;
- Inappropriate use of time sampling for main sources;
- Diverting small and damaged fish to meal deliberately without quantification via any of the following methods: stickers via deck chute direct to meal auger, meal hopper direct to auger; IRA offal chute; gutting tables to offal chute (see figures 10 to 12 below);
- Losses associated with machine dropouts which are not quantified (see figure 13 below);
- No attempt to quantify processed fish to meal;
- Processed fish not separated to allow for quantification of fish cut beyond state;
- No, or incorrect, CF applied to processed fish sent to meal;
- Single method (i.e. time sampling) utilised for quantification of all sources of fish to meal.

Figure 10a - stickers retained on deck waiting to be batch processed to meal.

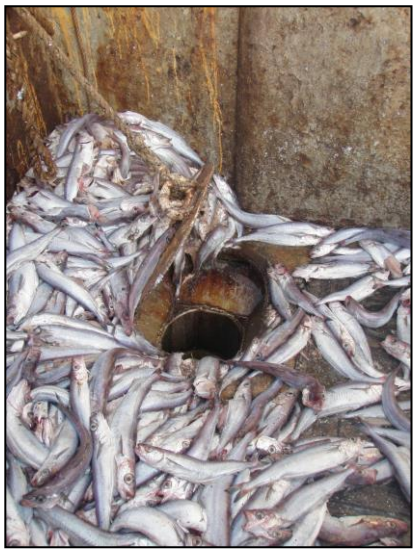


Figure 10b - chute from trawl deck hopper direct to meal auger (in some instances via main sorting hopper)

Figure 10c - Chute from trawl deck direct to meal augur.

Figure 11 - Sliding lid provides ease of access to divert fish to IRA offal.

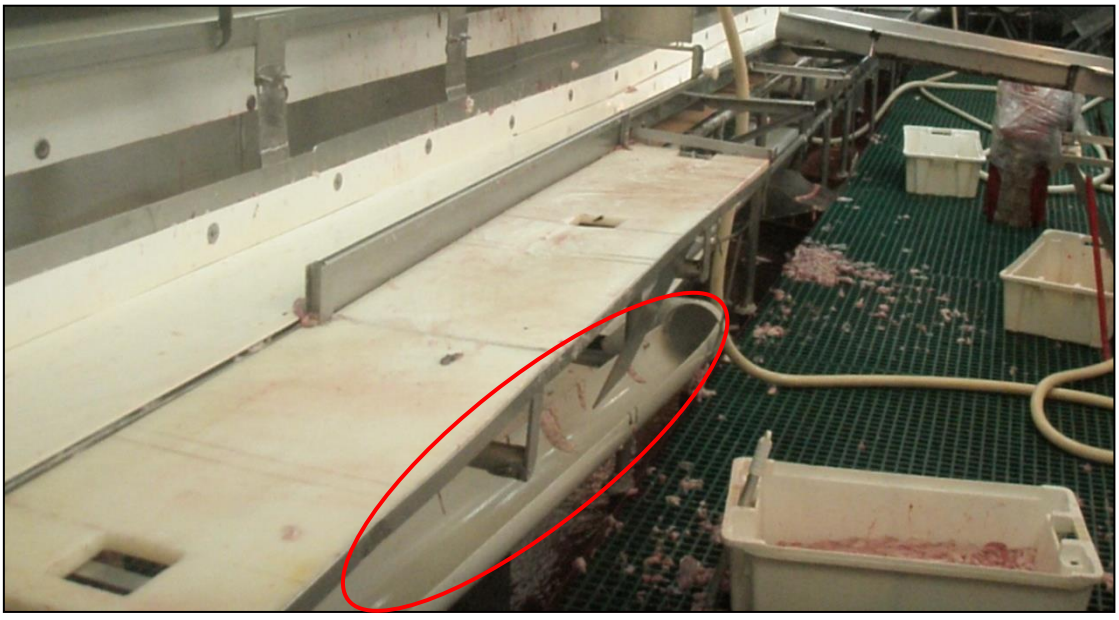


Figure 12 – chute from processing line to meal auger, enabling whole/processed fish to meal without quantification

Figure 13 – whole fish present in offal chute from IRA machine

The reporting of MEB, instead of MEA, to account for whole and processed fish sent to meal is also a risk identified for vessels with meal plants. Typically where this occurs quantities of MEB are inflated to disguise the under-reporting of MEA. In some instances to avoid the reporting of excessive amounts of MEB vessels will deliberately discharge soft offal overboard thereby reporting both MEA and MEB in what appears to be sufficient quantities. See figure 14 below for an illustration of soft offal losses.

Figure 14 – soft offal on factory floor – discharged overboard via sump.

Recommendations

OCM recommend that quantification methods used for main sources of whole and processed fish to meal must be robust and accurate. Time sampling is not recommended for the quantification of main sources of whole and processed fish to meal where other more reliable methods can be used.

OCM recommend that operators provide MPI with documented procedures regarding the quantification and recording of all sources of whole and processed fish to meal in the factory and on deck (if applicable), particular to each vessel. Procedures must include:

- Methodologies used for quantification of greenweight for each source;
- Person responsible for quantification and recording for each source
- Flow of information from person responsible for original records to Shift Supervisor and/or Factory Manager for recording in factory log.
- Annotated factory diagram identifying sources of whole and processed fish to meal (see appendix 8 for example);
- Declaration made for hopper and bin(s) weights used to quantify each source of whole and processed fish to meal. Weights should be specific for main target species;
- Separation of processed fish to account for any fish cut beyond intended state;

- Copies of documentation used to record weights for each source must be supplied. Documentation must identify each source, and where applicable, CF applied, both in the factory and in the factory log;
- All source documents to be retained for auditing purposes.

OCM recommend that where inadvertent losses to meal regularly occur, action is taken to mitigate these circumstances by way of modification to processing machinery, where practicable. Where modification is not possible, all such losses must be quantified and recorded appropriately as per recommendation above.

OCM recommend that vessel procedures used for quantification and recording of whole and processed fish to meal are verified at sea by MPI Observers. Where procedures are not adhered to by vessel, MPI Observers must document accordingly including any procedural weaknesses identified. All such instances reported by Observers must be brought to the attention of OCM.

OCM recommend that partial releases of fish to meal via hopper(s) are not routine practice and should only occur, if necessary, at the end of shift. To assist with quantification of partial releases each hopper should have internal measurements provided.

OCM recommend that ibutton technology is investigated for the purposes of corroborating total meal hopper releases against reported greenweight for a trip.

OCM recommend that Industry & MPI collaborate in order to find markets for small grade whole SBW that would otherwise be mealed due to being outside vessel specifications or subject to non-compliant head cuts.

OCM recommend that vessels must have back-up systems in place to deal with meal plant breakdowns and for instances where large volumes of fish are sent to meal beyond plant capacity.

3.6 (d) Surimi

During the 2012 season, it was identified that vessel 1 was consistently not achieving the official Conversion Factor for SBW SUR of 5.4. It was decided that a vessel-specific CF would be allocated to be re-assessed each season, using the most recent data available (i.e. from the season prior). For the 2013 season the VSCF was set at 5.7.

There are many risks particular to this vessel and surimi production, including:

- Vessel aiming for large bags, combined with absence of windows in net, leads to risk of burst bags. E.g. Observer eyeball estimate of 16t lost at surface during hauling of tow 18 (trip 3837) - large tow of about 215t (see figure 15 below).
- Potential for high level of damage due to large bags required for Surimi production.
- Losses from surimi process not accounted for - both whole fish and partially-processed product i.e. mince (see figure 16 below - average rate of fish dropping out of filleting machine for this trip was 14.47kg greenweight per hour).

- Losses due to poor head cuts prior to filleting (see figure 17 below).
- Losses are not accounted for in calculation of CF for the season in which they relate to (CF is re-calculated for each season using previous season's data). This means that landings declared for a fishing year may not account for the true greenweight extracted from the vessel from this vessel.
- Even if all losses were accounted for in greenweight calculation, value is not being maximised due to waste of usable product. Attitude on board vessel of discarding being acceptable so no need to try and maintain fish quality - this is a concern. Vessel only took action to prevent inadvertent losses when identified by MPI Observers.
- Proximity of discard/offal conveyor to main conveyor lends itself to easy diversion of whole fish to offal stream (see figure 18).
- Any whole and processed fish that are lost to the offal stream, whether inadvertently or intentionally, are illegal discards if not authorised and quantified by an MPI Observer prior to discharge.

Figure 15 – Surface loss due to tear in bag on vessel 1

Figure 16 – Fillets lost from filleting machine during 10 minute sample

Figure 17 – Incorrect head cuts collected during 10 minute sample

Figure 18 – Offal conveyor showing small chute from main conveyor

Several factors give uncertainty to accuracy of CF calculations for surimi production, including:

- Inaccurate use of pound dimensions give rise to inaccurate greenweight assessment;
- Question over use of 0.99 for fish density factor (issues surrounding bin used for determining density e.g. sides of bin are very flexible);
- Use of additives for each surimi grade (accounts for 7.5%) and how quantity of additive is factored into calculation for establishing greenweight (see figure 19 illustrating some of the additives used);

Figure 19 - Surimi additives used and example of label detailing composition of additives.

The first four recommendations identified in 2012 still apply and are therefore included below.

OCM recommend that pound volumes for vessel 1 are certified by an independent party so that MPI Observers are not recalculating volumes each trip. Certification should be the responsibility of the vessel operator to obtain. Certification must be provided to MPI to retain on file.

OCM recommend that where the vessel fails to meet the official surimi CF (or VSCF) continuously, then the operator should be made to re-declare catch using the observer derived conversion factor for the trip. The principal reason for this is that trip derived CF will take into account fish losses associated with trip.

OCM recommend that the surimi state definition is reviewed in order to define explicitly the position in which the head must be cut prior to further processing.

OCM recommend that vessel 1 carries two observers at all times during the SBW fishery, as damaged fish is discarded continuously. Observers must supervise and quantify all authorised discards. Unsupervised discards must not occur under any circumstances.

OCM recommend that the vessel operator is required to submit documentation to MPI regarding additives used for each grade of surimi processed. Documentation must include quantities/ratios of [fish:additive].

3.6 (e) Accidental Loss, Abandonment and Authorised Discards

Section 72 of the Fisheries Act 1996 prohibits the dumping of fish. However, 72(5)(c) provides for authorised discards in the presence of a Fishery Officer or Observer. All authorised discards of fish must be included in the appropriate returns, and reported against destination type code (DTC) 'A'. This code relates to fish or fish product of the species or classes of fish subject to the quota management system established under Part 4 of the Fisheries Act 1996 that are returned to, or abandoned in, or accidentally lost at sea.

The use of DTC 'A' in CLRs may relate to catch that was either (or a combination of): authorised discards, accidental losses (e.g. attributed to burst bag) and/or intentional releases (or abandonment) for reasons of vessel/crew safety. It is not immediately possible to identify which of these circumstances apply to catch recorded against DTC 'A' in a CLR. During the 2013 season 132,278 kgs of SBW was recorded against DTC 'A' by six vessels.

