ESTIMATE OF THE GLOBAL SALES VALUES FROM TUNA FISHERIES

STUDY FOR
PEW CHARITABLE TRUSTS

Photo: bluefin tuna Sakaiminato port, Japan. Courtesy of Yasuhiro Sanada

PHASE 3 REPORT

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Disclaimer and Report Information

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Table of Acronyms

ALB	Albacore
AZOR	Azores Islands Area
BB	Pole and line
BET	Bigeye
BFT	Atlantic bluefin
CANA	Canary Islands area
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CIF	Carriage Insurance and Freight
C&F	Carriage and Freight
CVER	Cape Verde area
EEZ	Economic Exclusion Zone
e.g.	*Exempli gratia* in Latin meaning 'for instance'/'for example'
EPO	Eastern Pacific Ocean
ETRO	East Tropical Atlantic
FAO	Food and Agriculture Organisation (of the United Nations)
FOB	Free On Board
GN	Gillnet
GOFM	Gulf of Mexico
HL	Handline
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
i.e	*Id est* in Latin meaning 'that is'
IOTC	Indian Ocean Tuna Commission
LL	Longline
MDRA	Madeira Islands area
NE	North East
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmosphere Administration
NW	North West
NWC	North West Central
OTH	Other
PBF	Pacific bluefin
PFMC	Pacific Fishery Management Council
PS	Purse seine
RFMO	Regional Fisheries Management Organisation
SBT	Southern Bluefin tuna
SKJ	Skipjack
SW	South West
T	tonnes
TR	Troll
TROP	Tropical Atlantic
ULT	Ultra Low Temperature
WCP(O)	Western Central Pacific (Ocean)
WCPFC	Western and Central Pacific Fisheries Commission

WTRO	West Tropical Atlantic
YFT	Yellowfin

1 BACKGROUND

This document provides the outputs from **Phase 3** of a three-phase project, to complete a study to provide an ***estimate of the global sales values from tuna fisheries***. The study was completed by **Poseidon Aquatic Resource Management Ltd** (Poseidon) of the UK, for **Pew Charitable Trusts** (Pew).

The study phases were as follows:

Phase 1 focused on: collecting and analysing tuna landings data by ocean, vessel flag, gear, and species; mapping product flows; and assessing the first sale value of landed catch in 2012 by multiplying landed volumes with ex-vessel/first sale prices.

Phase 2 focused on: generation of 2012 data on final consumer sales values, based on the volumes of sales and final sale prices.

Phase 3 focused on: updating the Phase 1 and Phase 2 outputs to arrive at estimates for 2014.

The Phase 1 report made a global estimation of landed volumes and values at the first point of sale for tuna fisheries globally in 2012, by multiplying tuna catches for different species and fishing methods from Regional Fisheries Management Organisation (RFMO) catch databases, with ex-vessel prices. A global estimate for 2012 of ex vessel values was calculated at US$12.2 billion (see Table 1).

Table 1: Summary of ex-vessel values of product by species, end market type and sub-ocean area, 2012 (US$)

Species	$	% of species total	Market segment	$	% by market segment	Ocean Area	$	% by ocean
ALB	924,700,704	7.6%	Canning	6,563,934,810	53.8%	WCPO	6,496,898,718	53.2%
BET	2,653,810,223	21.7%	Domestic	792,873,338	6.5%	EPO	1,538,621,840	12.6%
BFT	172,841,426	1.4%	Fresh sashimi	1,407,843,366	11.5%	WIO	1,822,570,002	14.9%
PBF	359,265,530	2.9%	Frozen sashimi	3,272,763,107	26.8%	EIO	855,705,787	7.0%
SBF	128,536,170	1.1%	Ranching	168,653,480	1.4%	EAO	962,510,252	7.9%
SKJ	4,036,805,178	33.1%	**Total**	**12,206,068,100**		WAO	401,225,331	3.3%
YFT	3,930,108,869	32.2%				Antartic	128,536,170	1.1%
Total	**12,206,068,100**					**Total**	**12,206,068,100**	

Source: Poseidon analysis, Phase 1 report

The Phase 2 report made an estimation of the final global sales value of tuna for 2012. The outputs of the analysis are provided in Table 2 below, and revealed that the final consumed value of tuna in 2012 was estimated at just under US$ 33.36 billion when using a drained weight[1] value of canned tuna (and US$ 41.63 billion when using the total canned sales price in the analysis rather than the value of the drained tuna).