Table 21 compares SBW losses/discards as reported on MPI returns and by MPI observers for the 2012 and 2013 seasons. A comparison of TCEPR and CLR data, where DTC "A" was used, showed that all SBW reported as "ACC" or "DIS" on TCEPRs was accounted for on the appropriate CLR.

Source		**2012**	**2013**
MPI returns	TCEPR ACC/DIS	135,257	118,253
	CLR dtc = A (ACC/DIS)	152,065	132,278
Observer records	Authorised Discard	86,832	86,555
	Burst Bag	7,250	26,800
	Total	***94,082***	***113,355***

Table 21 - Summary of SBW losses as reported by permit holders and MPI observers.

4. Summary of Identified Issues and Compliance Risks

The 2013 SBW Compliance Risks Update has identified a number of issues, as described below:

Reporting

A number of issues were identified relating to reporting requirements. They include:

- TCEPR estimated catch data is not always recorded in a timely manner at the end of a tow, giving vessels opportunity to mis-report catch. Regulations and explanatory notes are not prescriptive enough.
- TCEPR processing summary data is not always reported in a way that reflects product flow onboard, limiting reliability of product flow analysis. Regulations and explanatory notes are not consistent with factory procedures on board most deepwater factory vessels.
- Analysis of CEEDT audit history data not possible due to lack of analysis tool.

Fishing Practices

A number of risks were identified relating to vessel fishing practices. They include:

- Vessels not catching to factory processing capability leads to soaking of net and/or retaining catch on deck waiting for processing, both of which can contribute to deterioration of fish quality and hence increased likelihood of bulk mealing or discarding.
- Illegal disposal of unwanted SBW, especially on vessels with no meal plant. Large volumes can easily be routed via conveyors to discard chutes, macerators and/or hashers and discharged illegally overboard.
- Chute leading from meal auger to discard sump on Ukrainian vessels, fed via removable plate in side of auger casing, enables offal to be redirected from meal stream and discharged overboard. Risk of whole and processed fish also being illegally discarded, either inadvertently (when present in offal stream) or deliberately.

Processing Practices

A number of risks were identified relating to vessel processing practices. They include:

- Incorrect alignment of fish into processing machines, lack of maintenance of machinery and lack of adjustment of machine settings all contribute to non-compliant head cuts in DRE SBW.
- Vessels not using robust systems for assessing cut compliance of DRE product leads to incorrect CF being applied to non-compliant cut fish, and therefore under-reported greenweight.

- Inclusion of non-compliant cut fish in CF testing used for setting CFs causes difficulties for investigations into non-compliance of cuts.
- For vessels with no automated on-board weighing system, absence of robust and reliable product weight testing leads to inaccurate greenweight declarations.
- For vessels making deductions for glaze, absence of robust and reliable glaze weight testing leads to inaccurate greenweight declarations.
- If product and glaze weight testing results are not documented and retained by vessels, MPI has no way of auditing testing practices.
- Fish lost onto factory floor from conveyors or fish bins can be washed overboard, if not picked up and returned to conveyor/bin, leading to illegal discard.

Meal

There are many risks associated with the way in which vessels quantify and report sources of fish to meal. All whole and processed fish to meal must be accurately quantified and recorded to ensure accuracy of greenweight.

Inaccurate quantification of whole and processed fish to meal is due to one or more of the following:

- Vessel procedures not been adhered to;
- Inadequate vessel procedures for quantifying and recording all sources of fish to meal;
- Systems for recording quantities of fish to meal reliant on information being relayed person to person e.g. machine operators and/or graders advising shift supervisor of fish to meal;
- Single points of failure such as poundsman failing to record all hopper releases;
- Inaccurate use of hopper and bin capacities (with little or no regard for overfilling or partial releases);
- Hopper sliding base remaining open with fish direct to meal without quantification;
- Absence of records documenting all sources of fish to meal, thereby rendering auditing of fish to meal futile;
- Inappropriate use to time sampling for main sources;
- Diverting small and damaged fish to meal deliberately without quantification;
- Losses associated with machine dropouts which are not quantified;
- No attempt to quantify processed fish to meal;
- Processed fish not separated to allow for quantification of fish cut beyond state;
- No, or incorrect, CF applied to processed fish sent to meal;
- Single method (i.e. time sampling) utilised for quantification of all sources of fish to meal.

The reporting of MEB, instead of MEA, to account for whole and processed fish sent to meal is also a risk identified for vessels with meal plants. Typically where this occurs quantities of MEB are inflated to disguise the under-reporting of MEA. In some instances to avoid the

reporting of excessive amounts of MEB vessels will deliberately discharge soft offal overboard thereby reporting both MEA and MEB in what appears to be sufficient quantities.

Surimi

A number of risks have been identified in relation to the production of surimi. They include:

- Vessel targeting large bags, combined with absence of windows in net, leads to risk of burst bags.
- Potential for high level of damage due to large bags required for Surimi production.
- Losses from surimi process – both whole fish and partially-processed product ie mince
- Losses due to poor head cuts prior to filleting.
- Losses are not accounted for in calculation of CF for the season in which they relate to (CF is re-calculated for each season using previous season's data). This means that landings declared for a fishing year may not account for the true greenweight extracted from the vessel from this vessel.
- Even if all losses were accounted for in greenweight calculation, still big wastage – impact on sustainability. Attitude on board vessel of discarding being acceptable so no need to try and maintain fish quality – this is a concern. Vessel only took action to prevent inadvertent losses when identified by MPI Observers.
- Proximity of discard/offal conveyor to main conveyor lends itself to easy diversion of whole fish to offal stream.
- Any whole and processed fish that are lost to the offal stream, whether inadvertently or intentionally, are illegal discards if not authorised and quantified by an MPI Observer prior to discharge.

Several factors give uncertainty to accuracy of CF calculations for surimi production, including:

- Inaccurate use of pound dimensions give rise to inaccurate greenweight assessment;
- Question over use of 0.99 for fish density factor (issues surrounding bin used for determining density e.g. sides of bin are very flexible);
- Use of additives for each surimi grade (accounts for 7.5%) and how quantity of additive is factored into calculation for establishing greenweight (see figure 19 illustrating some of the additives used).

5. Recommendations

OCM has made a number of recommendations throughout the 2013 SBW Compliance Risk Update. For ease of reference, all recommendations are listed below:

OCM recommend that the Fisheries (Reporting) Regulations 2001 and associated explanatory notes are reviewed in order to clarify reporting requirements. The requirement for the timely entry of effort and estimated catch data is paramount (e.g. "...as soon as practicable once the trawl net has been landed on the vessel...").

OCM recommend that the Fisheries (Reporting) Regulations 2001 and associated explanatory notes are reviewed in order to clarify reporting requirements. It is imperative that reporting requirements allow deepwater vessels to report in a way that reflects product flow onboard. In doing so, this will enable compliance to conduct product flow analysis.

OCM recommend that implementation of the autosave feature is verified and tested to ensure that it satisfies recommendation 1 as below.

1. The manner in which dates and times are written out to the CEEDT event fields needs to be amended to accurately record when the data was entered, in-accordance with the original CEEDT specifications.

OCM recommend that progress is made regarding recommendations 2 and 3, as below, to enable for the accurate and timely analysis of CEEDT data.

2. An analysis tool to process the CEEDT audit history data exported from the FishServe system is developed to enable prompt and accurate data analysis.
3. The analysis tool to process the Compliance Management Tool (CMT) exported CEEDT audit history data needs to be further developed as only an early draft version of an analysis tool has been prepared at this stage.

OCM recommend that vessel operators are encouraged to catch to capacity thereby eliminating the need to soak the net or retain catch on deck.

OCM recommend that correct alignment of fish into processing machines is constantly monitored to enable precision of DRE cuts. Size grading and adjustment of machine settings should be used for optimal performance.

OCM recommend that where non-compliant cuts regularly occur, action is taken to mitigate these circumstances by way of regular maintenance and/or modification to machinery, where practicable.

OCM recommend that vessel operators consider re-designing SBW body holders and belts on IRA machines to ensure small grade SBW are cut compliantly.

OCM recommends that vessels put in place robust systems for assessing cut compliance of DRE product to ensure that any product cut beyond this state, and not destined for meal, is reported appropriately.

OCM recommend that as part MPI Observer CF testing two types of CF tests are carried out:

1. Setting CF test - Fish tested are cut to state definition only (i.e. non-compliant cuts must not be included in these tests[10]). This data can then be used for purposes of setting the official CF.
2. Machine/Operator Performance test - Fish tested may include both compliant and non-compliant cuts. This type of test enables machine and operator performance to be tested in respect of achieving defined state. This data can be used to compare each vessels trip derived CF against the official CF, highlighting instances of non-compliance and inaccuracy of reported greenweight.

When conducting random CF tests, on machine and operator performance, there is no way of accounting for dropouts that fall directly into the meal stream (this is especially relevant to the IRA machine). Consequently results do not accurately reflect machine output despite losses being a normal part of processing. Where losses are suspected OCM recommend that follow through tests are undertaken in order to account for these.

As a result of work completed by OCM a number of recommendations were enacted for the 2014 season (prior to this report being finalised). These recommendations included:

1. Redefine definition for SBW DRE to allow for head cuts between posterior insertion of the pectoral fin and anterior insertion of the first dorsal fin. Albeit operators should be encouraged to cut as close to pectoral fin as possible to maximise value.

2. Amend official CF to 1.65 in line with results of CF testing carried out by MPI Observers during the 2013 season.

3. Advise industry that any fish cut beyond new definition of DRE, and not mealed, must be packed separately from DRE product and declared as FIL with a CF of 2.5 applied.

Industry was advised in writing on 1 August 2014 of these changes and associated requirements for the 2014-15 fishing year.

OCM recommend that in the absence of automated on-board weighing systems (e.g. Innova/Marel) vessels must conduct robust and reliable product weight testing to calculate average unit weights for declaration of greenweight on CLRs.

OCM recommend that all vessels applying glaze must conduct robust and reliable glaze testing to support legitimate deductions made in respect of greenweight declarations on CLRs.

[10] Investigation in 2012 into head cut compliance on vessel 8 faltered, in part, when it became evident that the gazetted CF had been based on non-compliant head cuts in the first place.

OCM recommend that documented procedures for unit weight and glaze testing are provided to MPI including any deductions made for glaze for purposes of calculating unit weights on CLRs.

OCM recommend that MPI Observers verify vessel unit weight and glaze testing procedures at sea, identifying where procedures are not being followed and recording any weaknesses and/or variation to vessel's documented procedures.

OCM recommend that quantification methods used for main sources of whole and processed fish to meal must be robust and accurate. Time sampling is not recommended for the quantification of main sources of whole and processed fish to meal where other more reliable methods can be used.

OCM recommend that operators provide MPI with documented procedures regarding the quantification and recording of all sources of whole and processed fish to meal in the factory and on deck (if applicable), particular to each vessel. Procedures must include:

- Methodologies used for quantification of greenweight for each source;
- Person responsible for quantification and recording for each source
- Flow of information from person responsible for original records to Shift supervisor and/or factory manager for recording in factory log.
- Annotated factory diagram identifying sources of whole and processed fish to meal;
- Declaration made for hopper and bin(s) weights used to quantify each source of whole and processed fish to meal. Weights should be specific for main target species;
- Separation of processed fish to account for any fish cut beyond intended state;
- Copies of documentation used to record weights for each source must be supplied. Documentation must identify each source, and where applicable, CF applied, both in the factory and in the factory log;
- All source documents to be retained for auditing purposes.

OCM recommend that where inadvertent losses to meal regularly occur, action is taken to mitigate these circumstances by way of modification to processing machinery, where practicable. Where modification is not possible, all such losses must be quantified and recorded appropriately as per recommendation above.

OCM recommend that vessel procedures used for quantification and recording of whole and processed fish to meal are verified at sea by MPI Observers. Where procedures are not adhered to by vessel, MPI Observers must document accordingly including any procedural weaknesses identified. All such instances reported by Observers must be brought to the attention of OCM.

OCM recommend that partial releases of fish to meal via hopper(s) are not routine practice and should only occur, if necessary, at the end of shift. To assist with quantification of partial releases each hopper should have internal measurements provided.

OCM recommend that ibutton technology is investigated for the purposes of corroborating total meal hopper releases against reported greenweight for a trip.

OCM recommend that Industry & MPI collaborate in order to find markets for small grade whole SBW that would otherwise be mealed due to being outside vessel specifications or subject to non-compliant head cuts.

OCM recommend that vessels must have back-up systems in place to deal with meal plant breakdowns and for instances where large volumes of fish are sent to meal beyond plant capacity.

OCM recommend that pound volumes for vessel 1 are certified by an independent party so that MPI Observers are not recalculating volumes each trip. Certification should be the responsibility of the vessel operator to obtain. Certification must be provided to MPI to retain on file.

OCM recommend that where the vessel fails to meet the official surimi CF (or VSCF) continuously, then the operator should be made to re-declare catch using the observer derived conversion factor for the trip. The principal reason for this is that trip derived CF will take into account fish losses associated with trip.

OCM recommend that the surimi state definition is reviewed in order to define explicitly the position in which the head must be cut prior to further processing.

OCM recommend that vessel 1 carries two observers at all times during the SBW fishery, as damaged fish is discarded continuously. Observers must supervise and quantify all authorised discards. Unsupervised discards must not occur under any circumstances.

OCM recommend that the vessel operator is required to submit documentation to MPI regarding additives used for each grade of surimi processed. Documentation must include quantities/ratios of [fish:additive].

6. Appendices

Appendix One – Letter to SBW Operators 2 August 2013

Ministry for Primary Industries
Manatū Ahu Matua

2 August 2013

Dear SBW Operator

After recent discussions with a number of companies, I am writing to clarify the Ministry's expectations regarding processed states and conversion factors in this year's SBW fishery.

You will be aware that the Ministry has had some concerns about the ability of operators to consistently meet the DRE state definition when processing SBW. The Ministry collected information in last year's fishery that indicated several companies were, at times, not meeting the legal definition for DRE SBW as cuts were made too far behind the pectoral fin, this was particularly so for small fish. This raised the question about whether it was appropriate to use the DRE conversion factor of 1.7 or whether fish should be declared as processed to FIL and a conversion factor of 2.5 applied.

The Ministry accepts that the high volume nature of this fishery makes it difficult to consistently process fish to the relatively fine tolerances required in the conversion factor notice. Operating under the VADE model, the Ministry brought this matter to the attention of operators to allow the opportunity to implement corrective action. Notwithstanding that approach, the Ministry still expects operators to take all practical steps to ensure processing is compliant with the law.

This year the Ministry will implement a programme to monitor compliance with the DRE state definition and to assess the conversion factors for processed fish. Based on that information, the Ministry will then consider what further management or compliance action may necessary (if any). This may include re-declaration of product, amending the DRE state definition, amending the DRE conversion factor or adding new conversion factors for states processed between DRE and FIL.

In advance of this new information being available, this season the Ministry expects operators to take all reasonable steps to ensure processed fish meets the legal definition specified in the conversion factor notice. If it is your intention to process fish to DRE it should be declared at the conversion factor of 1.7.

I trust you will extend Ministry Observers all reasonable assistance as they collect the necessary information that will assist us collectively to work towards a durable solution.

Regards,

Jeremy Helson
Manager Deepwater Fisheries

Page 1 of 1

Appendix Two – Letter to SBW Operators 9 August 2013

Ministry for Primary Industries
Manatū Ahu Matua

9th August 2013

Dear SBW Operator

Re: Compliance Risk Profiling of the SBW Fishery 2013

MPI is working with industry to profile a number of fisheries as part of the National Fisheries Plan for Deepwater and Middle-depth Fisheries. Last year MPI profiled the southern blue whiting (SBW) fishery. The compliance risks and issues identified in the 2012 SBW profile were presented to an industry group meeting in Christchurch on 29th June 2013. At this meeting three main areas of concern were discussed: conversion factors and non-compliant dressed cuts to SBW; the accurate reporting of whole and badly cut SBW to meal; and the accuracy of SBW block weights. MPI is investing in further information collection on these three issues this year.

This letter is to inform your company and vessel captains that MPI intends to place Observers on as many vessels as possible operating in the 2013 SBW fishery to support information collection.

In addition to conversion factor testing, (notified on the 2nd August), MPI Observers will also be carrying out block weight testing pre and post application of glaze (where applicable) along with a comprehensive assessment of whole and processed SBW to meal.

MPI Observers need assistance/advice from the captain, or the factory manager, to explain vessel systems in place for capturing all SBW to meal. All sources of whole and processed fish to meal will be quantified by MPI observers.

I request that you please advise your captain(s) of our intentions and the expectation that all reasonable assistance is provided to MPI Observers in order for them to carry out their duties. There will be an opportunity to raise and address any issues as part of the pre-trip briefing with MPI observers.

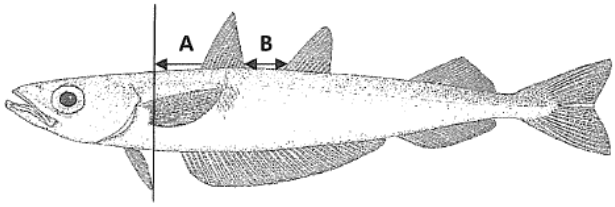
Thank you in advance for your cooperation. If you have any further questions please do not hesitate to contact Geoff Backhouse, Team Leader Maritime, on (04) 570 5125.

Yours faithfully

James Stevenson-Wallace
Director Fisheries Management

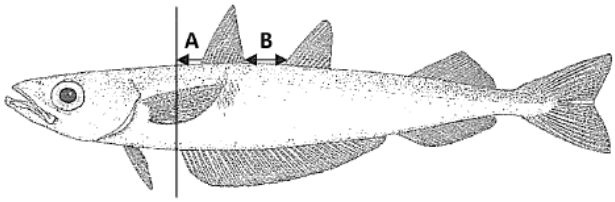
Appendix Three – SBW DRE cut categories for 2013 season

SBW DRE cut categories



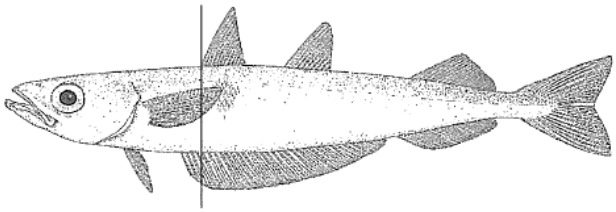
A is greater than or equal to **B**, cut is **C1**

C1. The flesh remaining forward of the first dorsal fin (distance A) is similar to or greater than the distance between the posterior edge of the first dorsal fin (distance B). Fish cut forward of the pectoral fin are included in this category.

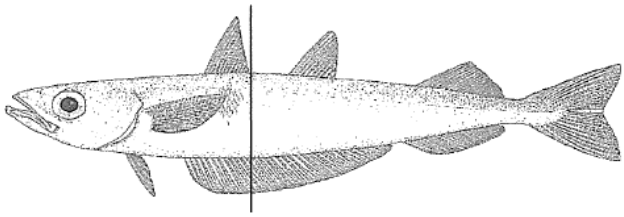


A is less than **B**, cut is **C2**

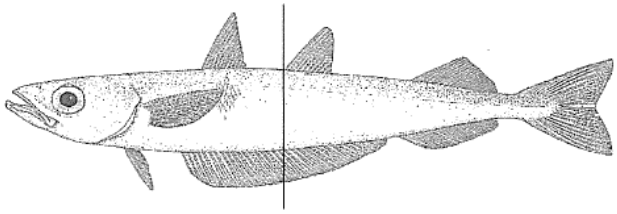
C2. The flesh remaining forward of the anterior edge of the first dorsal fin is less than distance B. The fin is fully intact.



C3. The cut is made at any point between the anterior edge and the posterior edge of the first dorsal fin.



C4. The cut is made at any point between the posterior edge of the first dorsal fin and the anterior edge of the second dorsal fin.



C5. The cut is made at any point beyond the anterior edge of the second dorsal fin.

Appendix Four – Letter to SBW Operators 1 August 2014

Ministry for Primary Industries
Manatū Ahu Matua

1 August 2014

Dear SBW Operator

Conversion factor changes relating to southern blue whiting

The purpose of this letter is to inform you that a new definition of dressed will apply to southern blue whiting from 1 August 2014. The definition, which was published in the New Zealand Gazette on 31 July 2014, is as follows:

Dressed means in relation to southern blue whiting, the body of a fish from which the head and gut have been removed with:

(i) the anterior cut being a straight line passing forward of the anterior insertion of the first dorsal fin; and

(ii) if the tail has been removed, no part of the tail cut shall be forward of the posterior base of the third dorsal fin:

Although not part of the definition, the diagram below illustrates its intent. For a processed southern blue whiting to meet the new definition of dressed, the head cut can be made anywhere forward of the first dorsal fin.

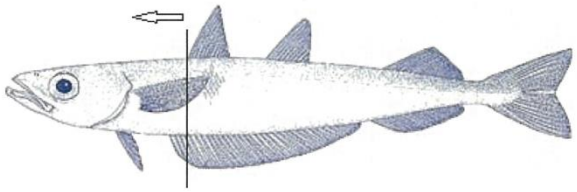


Figure 1. Diagram illustrating head cut requirement for southern blue whiting processed to a dressed state under new definition of dressed

While the new definition provides more flexibility to account for the nature of the fishery, the Ministry for Primary Industries (MPI) would encourage operators to cut as close as possible to the pectoral fin to ensure that maximum yield, and therefore revenue, is obtained from this resource. If, in the course of processing, any part of the first dorsal fin is removed, that fish no longer meets the definition of dressed. If packed, such fish must be packed separately, declared as FIL and have a conversion factor of 2.5 applied. Cartons must also be marked in some way to make them identifiable to fishery officers. If sent to meal, it must be converted to an appropriate greenweight prior to being mealed.