[1] Corresponding to the weight of the solid portion of the product with the liquid drained.

Table 2: Global sales value of tuna by species, value chain, ocean area, and fishing gear, 2012 (US$)

Species	US$	% of species total	Market segment	US$	% by market segment
ALB	$ 1,826,487,972	5.5%	Canning	$17,574,003,397	52.7%
BET	$ 5,946,861,172	17.8%	fish meal/pet food	$ 263,586,449	0.8%
BFT	$ 873,600,924	2.6%	Domestic	$ 1,756,022,309	5.3%
PBF	$ 903,627,794	2.7%	Fresh sashimi	$ 4,686,386,077	14.0%
SBF	$ 491,301,000	1.5%	Frozen sashimi	$ 9,084,529,608	27.2%
SKJ	$10,674,453,267	32.0%			
YFT	$12,648,195,712	37.9%			
Total	**$33,364,527,841**		**Total**	**$33,364,527,841**	
Ocean Area	**US$**	**% by ocean**	**Gear**	**US$**	**% by gear**
WCPO	$17,415,671,287	52.2%	Pole and line	$ 2,016,194,730	6.0%
EPO	$ 4,279,997,819	12.8%	Gillnet	$ 875,312,321	2.6%
WIO	$ 5,023,295,234	15.1%	Handline	$ 2,490,363,045	7.5%
EIO	$ 2,183,794,187	6.5%	Longline	$ 9,091,631,363	27.2%
EAO	$ 2,860,327,128	8.6%	Other	$ 2,222,896,295	6.7%
WAO	$ 1,110,141,186	3.3%	Purse seine	$16,230,625,352	48.6%
Antartic	$ 491,301,000	1.5%	Troll	$ 437,504,735	1.3%
Total	**$33,364,527,841**		**Total**	**$33,364,527,841**	

Source: Poseidon analysis, Phase 2 report. Notes: uses drained weight value of canned tuna

The assumptions and methodologies underpinning these estimate for 2012 sales values were described in the Phase 1 and Phase 2 reports to allow for full transparency in the way that the estimates were generated.

When the Phase 1 work on this study commenced, catch data available from the different RFMOs was only available for 2012, hence the decision to complete the analysis during Phase 1 and 2 to derive estimates for 2012. However, it was later agreed between Poseidon and Pew that it would be useful for a third and final Phase of this study to update the Phase 1 and Phase 2 estimates for 2014 because of:

1. The elapsed time since the beginning of the study.
2. The fact that the RFMO 2014 catch data were made available at the end of 2015.
3. The desire by Pew to release the outputs of the study early in 2016.

As well as providing more recent/current information about global values of tuna trade, the 2014 estimates also contribute to an assessment of the extent to which global values of tuna sales have changed in recent years.

2 METHODOLOGY AND APPROACH USED DURING PHASE 3

2.1 INTRODUCTION

The approach taken to Phase 3 has been to repeat the methodologies used during Phase 1 and Phase 2, so as to provide directly comparable results. Because the approach was fully documented in the Phase 1 and Phase 2 reports, it is not repeated here in detail. Only a summary of the methodology used is therefore provided below.

2.2 METHODOLOGY FOR ESTIMATING CATCHES AND EX VESSEL VALUES IN 2014 AND ASSOCIATED PRICE CHANGES

As with the Phase 1 analysis, catch data for 2014 was sourced from the relevant tuna RFMOs and entered/amalgamated into a database of global tuna catches so that catches for the main tuna species included in the study could be categorised by major and sub-ocean area, flag, species, and fishing method/gear. Catches in 2014 were as shown below (Table 3).