As well as a new definition of dressed, the conversion factor for southern blue whiting processed to a dressed state (SBW DRE) is also being amended. From 1 August 2014, the conversion factor for SBW DRE will be reduced from 1.70 to 1.65.

Growing and Protecting New Zealand

Regulation & Assurance
Fisheries Management
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www.mpi.govt.nz

The amendments outlined above have resulted from profiling work undertaken on the southern blue whiting fishery during the 2012 and 2013 seasons. MPI appreciates the general co-operation received from operators during both seasons. We consider this is an excellent example of the VADE model in action and illustrates how a collaborative management approach can result in positive outcomes for both MPI and the seafood industry.

Yours sincerely

Vicky Reeve
Acting Manager Deepwater Fisheries

Appendix Five – Letter informing industry about the reporting of fish meal

Ministry of
Fisheries
Te Tautiaki i nga tini a Tangaroa

New Zealand Government

ASB House
101-103 The Terrace
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Wellington, New Zealand
Tel +64 4 470 2600
Fax +64 4 819 4601

fish.govt.nz

0800 4 POACHER

10 July 2008

File Ref: 22/9/0

Dear Kerry

REPORTING OF FISH MEAL – TRAWLERS

The purpose of this letter is to inform you of revised reporting procedures for trawlers processing and landing fish meal (MEA) and fish meal by-product (MEB).

Fish meal is defined in the Fisheries (Conversion Factors) Notice 2005 (the Notice) as whole fish that has been rendered or cooked into a dried form. The conversion factor for processed weight to greenweight for fish meal is 5.60. The additional landed state of fish meal by-product is defined in the Fisheries (Reporting) Regulations 2001 as the state in which offcuts and offal from whole fish have been rendered or cooked into a dried form.

For most fish product, the greenweight is derived by multiplying the number of cartons by the carton weight and then by the relevant CF as prescribed in the Notice. However –

- Meal is not packed into bags by individual species – it is a combination of many species of whole fish, heads, frames and offal;
- For meal, the greenweight of each species is obtained by a combination of methods, including time sampling of species along conveyor belts leading to the meal plant, or weighing the fish in bins where it is practicable to do so. The greenweight for each species is then entered by the vessel master on to the catch effort return;
- At present, the master of the vessel then divides the greenweight by the CF for fish meal, then again by the bag weight to arrive at a number of bags for that species, in effect working backward from the method used for frozen fish. This figure is usually expressed in decimal points of the number of bags;

meal, then again by the bag weight to arrive at a number of bags for that species, in effect working backward from the method used for frozen fish. This figure is usually expressed in decimal points of the number of bags;

- The master of the vessel then enters that number of bags and part bags on their catch effort returns for each species or fishstock. This can run to many lines, or even pages, on the catch effort return, depending on the number of stocks being reported.

MFish believes the practice does not comply with Regulation 36(3)(a) of the Fisheries (Reporting) Regulations 2001, which requires that all weights of fish must be recorded in greenweight kilograms using, if appropriate to the landed state of the fish, the CF stated in the *Gazette* Notice. Although a CF is applied in this practice, it is not applied to the 'product' to derive a greenweight.

Fishing Industry representatives and MFish have collaborated on developing an alternative system for reporting of fish meal that we believe meets the objective of providing information on reasonable estimates of bags of fish meal, while doing away with a system that is inherently time-wasting and bureaucratic and has no real management purpose.

Acting under delegated authority, pursuant to Regulation 41(1) of the Fisheries (Reporting) Regulations 2001, as from the date of this letter I direct that all trawlers registered to your company and landing fish in the 'fish meal' state provide relevant returns by the following method:

Trawl Catch Effort and Processing Return (Daily Processing Summary)

- In the 'Species' column, enter the species code. If you have produced meal from offal, you may use the species code "OFF" for the species on this row;
- In the 'Processed state' column, enter the processed state code, e.g., MEA (for fish meal) or MEB (for fish meal by-product);
- In the 'Number of processed units' column enter the total number of bags of fishmeal produced on one of the rows and put a dash to indicate that the value is NULL for all other rows of MEA and MEB;
- In the 'Unit weight (kg)' column enter the unit weight and indicate with brackets or an arrow which species that unit weight relates to;
- In the 'Processed catch weight (kg)' column put a dash to indicate that no processed weight has been calculated;
- In the 'Conversion factor' column put a dash to indicate that no conversion factor is being used;
- In the 'Calculated weight before processing (kg)' column, enter the calculated greenweight in kilograms for each species processed to MEA. Enter a dash in this column for offal processed to MEB.
- In the 'Product from offal only/Meal (kg)" box put a dash to indicate that this box is not being used

Catch Landing Return

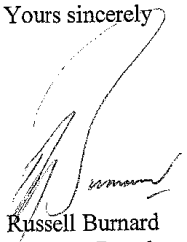
- Enter each fishstock in the 'Fishstock (species/area)' column;
- Enter the state code (e.g. 'MEA' or 'MEB') in the 'Landed state' column and indicate by an arrow or brackets the fishstocks to which it relates;
- In the 'Containers/Number' column enter the total number of bags of fishmeal produced during the trip on one of the rows and put a dash to indicate that the value is NULL for all other rows of MEA and MEB;
- In the 'Containers/Type' column enter 'BAG' and indicate by an arrow or brackets the fishstocks to which it relates;
- In the 'Containers/Content weight' column enter the content weight and indicate by an arrow or brackets the fishstocks to which it relates;
- In the 'Destination/Type' column enter the type of destination (eg, R = Retained on board), and indicate by an arrow or brackets the fishstocks to which it relates;
- In the 'Destination/LFR no or vessel reg no' column enter the relevant licensed fish receiver number or vessel registration number, and indicate by an arrow or brackets the fishstocks to which it relates;
- In the 'Greenweight (kilograms)' column, enter the greenweight in kilograms for each fishstock processed to MEA. Enter a dash in this column for offal processed to MEB.
- In the 'Purchase tax invoice number from LFR' column write the number of the purchase tax invoice (or equivalent document) used by the LFR in relation to this fish.

I have attached, for illustrative purposes only, examples of how a TCEPR and a CLR are to be completed using the above procedures.

Please note that MFish is instituting these procedures as an interim measure for the 2007/08 and 2008/09 fishing years, and subject to annual review thereafter, while MFish and Industry address more robust alternatives to the current system of conversion factors. MFish has initiated discussion with Industry representatives on greenweight weighing as an alternative to the CF system. The time sampling system used by vessel operators to calculate meal is in effect a variation on greenweight weighing, and as such could form part of a wider solution.

If you have any questions about these issues, or need assistance filling out your returns, you should contact FishServe (04) 460 9555 or seek legal advice.

Yours sincerely



Russell Burnard
Manager Regulatory and Information
Ministry of Fisheries

In exercise of delegated authority

Appendix Six – Fishmeal estimation techniques used by industry

FISHMEAL – Estimation Methods

Introduction One or more of the following methods must be used to estimate the quantity of whole fish to meal. A combination of methods could be used in a single trawl or days production e.g. M4 for main species, M1 for dropped fillets or fish falling through machines, M3 for non quota species discards etc.

M1 **Accurate Weight**

Overview Crew obtain an accurate greenweight figure by weighing all fish.

Method Separate fish for mealing, discard or galley during sorting and processing of a tow.

Use calibrated electronic scales (or hanging Salter scales if electronic scales not available) to weigh in full the quantity of fish.

Application Recommend for:
- small quantities of fish (quota and non-quota)

M2 **Full Bin x Known Bin Weight**

Overview Crew calculate greenweight by counting the number of fish bins filled with whole fish for meal and multiplying this by the known average weight of a full bin.

Method Set aside fish bins for meal fish, ensuring there are enough bins to allow different species to be separated.

Throughout production place all meal grade fish into the bins, keeping each species separate. Record each full bin sent to meal on a whiteboard located at the sorting position or other recording system.

On completion of the shift (or when processing of a tow is finished) multiply the number of bins marked on the whiteboard by the known average full bin weight to obtain the greenweight of all species sent to meal during that shift or tow.

Continued on next page

Method *(Continued)*

NB: A sample of full bins must first be weighed to obtain a known average full bin weight for all commonly mealed species. Regular documented check must be made to ensure the know average full bin weight remains accurate.

Record the calculated greenweights in factory processing records.

Application Recommend as the most practical method for all situations where fish to meal is regular but not excessive and resources allow.

M3 **Fish count x Average Fish Weight**

Overview Crew calculate greenweight by counting individual fish sent to meal or discarded and multiplying this count by a known average fish weight.

Method A During processing separate and put aside fish for mealing. Count these fish at an appropriate time, such as at the end of a tow or a shift, and multiply by the previously calculated average fish weight for that species. This greenweight is then recorded in the factory's processing records.

This method is relatively simple and accurate if a small number of fish (less than 50) have been kept aside for mealing at the end of the shift.

Method B With a larger quantity of fish it may not be possible to set all meal fish aside for counting later, therefore individual fish are counted as they are sent to meal throughout processing. This count is then multiplied by an average fish weight at the end of a shift and the greenweight recorded.

This method is NOT recommended unless crew use "clicker" counters in order to reliably count the fish.

NB: An average fish weight must first be obtained for each species likely to be quantified using this method. A sample of 100 fish should be weighed and the average calculated. If fish size is variable e.g. HAK/LIN then frequent documented checks must be made to ensure average fish weights are accurate.

Application Appropriate for small amounts of fish to meal especially if held over to the end of a tow or shift.

In general larger quantities of fish to meal should be estimated using full bin counts (M2); however this method may be preferable if it is not practical to bin fish in a confined space.

Continued on next page

M4 **Time Sampling**

Overview Crew calculate species greenweights by taking a sample of meal fish over a specified period of time, weighing the sample and then use the weight and time information to calculate estimated greenweights for a tow.

Method Record the time processing for a tow starts.

Recover all meal grade fish. Place the most common species in fish bins with a known capacity. Keep different species separate if possible. Record how long it takes to fill a bin. Once a bin of a particular species is filled, fish of that species can be sent directly to meal.

Record the time processing is completed, and calculate the total processing time for that tow.

Divide the time taken to process the tow by the time taken to fill the fish bin. This gives the number of bins that would have been filled with meal fish while the tow was processed.

Place all other species (i.e. where there is only 1 or 2 fish) in another bin. Sort individually by species when processing is completed and weigh as per M1.

Multiply this figure by the known full bin weight to obtain the estimated greenweight of fish sent to meal from that tow.

E.g. Tow #25 took 6 hours to process.

During processing all small and damaged hoki were removed and place in a bin. It took 2 hours to fill the bin and we know that bin holds 300 kg of fish.

Therefore total hoki to meal = 6 hrs / 2 hours = 3
3 x 300 kg = 900 kg

Record 900 kg greenweight of hoki to meal for that tow in factory processing records.

Continued on next page

M4 **Time Sampling** ***(Continued)***

Method B

Record the time processing of a tow starts.

While the tow is being processed, take a sample of meal grade fish over a set time period e.g. 10 minutes. During this sampling period remove all whole fish to be sent to meal, separate the fish into different species and place them in a holding bin.

At the end of the sampling period separate the fish by species and obtain an accurate greenweight figure for each species.

Record the sample weight for each species. Several samples may need to be taken during the processing of a tow to make sure the samples are representative of production. The number of samples required will also increase with the size of the tow.

Record the time processing of the tow is completed, and calculate the total processing time for that tow.

Add together the sample weights for each species if more than on sample was taken during processing of the tow.

Divide the time taken to process the tow by the total time spent sampling.

Multiply this figure by the total sample weight of each species to obtain the estimated greenweight of fish sent to meal from that tow.

E.g. Tow #26 took 2 hours (120 minutes) to process

There were 2 sample periods of 10 minutes each, 20 minutes sample time in total.

Total sample weights of fish to meal were:
HOK 25 kg
RCO 15 kg
FRO 50 kg

Therefore total fish to meal for that tow is:
120 minutes/20 minutes = 6
HOK 25 kg x 6 = 150 kg
RCO 15 kg x 6 = 90 kg
FRO 50 kg x 6 = 300 kg

Continued on next page

M4 **Time Sampling** *(Continued)*

Method B *(continued)*

Record 150 kg HOK, 90 kg RCO and 300 kg FRO in factory records as the estimated greenweight of fish to meal from that tow.

It is important that time samples are taken from a representative part of the catch. For example, all the damaged or deck fish might have been placed into one bunker after deck crew cleaned the net. It would be incorrect to sample entirely from this bunker or not to sample from this bunker at all.

Processing time must be also be accurately recorded. Any stops in processing, e.g. if a machine breaks down or crew take meal breaks, must be subtracted from the total processing time for that tow. If this is not done fish to meal will be overestimated.

Application

This method is only accurate if there is strict control of information gathering and timekeeping.

Method not recommended for general use; a more accurate method of quantifying such as M2 should be used whenever possible. This method should only be used whenever possible. This method should only be used if the quantity of fish to meal is too great to bin, or if factory design makes the use of fish bins not practical.

M5 **Percentage Composition**

Overview

Greenweights of species to meal are estimated using a percentage breakdown of a tow or a full bunker.

Method

Estimate the total greenweight of fish in a bunker or a codend.

Process the fish from the codend or bunker. Discard or send to meal all non-quota fish without quantifying or recording while processing.

At different times during processing take samples of fish from the tow being processed by filling fish bins. The number of fish bins that must be filled to give a representative sample of the tow will increase with the size of the tow.

Empty out each fish bin and sort the fish by species. Estimate what percentage of the total quantity of fish in the bin is made up of each different species e.g. 75% hoki, 15% rattails, 10% spiny dogfish. Note these percentages and return the sampled fish for processing or mealing.

Continued on next page

M5 **Percentage Composition** *(Continued)*

Method B *(continued)*

Compare the percentages for each bin and work out average species percentages for the tow.

The greenweight of the processed fish is calculated as usual by using production figures multiplied by official conversion factors.

The greenweight of the non-quota species mealed or discarded during processing is calculated by applying the percentages obtained from the fish bin samples to the estimated total quantity in the bunker or codend.

E.g. A codend is estimated as holding 20 mt of fish.

The percentage composition of the species in the sample bins is 75% hoki, 15% rattails and 10% spiny dogfish.

HOK greenweight is calculated using production figures and conversion factors.

RAT and SPD greenweight is calculated by applying the sample percentages to the whole tow:

15% RAT = 0.15 x 20,000 kg = 3,000 kg
10% SPD = 0.10 x 20,000 kg = 2,000 kg

While the codend was being processed all RAT was mealed and all SPD was discarded. Record estimated greenweight of 3 mt RAT to meal and 2 mt SPD discarded for that tow.

Application

This method should be used for NON-QUOTA species ONLY. This method of assessment is not considered accurate enough for quantifying quota species to meal.

The method should only be used when catch size means it is not practical to sue a more accurate method such as M2 for quantifying non-quota species to meal.

If a vessel is using this method regularly, the Captain or Factory Manager making the estimate of the total greenweight of the bunker or codend should regularly check his estimates against the greenweights derived from production figures of fish processed from that bunker or codend. This comparison will indicate if he is consistently under or over estimating the total greenweight.

Continued on next page

FISHMEAL – Estimation Methods, *Continued*

M6	**Eyeball Estimate**
Overview	Greenweight of fish to meal is visually assessed and an estimate made.
Method	The Captain, Factory Manager or responsible crew member looks over the fish to be sent to meal and makes an assessment of quantity. The estimate must be as accurate as possible in the circumstances, based on experience and knowledge. If possible, more than one person should make an estimate to allow comparison of quantities and then final greenweight agreed. The agreed greenweight is then recorded in the factory records.
Application	NOT to be used for quota species. Not recommended for general use. Appropriate for large single fish such as sharks. Appropriate for non-quota species to meal in extreme circumstances when no other methods are practical or possible.

Appendix Seven – Vessel procedures & risks for the quantification and recording of Meal

	Observer summary			Information given to Fishery Officers	Risk Assessment
Vessel	**Trip**	**Offal Discards**	**Meal Procedures and Issues Identified by Observers**		
Vessel 4	3842 (two trips)	Sometimes discharged heads (to conserve space in meal bunkers), only while steaming. Some soft offal drip loss onto floor from auger.	MEAL SOURCES • The primary source of SBW to MEA is the main sorting station hopper. Joint testing (observers and fishmaster) established a full SBW capacity of 110kg. The sorter/poundsman, was responsible for recording each full hopper or portion thereof on whiteboard. Tallies of hoppers emptied were noted in factory log at the end of each tow or shift. The sorter removed as much damaged and juvenile fish he is capable of doing under a very busy workload. It was not possible for the sorter to remove all damaged and small fish, resulting in: ○ IRA drop-outs - damaged and small fish that should have been removed at sorting station, going directly into meal stream via offal outlet. ○ IRA operators sending whole SBW (small fish <30cm) to meal by placing fish along the head section of feeding tray thereby going straight to meal stream via offal outlet. When there were two sorters working at the main sorting station, few damaged/small fish were missed. Processes for quantifying fish to meal were erratic. • For the second leg of this trip, following MPI advice, a more detailed account of meal fish was recorded. DRE SBW were also removed from the grading/gutting line, due to small SBW (less than processing specification) and/or non-compliant cuts. These processed fish were stowed in fish bins (eg blue bins to store overcut fish in, along with white bins for damaged fish were placed on the port side (IRA) line post-processing) and the weights recorded by the shift supervisor at completion of tow or shift. The amount recorded to meal was back calculated, using (1.7) conversion factor for underweight fish, and 2.5 factor for over- cut SBW. Observers were given yellow post-its with quantity of DRE/FIL SBW to meal per shift. However, it was not clear to observers how these figures were calculated by the vessel. • In tows where there was a high incidence of small SBW, a 5 minute time sample was recorded by the fish master and extrapolated to cover the particular tow. OTHER • Stickers are not quantified separately but are binned on deck and put into pounds with other fish to be sorted along with main catch. • Observers noted that the whiteboard for meal recording was untouched at times. Appear to have ad-hoc recording system. • The meal auger is fully enclosed, which makes it virtually impossible to monitor any damaged or whole fish sent to meal. • Factory Manager advised observer that allowance of 50kg/shift made for SBW to MEA (where juveniles occur). Observer time samples, however, indicate much more was put to meal (range 84-427kg/shift). • At end of first trip, when asked by observer, Captain indicated they simply record a quantity that they think will keep MPI happy – ie not accurately quantified. • Circular Saw has an infeed tray similar to the cup conveyor on the IRA machine.	• Whole fish to meal is calculated using hopper counts (of 100 kg each). This hopper could hold up to 140 kg as advised by MPI observers. • Anything that meets DRE specification goes to freezing area. Anything that doesn't meet spec's is placed in a fish bin and then taken to meal. A conversion factor of 1.7 is applied to each bin of fish. Vessel only produces about 2 bins of poor cut fish per hour.	• Lack of robust systems in place to quantify and record whole and processed fish to meal. ○ Very unlikely that greenweight is consistently calculated using the appropriate CF for processed fish. It is not clear how the vessel calculated and recorded quantities. ○ Use of inaccurate nominal weight for hopper (100kg), leading to under-reporting greenweight by 9% to 29%. ○ Inconsistent recording of hopper releases. ○ Time sampling is not a reliable method of quantification for a main meal source. One 5 min time sample not representative of fish to meal from entire tow. ○ Nominal allowance (50kg per shift) made to account for fish to meal. • No quantification of IRA dropouts of whole and/or processed SBW into meal stream. • No quantification of SBW deliberately diverted to meal stream at IRA. • Enclosed auger results in inability to time sample fish to meal from processing lines that has not been quantified. • Deliberate discharge of soft offal overboard. This may provide opportunity for vessel to underreport MEA by reporting as MEB. • No written records in factory for keeping track of grade-outs of whole and processed SBW to meal. Reliance on information being relayed person to person. • At times used nominal net bin weights (45 kgs) for graded out whole and processed fish in factory – overfilling of bins would lead to under-reporting of fish to meal.
	3879	All offal to auger. Large proportion of soft offal is filtered out of system via slots in auger housing. It then falls to factory deck and is washed overboard. This is a deliberate strategy to eliminate wet offal from meal stream prior to meal plant. Grills around	• Approximately 5 days SBW fishing on this trip, with small grade SBW being packed GRE. Some improvements in vessel quantification of fish to meal are listed below: ○ Bins located on starboard processing line (packing GRE on this trip) to collect small & damaged whole fish that have been missed at the sorting conveyor. Average bin weighs 45kg full. Bin counts x average weight used to quantify fish to meal. ○ Grade outs from IRA - Bad cuts from grading area weighed in full x 1.7 CF for damaged DRE or x 2.5 CF for bad cuts • SBW grade-outs – employee at station doesn't write down information, passes it to Fishmaster whenever a bin is full. • Small and damaged fish to meal. Hopper holds 115kg when full based on testing done this trip. Meal hopper not always full at the end of processing each tow so an eyeball estimate used to quantify meal based on fullness of hopper.		