Table 3: Global catches of selected tuna species by ocean area and fishing method, 2014 (tonnes)

Ocean/ species	Pole and line	Gillnet	Handline	Longline	Other	Purse seine	Troll	Grand Total
Antarctic	**10**		**1**	**7,730**	**2**	**4,168**		**11,911**
SBF	10		1	7,730	2	4,168		11,911
Atlantic	**81,784**	**1,450**	**8,289**	**66,995**	**12,352**	**288,560**	**7,180**	**466,610**
ALB	12,082	4	172	14,371	9,203	91	6,671	42,593
BET	8,657	12	1,910	37,264	22	24,800	29	72,695
BFT	95	0	1,088	2,443	2,904	8,237	109	14,876
SKJ	51,010	1,216	626	118	191	179,434	222	232,818
YFT	9,940	219	4,492	12,798	32	75,998	149	103,629
Indian	**111,225**	**179,085**	**180,719**	**160,709**	**12,500**	**359,766**		**1,004,006**
ALB		67	1,847	38,193	122	752		40,981
BET	304	3,883	12,516	52,579	2,126	28,823		100,231
SKJ	87,323	109,352	49,630	2,889	7,619	175,653		432,467
YFT	23,598	65,783	116,726	67,049	2,633	154,538		430,327
Pacific	**185,712**	**63,756**	**82,564**	**330,520**	**19,007**	**2,705,217**	**116,306**	**3,503,081**
ALB	33,783	26	174	120,358	667	13	22,147	177,168
BET	4,529	2,504	8,099	106,999	297	132,128	6,186	260,743
PBF	5	1,920		1,195	500	12,024	1,023	16,667
SKJ	128,415	55,115	18,308	2,221	10,435	1,944,178	54,401	2,213,073
YFT	18,980	4,191	55,983	99,747	7,108	616,873	32,549	835,431
Grand Total	**378,730**	**244,291**	**271,574**	**565,954**	**43,862**	**3,357,711**	**123,486**	**4,985,608**

Source: Poseidon analysis based on data provided by RFMOs

The following table shows that while total catches rose from 4.6 million tonnes in 2012 to 4.99 million tonnes in 2014 (an increase of 8.1%), this increase was not evenly distributed between major ocean area, with catches in the Atlantic falling slightly (2%), while catches in the Antarctic, Indian Ocean and Pacific Ocean increased by 16%, 19% and 7% respectively. It was not the purpose of this study to explore the reasons for change in catches between the two years, but they may have included a combination of: (i) improved fisheries management; (ii) natural fluctuations in tuna stocks, and (iii) in the case of the Atlantic and Indian Oceans a move back to the Indian Ocean of

some tuna fishing vessels which had been fishing in the Atlantic Ocean during 2012 due to the piracy problem in the Indian Ocean, which was significantly reduced over the 2012 to 2014 period.

Table 4: Comparison of tuna catches by major ocean area, 2012 and 2014 (tonnes)

Ocean / species	2012	2014
Antarctic	**10,261**	**11,911**
SBF	10,261	11,911
Atlantic	**477,990**	**466,610**
ALB	52,664	42,593
BET	70,516	72,695
BFT	12,602	14,876
SKJ	240,821	232,818
YFT	101,386	103,629
Indian	**843,784**	**1,004,006**
ALB	33,662	40,981
BET	115,589	100,231
SKJ	313,682	432,467
YFT	380,851	430,327
Pacific	**3,277,175**	**3,503,081**
ALB	178,907	177,168
BET	274,780	260,743
PBF	14,201	16,667
SKJ	1,983,768	2,213,073
YFT	825,519	835,431
Grand Total	**4,609,209**	**4,985,608**

Source: Poseidon analysis based on data provided by RFMOs

Ex vessel prices for 2014 used in the estimation of 2014 ex vessel values were obtained from similar sources as those used for the 2012 estimate, as provided in the Phase 1 report.