		overboard outfalls ostensibly prevent offal washing overboard but frequently noted grills not effectively in place, allowing soft offal to constantly wash overboard.	• Dedicated offal buffer tank to retain offal from auger for batch dumping in event of meal plant breakdown.		
Vessel 8	3849	Soft offal extracted by IRA continually discharged overboard.	MEAL SOURCES • Main sorting station hopper capacity is 170kg. Poundsman records hopper releases on tally board. Tally is transferred onto piece of card at the end of tow or shift depending on crew member preference and brought to factory office at the end of shift. Entered into factory log for subsequent additions to other factory figures and eventual entry into a database daily at 20:00. Meal hopper is rarely full when emptied, sorter often makes estimate of weight when releasing hopper. • Damaged whole fish rejected by IRA operators are binned or run through IRA central offal chute. Bins are passed over the sorting conveyor and, as these are GRE fish, thrown into the "170" meal hopper. • The quantity of fish lost by IRA machine (referred to as drop-outs) is so large that all other meal sources (post processing) are negligible by comparison. Vessel conducts a 10 minute time sample once every 4 hours (with no regard given to factors such as: number of crew operating the IRA machine; quality of fish; weather etc). Fish lost are either counted and multiplied by an average fish weight (source unknown) or collected and weighed. Run-time is calculated at 3:50h and 3:30h for the first and second half of the shift respectively (accuracy is near enough). IRA time samples are recorded by crew members and fishmasters on the same card as damaged processed fish to meal, then recorded in factory logbook and collated with other figures in the factory meal log. Weights are not multiplied by the correct conversion factor given some fish are processed beyond the defined DRE state. • Processed fish to meal may be rejected from a number of sources throughout the factory, as listed below: o Grade-outs post IRA machine were binned, then weighed at QC station. o Grade-outs post wash tumblers (QC stations) are binned and weighed. o Rejects graded out by blast freezer cartridge packing operators. o Broken frozen blocks, individual or sporadic broken away product typically set aside on conveyor beside packing table. One such fish seen. This fish is sent to meal via a second hopper (140kg) located directly over the meal chute, and is recorded by the Fishmaster on tally card. Fishmaster multiplies weights of processed fish to meal by the official C.F. (only used 1.7 CF as far as observer could tell). This is entered into factory logbook after adding to figures forwarded from GRE fish to meal. Totals for the shift are added to IRA time sample totals and recorded in the "other fish" logbook. • Meal auger has some sections that are uncovered. OTHER • Stickers are not quantified separately; they are of good enough grade to be swept directly from the trawl deck into the fish pounds with other fish to be sorted along with main catch. • During processing of tow 29, the "newer" of the two conveyor operators tipped a bin of combined processed and unprocessed (GRE and DRE) damaged fish into the "140" meal hopper. This was later quantified on the standard meal, eat, and discard tally board behind the sorting conveyor. No attempt was made to estimate a proportion of these fish to be multiplied by a conversion factor, gazetted or otherwise.	Whole fish to meal. • Small and damaged fish are placed in a hopper at sorting conveyor. Starboard hopper 170 kgs, port hopper 140 kgs. Each hopper is recorded on a blackboard as it is emptied into the auger going to the meal plant. Blackboard figures are entered into fish meal folder and recorded as kgs. Entered in TCEPR for each day. • Some GRE fish ends up on floor prior to entering heading machines, placed in fish tubs. Weighed and recorded. • Some DRE fish end up on the floor or are removed as damaged or small. Weighed in fish bins. Separated x DRE + FIL state. Recorded. [	• Unreliable method of quantification of fish to meal from main sorting hopper (170kg), due to: o Partial releases of hopper which may lead to under-reporting of whole fish to meal; o Inconsistent procedures in transcribing fish to meal (i.e. at end of tow or shift) • Highly likely that whole SBW, deliberately diverted to meal stream via IRA central offal chute, is not being quantified. • Inconsistent time sampling methods used over consecutive trips for IRA drop-outs (using average fish weight vs actual sample weight; timing of sample collection). Correct application of CFs for fish cut beyond state not used (only apply 1.7CF) will lead to under-reporting of greenweight. • No provision for processed fish with damage and/or non-compliant cuts to be graded out and binned up at gutting stations for quantification to meal. This may lead to deliberate diversion of this fish to meal without quantification. • Absence of systems to assess head cut compliance (DRE) of graded-out processed fish destined for meal (via 140kg hopper). CF of 1.7 applied to this product, leads to under-reporting for product processed beyond state definition whereby 2.5 CF should be used. (Contrary to advice given to FOs in-port where it was stated that damaged fish was separated into DRE/FIL) • It is not clear who has responsibility for emptying bins into 140kg hopper, and ensuring all releases are quantified and recorded. • Lack of transparency relating to how SBW to meal is quantified – total amount includes GRE, DRE & FIL but no source documentation recording amounts by source (and CF applied) is retained (all recorded on plastic cards in factory and just total recorded in log). • Absence of meal auger covers enables intentional discarding of fish to meal, with no quantification. • Mixing of whole and processed fish in bins/hopper leading to under-reporting if no CF applied.
	3869	Loose offal prevented from escaping through scuppers by using grates and rings around out-flowing pipes. Some offal did	• Main sorting station: Fish placed into either 170kg hopper or 140kg hopper. 170kg hopper in front of sorter - small/damaged fish from sorting line. 140kg hopper used to quantify small damaged fish removed and cased by IRA machine operators • IRA drop-outs – Time sampling used to determine fish lost from IRA machine. Fish collected over 10 minutes twice per shift, then weighed and multiplied by CF giving greenweight per 10 minutes.		

		flow but it was minimised.	Average over 10 minutes calculated. Multiplied by total time processing in that shift minus meal breaks and stoppages. • Fish damaged or processed removed in processing area, C/F applied. Observer made no mention of vessel using 2.5CF.		• Deliberate discharge of soft offal overboard. This may provide opportunity for vessel to underreport MEA by reporting as MEB.
Vessel 5	3850	Vast majority of soft offal exits auger, is washed to scuppers and draining ports and discharged overboard. Gaps in auger were patched so no continuous offal drip (for HSL) but meal plant couldn't cope with volume and at times offal & HDS discharged continuously.	MEAL SOURCES • Stickers are removed after main catch is emptied into pounds. They are binned into 45 kgs bins then- tipped down a chute directly to the meal stream. At times bins were tipped into starboard deck hopper (sometimes accumulated over several tows until meal plant had processing space) then sent directly to meal (via chute). Count of bins on deck conveyed by deck crew to trawlmaster, then to fishmaster, and then to factory manager. Observer witnessed fish being thrown straight from net to hopper and not quantified. Observer concerned about quantity of fish being recorded. • There are 2 sorting station hoppers (45 kg each) located on the main conveyor line (prior to entering the IRA or circular saw lines). Fish that are damaged or too small (<28 cm) are put to meal. Poundsman for each shift is responsible for recording each hopper emptied on tally [recorded on water proof paper tow by tow]. Information is then recorded in poundsman notebook in fishmaster's office. Figures from poundsman notebook are then recorded by fishmaster into factory logbook. • Whole and processed fish to meal may be rejected from a number of sources throughout the factory, as listed below: ○ IRA sorting – bins are located on either side of machine including one at start of machine conveyor, to collect GRE fish unsuitable for processing. ○ IRA line grading – bins are located along starboard conveyor to collect damaged or badly cut fish from the IRA. ○ Circular Saw grading - bins are located along port conveyor to collect damaged or badly cut fish from the Circular Saw. ○ Freezer operators – each operator has a bin on floor behind them used to collect any damaged fish reaching this point. Fish from this source are emptied into bins located along either port or starboard grading conveyors. There is no separate recording system in place for fish from these sources. Where whole fish are emptied into main meal hopper, the poundsman is informed of number of bins emptied, which are recorded as a 45 kg mark on his tally sheet. For processed fish removed and binned for meal by graders, the fishmaster is informed of bin count. • IRA machine - drop-outs enter meal stream as a result of jam ups or fish not placed properly in conveyor cups. The machine was considered very good with minimal amounts observed to meal. However, the vessel had no recording system in place for any fish (dropouts) to meal from this machine. OTHER • Meal plant unable to keep up, leading to discharge of offal (both soft & hard at times). • No set practice of closing chutes (discard) or putting grates down (around scuppers) when shooting or hauling. Improved later in trip. • Hole in auger casing by poundsman area to allow water out, offal also exits and falls on floor. As poundsman seadoor left open leads to continuous discharge through shooting/hauling/towing. Seadoor jammed shut after observer conveyed problem to Fishmaster. Also change made to IRA offal output to allow water to exit while soft offal sent to meal. • Quantification of meal a grey area – poundsman recording bins to meal, observers record 5t more than vessel figures (debrief notes).		• Unreliable method of quantification of stickers to meal – reliant on information being relayed person to person. Use nominal net bin weights (45kg) for stickers to meal – overfilling of bins would lead to under-reporting of fish to meal. • Stickers thrown directly into deck hopper without quantification of bins – resulting in under-reporting of fish to meal. • Main sorting station hopper only holds 45 kgs (on small side). May encourage poundsman to keep hopper gate open at times when large quantities put to meal. Unrecorded fish to meal may lead to inflated quantity of MEB. • No attempt to quantify and record whole and/or processed fish that drop into meal stream from IRA machine. • Bins located throughout factory are used to collect fish that are badly damaged, incorrectly cut and/or too small to process. Unreliable recording system in place for this fish due to verbal relay of information. May lead to under-reporting of fish to meal. • Processed fish with damage and/or non-compliant cuts are not graded out at gutting stations (Circular Saw processing line) for quantification to meal. This may lead to deliberate diversion of this fish to meal without quantification. • Use nominal net bin weights (45kg) for quantification of SBW to meal – overfilling bins would lead to under-reporting of fish to meal. • Unclear what system is used by vessel to assess head cut compliance (DRE) of graded-out processed fish destined for meal. CF of 1.7 applied to this product, leads to under-reporting for product processed beyond state definition whereby 2.5 CF should be applied. • Deliberate discharge of soft offal overboard. This may provide opportunity for vessel to underreport MEA and report as MEB instead. • Accidental losses of whole and processed fish to factory floor sent to meal potentially without quantification.
	3873	Offal to meal, if meal plant at capacity offal batched and discharged at 10min intervals throughout processing . On some occasions offal discharged	• Stickers – fish is binned up on deck, counted and recorded with a average bin weight of 45 kgs. Fish is then put down chute directly to meal plant. • Main sorting station – damaged fish and fish to small to process. Hopper count x average weight (45 kgs). Hoppers emptied onto auger to meal plant. • IRA sorting – damaged fish and fish too small to process, removed into bins, bins counted x average weight. Tipped onto meal auger. • Circular saw – no fish removed here.		

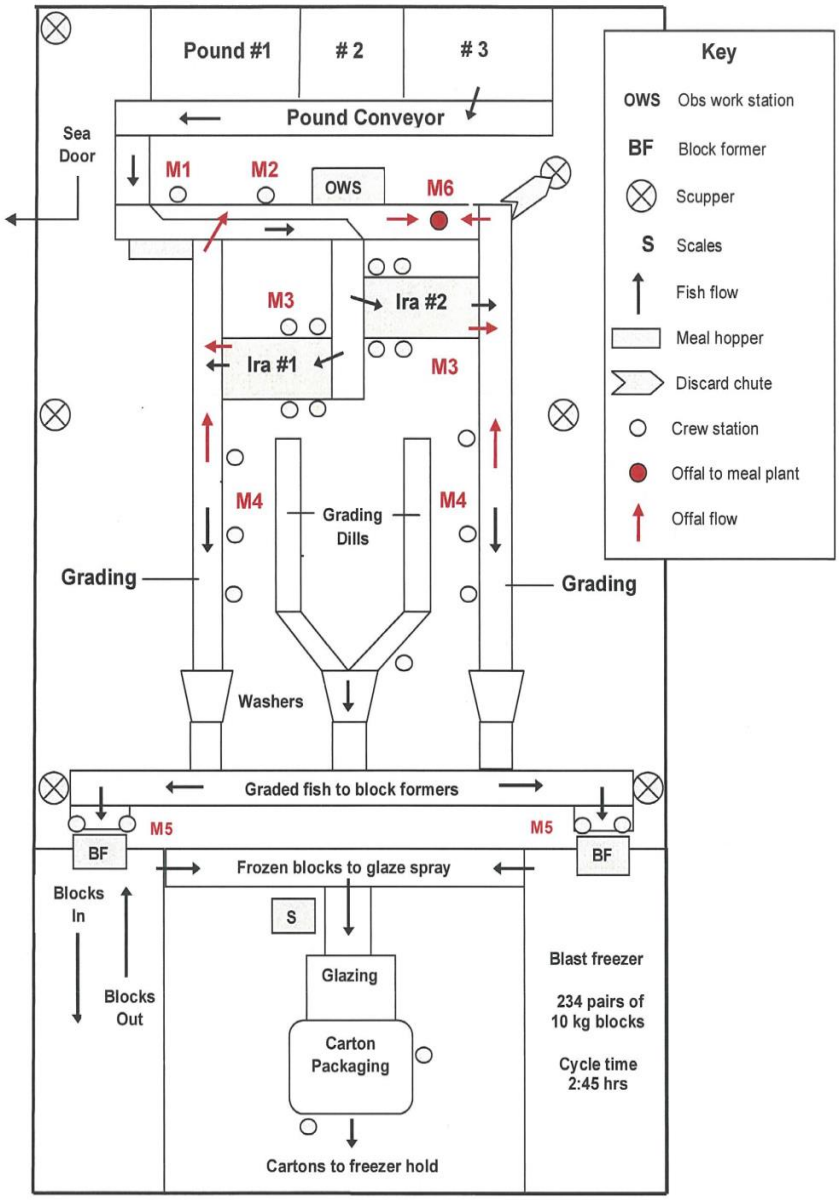
		continuously but only after bridge informed & net at suitable depth.	• Grading checks Starboard side (post IRA) - Gutting and Grading tables - Damaged & mis-cut fish removed into bins, bin count x average weight x official CF. Tipped into meal auger. • Grading checks Port side (post CS) - Gutting and Grading tables - Damaged & mis-cut fish removed into bins, bin count x average weight x official CF. Tipped into meal auger. • Block Formers - Damaged & mis-cut fish removed by freezer operators, bin count x average weight x official CF * methods appear consistent throughout trip, appeared very accurate & reliable. • Grates around scupper cleaned regularly whole fish removed sent to meal. • Meal plant not coping daily until problem with a steam pipe in meal plant was discovered and fixed, thereafter meal plant coped better. • Grading station quantification uses official CF.		
Vessel 7	3851	Offal whether soft or otherwise travels along the meal auger (to meal)	MEAL SOURCES • Stickers are removed and sent to meal via a chute from the trawl deck to meal hopper (by sorting station). According to observer a tally of hopper releases was recorded, as stickers were not quantified on deck. • Poundsman recorded tally each time a hopper was released into the meal stream; • Reject fish are removed from processing line and placed in bins located in the factory. One bin of processed fish is calculated using 40 kgs nominal bin weight x official CF of 1.7 giving 68 kgs/bin. Non-compliant cuts to meal were not accounted for (e.g. CF of 2.5 was not applied). Bins of reject fish remained in factory until end of shift when factory supervisor took full bins to main sorting hopper. Plastic card tally recorded at end of shift (only tally full bins - e.g. 1 = 68 kgs). Generally only 1 bin (1/2 bin)/shift. Shift supervisor added meal figures from plastic cards into factory journal which is then entered by factory manager into INNOVA.	• Stickers binned, trawlmaster advises FM of number of bins to meal. Nominal bin weight equals 45 kgs. • Small and damaged fish destined for meal are removed by poundsman who maintains a tally of hopper releases. Main sorting hopper has nominal weight of 110 kgs. Hopper adjacent to IRA machine holds approximately 120kg. The total number of hoppers to meal are provided to FM. • DRE/FIL fish that fall on the floor is placed into separate fish bins (nominal weight = 40 kgs) by state. At end of trawl, number of bins are advised to FM who applies appropriate CF and records in fish to meal diary.	• Stickers from deck directed to meal hopper via deck chute. Meal hopper is also used by poundsman who controls sorting and distributes to the 2 processing lines. Risk if hopper gate is left open and stickers are sent direct to auger and hence meal stream without quantification. • Use nominal net bin weights (40kgs - note FO's advised by vessel that bin weights were 45 kgs. Which bin weight is correct?) for stickers to meal – overfilling of bins would lead to under-reporting of fish to meal. • Use nominal net hopper weights of 100kg and 120 kgs for wholefish to meal – overfilling of hoppers would lead to under-reporting of fish to meal. • Inconsistent recording of hopper releases as well as non recording of partial releases would lead to under-reporting of fish to meal. • Absence of detail regarding vessel procedures for time sampling of IRA drop-outs (e.g. are fish removed and weighed or is fish count x average weight applied). Potential for under-reporting if sampling regime used is unreliable. • Potential for unreliable method of quantification of whole and processed fish to meal. Use nominal net bin weights (40kg) for bins stationed around factory – overfilling of bins would lead to under-reporting of fish to meal. • Absence of systems to assess head cut compliance (DRE) of graded-out processed fish destined for meal. CF of 1.7 applied to this product, leads to under-reporting for product processed beyond state definition whereby 2.5 CF should be used.
	3875	All to meal.	• Stickers from net are binned on deck and directed to meal hopper via trawl deck chute. Bin count x estimated average bin weight (40 kgs). On occasion stickers were put into pounds for processing if possible. • Poundsman removes small and damaged SBW into main sorting station hopper with nominal weight of 110 kgs. This source accounts for approximately 90-95% of fish to meal. As full hoppers are emptied a tally is recorded on whiteboard by poundsman. Data was passed to shift supervisor for compilation tow by tow. • IRA dropouts [offal] – Shift supervisor/Fishmaster conducts two x 10 minute samples per shift to quantify fish dropping out of IRA. • Reject fish are graded out at various locations along the processing lines. This fish is quantified using a bin count. Grade outs include: o IRA grading along the central conveyor processing line. Sorting crew pick out undersize/undergrade fish from conveyor. These fish have been missed at the main sorting station and at the IRA machine. Once processed they are below the 80 g weight so sent to meal. o Starboard side sorting of L grade fish from IRA machine. o Portside grading from circular saw All bins around factory tipped into hoppers or other location on conveyor where access to auger is easy. Fishmaster would record count x average bin weight. Recorded on tally board (which is separate to poundsman tally). • Vessel keeps book in factory with weights of fish to meal from deck, hopper, IRA machine, port, centre and starboard processing lines.		
Vessel 6	3853	Offal discharged via discard chute when meal plant overloaded (approx once per day). Crew member watched for whole fish.	MEAL SOURCES • Stickers are sorted on deck into cases (50 kgs nominal weight) by crew. These cases are emptied down chute (via deck) to main sorting station hopper. Hopper gate at bottom is open so fish fall straight through onto auger, this is done 2 or 3 times during early part of processing a trawl. Total cases (tallied by trawlmaster or bosun) reported to sorting crew who records on whiteboard, later transferred to factory logbook. • Damaged and small whole fish are sorted by poundsman into meal hopper (140 kg) located at start of sorting conveyor on starboard side. This hopper is within close proximity to IRA machine.	• FO's were told during inport inspection "Fish to meal is recorded tow by tow. Figures are in gwt from all sources of fish to meal. Calculated by hoppers with known weights or fish bins which are weighed. Figures on factory whiteboards.	• Use nominal net bin weights (50kg) for quantification of stickers to meal – overfilling bins would lead to under-reporting of fish to meal. • Recording of stickers to meal is reliant on information being relayed person to person. May lead to inconsistent recording and therefore under-reporting of wholefish to meal.

			Hopper is emptied into meal auger when full. Tally recorded on whiteboard and later transferred to factory logbook. • Damaged and small GRE fish are sorted by shift supervisor into meal hopper (150 kgs) located on port side of vessel at end of sorting conveyor (immediately prior to CS processing line). Hopper is emptied when full (150 kg) into meal auger. Recorded on whiteboard and transferred later to factory logbook. • IRA operators remove damaged wholefish and place into a trough (150 kgs capacity) on one side or fish bins on the otherside. Once trough or bins are full, fish is sent to meal and weight is recorded on a board at front of factory. – This figure is not always calculated in relation to a tow. Often crew fill bins/trough until end of shift. All figures then applied to the current tow that is being processed. • IRA GRE and DRE dropouts are time sampled. A temporary conveyor was installed to assist with this. Time sampling used to extrapolate out over period of processing. Total of 5 x 5 min samples completed per day. Relevant CF applied (vessel separated DRE/FIL). Recorded in exercise book for just this source. • Circular saw operator removes damaged fish. When bin full it is emptied to meal then recorded together with the hopper figures. • Damaged and miss-cut DRE fish removed during grading and put into fish cases (50 kg). Initially fish were separated by damage or mis-cut however this was not maintained as it slowed down grading. When fish cases were full these were emptied into meal auger, recorded on whiteboard and later transferred to factory logbook. As fish were mixed in bins CF applied to each case as 50% at 1.7 (DRE) and 50% at 2.5 (FIL). During second trip C1-2 and C3-5 were separated in bins. When shift change over occurs, bins are tipped into one another to make full bins. Full bins are then multiplied by appropriate CF (1.7 for C1-C2 and 2.5 for C3-C5) and multiplied by average bin weight. Bins are also filled at freezing stations. Often crew fill bins until end of shift. All figures then applied to the current tow that is being processed. • Damaged, miss-cut DRE fish plus broken blocks are sorted from fish being fed to freezers and from carton area, put into fish cases (50 kg) and emptied when full into meal auger. Tallied on whiteboard and later transferred to factory logbook. OTHER • Bins of fish sorted for meal can slide around and spill onto floor in rough weather. Usually picked up at shift changeover but can wash out through scuppers or sump pump.	Stickers in net from trawl deck also included. Record does not break up figures from each individual area. Chief Technologist stated he will expand the reporting x processing area x state to create a better picture of fish to meal and the various sources which make up the fish to meal figures".	• Unclear how hoppers of different capacity are recorded on poundsman tally. May lead to under-reporting of wholefish to meal. • Use nominal net hopper weight of 140 kgs and 150 kgs for wholefish (damaged and small) to meal – overfilling of hoppers would lead to under-reporting of fish to meal. • IRA operators remove small and damaged fish unsuitable for processing through the IRA and place in trough and/or bins. Trough capacity thought to be between (150-160kgs). Unclear what weight vessel uses for recording of fish to meal. If recorded at lower end of capacity may lead to underreporting of fish to meal. • Inconsistent methods used by vessel to calculate IRA drop outs. First trip indicates 5 x 5 min samples are conducted compared to that of a 10 min sample/day for second trip. Appears that there is no standard procedure for sampling of dropouts and may invariably lead to inaccurate data and underreporting of whole and processed fish to meal. • Use nominal net bin weights (50 kg) for graded out whole and processed fish destined for meal – overfilling of bins would lead to under-reporting of fish to meal. • Absence of systems in first trip to assess head cut compliance (DRE) of graded-out processed fish destined for meal. Blanket application of CF's 1.7 and 2.5 to 50% of graded out product. Inaccurate method and may lead to under-reporting where product processed beyond state definition is >50% of gradeouts. Second trip product separated to reflect non-compliant cuts however greenweight calculated based on bin count x average bin weight. Overfilling of bins would lead to under-reporting of fish to meal.
	3871	Offal management seemed good, none intentionally discharged. Small amount leaks from bottom of meal chute, not enough to block grates/scuppers however small amt flushes out stb discard hatch which has no grate.	• Stickers are removed from net, collected in bins and placed in chute at the starboard side of trawl deck into the meal stream. Crew count bins and times by average weight of bin (50kg). • Main sorting station - full hopper nominal weight of 140kg noted on whiteboard at sorting conveyor. Immediate person to sort fish throws all damaged fish into hopper then empties it when full. He records how many hoppers are emptied and multiplied by average load (140kg) of hopper. • IRA sorting - Crew lining fish for IRA throw out any damaged fish to a trough on one side or to fish bins on the other. Once trough or bins become full, fish are sent to meal and weight is recorded on a board at front of factory (trough capacity 160kg). • IRA dropouts - Cut or green fish which fall out of IRA machine are time sampled for 10min a day by FM. The fish collected then multiplied by correct CF then by total time spent processing in the day (generally 22 hrs). • CS sorting - Person who lines fish up before being cut bins up any damaged fish. When bin becomes full it is emptied to meal then recorded together with the hopper figures. • Grading - Men at gutting stations remove any badly cut or damaged fish. C1-C2 cuts are separated into bins from C3-C5 cuts. When shift change happens, bins are tipped into one another to make full bins. Full bins then multiplied by CF (1.7 for C1-C2 and 2.5 for C3-C5) and multiplied by average bin weight. Bins are also filled at freezing stations. [SP - risk if bins over-filled.] • Meal plant broke down a few times, heads & offal directed to rear port side discard chute, factory hand picked out any DRE/GRE.		
Vessel 3	3857 (two trips)	Soft offal and some small HDS lost from auger to factory deck, washed overboard in continual stream via	MEAL SOURCES • Main sorting station, removal of green damaged fish, put into hopper. Hopper regularly filled beyond nominal capacity of 140 kgs (up to 150 kgs), also when the gate is opened to empty fish further fish continues to be tossed in the top and passes through without being quantified. Very easily a minimum of 10% above nominal capacity occurs regularly.		• Use of inaccurate nominal weight for hopper, leading to under-reporting greenweight by 14%. • Occurrences where hopper gate was left open and fish was directly sent to meal without