Prices of frozen purse seine-caught tuna for canning used in the analysis for 2014 were 75% of those in 2012 for skipjack, 76% for yellowfin, and 78% for bigeye, and prices for frozen longline caught albacore for canning also fell in 2014 to 74% of 2012 prices[2]. These prices are derived from Thai import/customs data in Thai Baht and converted to US$, but are not significantly impacted by exchange rates as the US$/Thai Baht only changed by 6% over the period from US$1 : 30.8 Thai Baht in January 2012 to US$1 : 32.6 Thai Baht in December 2014[3].

Ex vessel longline prices for product destined for sashimi markets used in the modelling also declined between 2012 and 2014 in US$ terms by 19% for frozen albacore and 5% for frozen yellowfin, but increased slightly for frozen bigeye tuna by 1%. Fresh tuna import prices also declined in US$ terms by 2% for both albacore and yellowfin and 13% for bigeye. However, these declines were more strongly driven by gradual and consistent changes in the US$/Japanese Yen exchange rate, with US$1 being equivalent to less than 80 Japanese Yen in January 2012 but 120 Japanese Yen

[2] Based on Thai customs data (http://www.customs.go.th).

[3] http://www.oanda.com/currency/historical-rates/

by December 2014, a change of 44% over the period[4]. Price trends in Japanese Yen for Japanese frozen and fresh import prices (used as the basis for estimating ex vessel values and accounting for carriage insurance and freight costs) are provided in Figure 4 in Appendix 1 and show more consistent prices over the 2012 to 2014 period.

The Phase 3 analysis assumes that the market flows described in the Phase 1 report, and the percentages of catch going from different oceans and fishing methods to different market segments (e.g. canning, sashimi, domestic sales, and canning by-products), remained unchanged between 2012 and 2014.

2.3 METHODOLOGY FOR ESTIMATING FINAL GLOBAL CONSUMED VALUES IN 2014 AND ASSOCIATED PRICE CHANGES

With respect to the 2014 estimate of final consumed values of tuna, the Phase 2 report (and relevant tables in the Appendix of that report) provided price data for 2012 and 2014, so the Phase 3 model draws on the 2014 prices in the Phase 2 report and they are not presented again in this report.

The tables in the Appendix of the Phase 2 report showed that retailed canned prices changed very little between 2012 and 2014 (Tables 8 and 9 in the Phase 2 report), due largely to inventories and a desire by retailers to have consistent shelf prices. However prices used in the calculation of 2014 sales values were reduced from the 2015 averages collected from the survey of retail store prices by 0.75% to account for inflation of processed foods in the European area between 2014 and 2015.

Sashimi prices declined considerably over the period 2012 to 2014 (see Tables 11, 12, 14, 15, 16 and 17 in the Phase 2 report) in US$ terms. However, these declines were more strongly driven by gradual and consistent changes in the US$/Japanese Yen exchange rate as discussed above. Figure 2 and Figure 2 in Appendix 1 provide prices for frozen and fresh sashimi-grade tuna in Japan at the Tokyo market in Japanese Yen, to demonstrate that in Japanese Yen, prices in 2014 compared well against those in 2012.

Fish meal prices also rose slightly over 2012 to 2014 (Table 20 of the Phase 2 report), but given the small share of total consumed values being contributed by by-products of canning, these rises make little difference to the final estimate of global sales values.

The volume of tuna sold domestically is relatively small and contributes little to the total global consumed values, so while the Phase 2 reported acknowledged the uncertainty associated with the prices used, as the estimates of prices in 2012 are in any case best estimates, similar prices are used for 2014.

[4] http://www.oanda.com/currency/historical-rates/

3 PHASE 3 RESULTS AND DISCUSSION

Table 5 and Table 6 below provide the two main table outputs of the Phase 3 analysis, to compare with Table 1 and Table 2 provided earlier in this report (from the Phase 1 and Phase 2 analysis respectively).