		scuppers & stb aft sea door. At aft end gutting line, covers can be removed allowing all wet offal to fall to deck (covers were in place for this trip). Grates around scuppers usually ajar. First trip sea door open, second trip grate was placed around it.	• Adjacent to main sorting station hopper further along the conveyor: Damaged GRE fish beyond the capacity of the pounds man to pick out at M1 when processing GRE product. Fish put into bins at a nominal 50kg capacity. Bins can easily be loaded up to 65kg, 30% above the nominal weight, between 50 and 60kg a regular occurrence. • IRA sorting - Damaged GRE fish missed at the above two locations is removed and placed in bins, bin capacity 50kg. At IRA machine damaged fish can be shovelled into meal stream via open gate at the forward end of the IRA fish tray – unquantified. • Fish entering meal stream direct from Ira machines either from machine dropouts or crew grade outs not quantified. Observer sampling gave 10-15kg/hr [220-330kg/day if processing 22hrs]. • Gutting line grade outs - these are miss cuts and damaged. All binned up. Factory using 40-45 kg/bin. On checking 3 bins totalled 151.66 kg, average 50.6 kgs of DRE fish. Looks like just the DRE weight is being recorded by vessel. Obs talked to FM about bin weights of SBW DRE going to meal and using a CF to calculate greenweight. FM said the vessel used 45kg/bin, showed him results of weighing. FM said they would use 50kg and of course the DRE CF of 1.7 is used to calculate greenweight. FM said it was the responsibility of the duty fish master (shift supervisor) to record this fish to meal and make the CF calculation. DRE fish slid down the offal shoots at the grading/gutting lines, unquantified. Fish sorted to meal at gutting/grading station all had 1.7 CF applied. • Damaged fish removed at block formers prior to going to the freezers. Fish are binned and aggregated with Gutting/Grading lines fish for quantification. [TB. likely that nominal bin weight used] OTHER • During early stages of trip, some damaged fish reaching machines was discharged directly into meal stream and not accounted for. This was amended following discussion between observer and vessel personnel. • Vessel attention to accurate recording of SBW to meal appeared variable, at times volume appeared to increase in presence of observer. • Tally board at main sorting station is recorded by source. • Whole fish lost overboard with offal from factory floor. • All sources have potential to be unquantified, this didn't occur in observer's presence except for losses from Ira machines on occasions. Observer suspected significant volumes from hopper were not recorded. • Vessel used 120kg weight for main hopper until observer tested and found it should be 140kg. Similarly vessel used 40kg for bin weights until observer tested then changed to 50kg.		quantification. Observer suspected significant volumes from hopper were not recorded. • Use of inaccurate nominal weight for bins of wholefish, leading to under-reporting greenweight by 20%. • At IRA machine damaged fish can easily be shovelled into meal stream via open gate at the forward end of the IRA fish tray. Very likely to be un-quantified in this instance. • Damaged fish entering meal stream either directly by IRA machine operators or as a result of machine drop-outs are not quantified. Observer calculated between 220-330 kg/processing period. • DRE fish deliberately sent down the offal chutes at the grading/gutting lines, without quantification. • Absence of systems to assess head cut compliance (DRE) of graded-out processed fish (from gutting/grading and block formers) destined for meal. CF of 1.7 applied to this product (but not initially), leads to under-reporting for product processed beyond state definition whereby 2.5 CF should be used. • For rejected fish nominal bin weight of 45 kg was used initially until observer pointed out that bin capacity was 50 kg. Use of inaccurate bin weight led to under-reporting of greenweight. • Variable reporting of SBW to meal by vessel, with identified improvements in observer's presence. • Deliberate and inadvertent discharge of soft offal overboard. This may provide opportunity for vessel to underreport MEA by reporting as MEB.
Vessel 10	3872	Meal tank can hold at least 5t offal before cooked.	MEAL SOURCES • At the Baader 212 all damaged whole fish from deck, hatch doors and buffer tank belt were held in fish bins and then weighed in full before meal. The 212 operator writes amount in the factory sheet. • At the meal belt - drop offs from the 212 and feeding belt. Time sampling used by vessel to quantify fish to meal. Fish collected for period of time and then total weights were scaled up for total processing time. Observer indicated vessel did not undertake sufficient level of testing. Recorded on a separate time sampling sheet. • At the gutting and sorting station mis-cuts or fish damaged by the machine and damaged fish that are missed by the 212 operator are placed in fish bins. Damaged fish cut in front of the dorsal fins were placed in red bins and fish that were headed behind the 1st dorsal were placed in the red bins with green wire wound along top edge. These bins were then weighed or nominal weight used and multiplied by the relevant CF to achieve total greenweight then recorded on the sheet. Factory grade-outs sometimes quantified by average bin weight. • Photo of red and red/green bins for DRE/FIL product show lots of fish spilling from bins onto floor. • QC rejects destined for meal are quantified via a block count x the nominal weight and official CF. OTHER • Clipboard with paper factory sheet for all sources except meal belt drop-offs, filled in by Factory Foreman or Factory Manager. Separated by 1.7/2.5 (ie DRE/FIL) with processed weights recorded. Meal belt drop-offs has separate time sample sheet.		• Time sampling of B212 dropouts may be insufficient. Greater detail regarding testing regime required. Potential for under-reporting of fish to meal if testing is unreliable. Testing also needs to include assessment of head cut compliance so that appropriate CFs can be applied to processed fish to meal. • At times used nominal net bin weights for graded out whole and processed fish in factory – overfilling of bins would lead to under-reporting of fish to meal. • Unclear whether or not vessel had procedure in place for collecting and quantifying fish lost on floor from graded out processed fish destined for meal. Lack of system may lead to under-reporting of such fish. • Risk of under-reporting if mis-cut fish are included in blocks of QC rejects, as only 1.7 CF is applied to this product.

Vessel 9	3874	No offal discarded, all goes through hasher then mealed. Slick water pumped overboard, no pieces in slick water.	• All fish from pounds is conveyed to B212 machine. No sorting of fish occurs prior to this point. • All whole fish to meal is put through chute to meal belt by Baader 212 operators (2 persons on machine) - very damaged fish and very small fish ≤28 cm. Meal men conduct 10 min meal checks for every 5 tonne greenweight processed. Fish weighed and multiplied up over total processing time. Also DRE fish separated and multiplied by CF first. Consistent throughout voyage. Observer considered accurate over more bags processed. • Fish to meal comes from 3 sources. All fish including stickers go into pounds and fish (whole) that falls off conveyors is routinely picked up and put back onto conveyors. Baader212 operators will only meal very damaged fish allowing graders to make decisions on quality. Fish that they do meal are quantified using a time sample. This is not the major source. • Graders sort fish into grades 1, 2, 3 and QC. • Graders then have two bins one for bad cuts i.e. non-compliant and one for poor quality but compliant then used the CFs 2.5 and 1.7 respectively • Time sampling for fish to meal by meal plant operators, conducted at the bottom of elevator going to meal plant. • Observer has been monitoring bins and doing time samples of whole fish but a bit tricky to do as can't be in all places at once. Volumes indicate that they are similar to the differences between CF test and box tests. Estimations are made of amount of fish in bins. No scales so can't weighany.	• Vessel uses a time run sampling system. Meal operators only do this work. They spend 50% of their time in the factory. Operator samples ten minute time block and records quantity of fish (by state GRE, DRE and FIL). The total belt time is then determined along with the sample time. They then extrapolate the quantity observed by time across the total time to arrive at a quantity by tow. Quantities are recorded on the fish to meal recording sheet.	• Greater risk of underreporting greenweight as vessel relies soley on time sampling for quantification of whole and processed fish to meal.

Appendix Eight – Factory Plan: SBW Fish (whole and processed) to Meal



Fish to Meal Sources

M1 Meal hopper: GRE damaged fish from deck via pounds, hopper 140kg SBW

M2 Conveyor adjacent to M1: GRE damaged missed at M1, bins 50kg SBW

M3 Ira machines: GRE damaged missed at M1 and M2, bins 50kg SBW

M4 Grading line: DRE damaged & miss cuts, bins 50kg x CF 1.7 or 2.5

M5 Block formers: DRE miss cuts/damaged missed at M3, aggregated with M4

M6 Offal augur: Ira dropouts, DRE miss cuts direct from grading line, time sampled