Table 5: Summary of ex-vessel values of product by species, end market type and sub-ocean area, 2014 (US$)

Species	$	% of species total
ALB	686,819,488	7.0%
BET	1,861,348,662	19.1%
BFT	189,860,316	1.9%
PBF	280,780,062	2.9%
SBF	139,243,422	1.4%
SKJ	3,367,005,550	34.5%
YFT	3,239,627,748	33.2%
Total	**9,764,685,249**	

Market segment	$	% by market segment
Canning	5,068,299,669	51.9%
Domestic	535,471,274	5.5%
Fresh sashimi	1,702,350,463	17.4%
Frozen sashimi	2,286,847,180	23.4%
Ranching	171,716,662	1.8%
Total	**9,764,685,249**	

Ocean Area	$	% by ocean
WCPO	5,049,825,028	51.7%
EPO	1,114,071,945	11.4%
WIO	1,564,568,259	16.0%
EIO	756,150,912	7.7%
EAO	821,675,744	8.4%
WAO	319,149,938	3.3%
Antartic	139,243,422	1.4%
Total	**9,764,685,249**	

Source: Poseidon analysis

Table 6: Global sales value of tuna by species, value chain, ocean area, and fishing gear, 2014 (US$)

Species	US$	% of species total
ALB	$ 1,751,564,069	5.3%
BET	$ 4,674,873,615	14.2%
BFT	$ 816,490,378	2.5%
PBF	$ 766,353,222	2.3%
SBF	$ 453,015,101	1.4%
SKJ	$12,507,099,630	37.9%
YFT	$11,991,443,563	36.4%
Total	**$32,960,839,578**	

Market segment	US$	% by market segment
Canning	$19,662,994,021	59.7%
fish meal/pet food	$ 299,864,791	0.9%
Domestic	$ 1,433,360,476	4.3%
Fresh sashimi	$ 4,479,324,174	13.6%
Frozen sashimi	$ 7,085,296,117	21.5%
Total	**$32,960,839,578**	

Ocean Area	US$	% by ocean
WCPO	$17,221,155,033	52.2%
EPO	$ 4,239,804,969	12.9%
WIO	$ 5,430,251,028	16.5%
EIO	$ 1,980,297,633	6.0%
EAO	$ 2,776,478,018	8.4%
WAO	$ 859,837,796	2.6%
Antartic	$ 453,015,101	1.4%
Total	**$32,960,839,578**	

Gear	US$	% by gear
Pole and line	$ 1,726,890,574	5.2%
Gillnet	$ 1,136,957,291	3.4%
Handline	$ 3,313,064,935	10.1%
Longline	$ 7,115,673,180	21.6%
Other	$ 466,725,904	1.4%
Purse seine	$18,212,338,770	55.3%
Troll	$ 989,188,924	3.0%
Total	**$32,960,839,578**	

Source: Poseidon analysis. Note: The corresponding table showing values when the retail canned price of tuna is assumed in the analysis (rather than just value of the drained weight of tuna) is provided in Table 10 in Appendix 1 and shows a total consumed value of US$ 42.21 billion.

A comparison of the estimates for 2012 and 2014 are summarised below.

Table 7: Comparison of 2012 and 2014 ex vessel and final consumed values

	2012 (Phase 1 and 2 estimates)	2014 (Phase 3 estimates)
Ex vessel values	$ 12.21 billion	$ 9.76 billion
Final consumed values (using drained weight value of canned tuna)	$ 33.36 billion	$ 32.96 billion
Final consumed values (using total canned tuna sales price)	*$ 41.63 billion*	*$42.21 billion*

Source: Poseidon analysis. Notes: the 2014 value is lower than the 2012 value if using the drained weight, but higher if using the total can price given the importance of canned tuna in the overall sales values and the fact that canned retailed prices did not decline over 2012 to 2014. All prices are in nominal terms and have not been adjusted for inflation.

Some observations and comments on the results for 2012 and 2014 when comparing ex vessel values and the final consumed values (using the drained weight value of canned tuna) are:

- Declines in ex vessel and final consumed values are strongly driven by changes in US$ exchange rates with the Japanese Yen, given the methodology used which sourced a number of data sets in Japanese Yen and converted them into US$. The exchange rate changes mask the fact that sashimi prices actually rose between 2012 and 2014 in Japanese Yen reflecting strong and increasing global demand for sushi/sashimi products, and that total catch volumes increased between 2012 and 2014. However commodity prices of frozen skipjack tuna for canning did decline significantly in US$ and Thai Baht terms, also contributing to the fall in ex vessel values.

- The increase in catches of tuna in 2014 (and a 13% increase in catches of skipjack, the main tuna species used in canning), did not result in significant declines in shelf prices of canned tuna, meaning that increased catches fed through into increased values of canned tuna sales, with a rise from US$ 17.6 billion in 2012 to US$ 19.7 billion 2014. This suggests that retailer margins on canned tuna increased over the 2 year period. The absolute levels of margin obtained by retailers has not been the focus of this study however, and it is possible that 2012 retailer margins may have been small compared to historic levels due to high tuna commodity prices during that year and a desire not to increase shelf prices of canned tuna, with margins in 2014 returning to more 'normal' levels.

- Declines in sashimi US$ prices between 2012 and 2014 were typically between 13% and 30% for different species and product forms (i.e. frozen and fresh). These significant declines in US$ terms meant that increases in catches destined for sashimi markets in 2014 were not sufficient to offset weaker prices, meaning that the total value of sashimi sales fell from US$ 13.7 billion in 2012 to US$ 11.5 billion in 2014.

- These occurrences combined together to result in the proportion of total global consumed values attributed to the canned tuna market rising from 53% in 2012 to 60% in 2014, while conversely the share of total global consumed values attributable to sashimi markets fell from 41% to 35%.

- The changes in the proportion of global catch by ocean area highlighted in Table 4 resulted in some minor changes in the share of total global consumed values being sourced from different oceans. The Atlantic Ocean's contribution to total global consumed values fell from 12% in 2012 to 11% in 2014. The Pacific Ocean's contribution remained roughly constant. The contribution to total global consumed values being sourced from the Indian increased from 21.6% to 22.5%.

- The contribution of skipjack to total global consumed values (being the main input for canned tuna, for which prices held more steady in US$ terms compared to sashimi species/products), rose from 32% in 2012 to 38% in 2014. The share of total consumed values originating from purse seine fisheries (which catch most skipjack tuna) also therefore increased from 49% to 55%, while the share of final consumed values attributable to long line vessels fell from 27.2% to 21.6%.

- Final consumed values fell by US$ 0.4 billion while ex vessel values fell by US$ 2.45 billion. The ratio of total global consumed values to ex vessel values changed from 2.73:1 in 2012 to 3.37:1 in 2014. These estimates/data suggest that the catching sector was disproportionally impacted by falling prices over the 2 year period compared to the retail sector (i.e. retailers passed on to canned tuna consumers little of the falling prices paid to vessels for skipjack tuna).

- Comparison of tuna price data for 2012 and 2014, and as part of longer term price trends (e.g. see Tables 11 and 12 in Phase 2 report, and Figure 1 in the Appendix to this report), suggest that 2012 was an anomalous year in terms of high prices (especially for frozen tuna for canning). The apparent inverse relationship between increased catch volumes and decreased prices (observable at least for 2012 and 2014), *suggests* (again, based on 2012 and 2014 data estimates) that increases in supply may result in decreases in prices, resulting in final consumed values that may not change significantly between years. However, it is perhaps more likely given declines in global commodity prices more generally as reported by both the World Bank (for commodity prices)[5] and FAO (in their food index made up of key food types)[6] that declines in frozen tuna prices are to some extent independent of volumes of catch and more strongly linked to global economic performance and demand. If so, then the overall estimates of the values of ex vessel and final consumed values in 2012 may represent a 'high point'.

[5] http://www.worldbank.org/en/research/commodity-markets

[6] http://www.fao.org/worldfoodsituation/foodpricesindex/en/

Appendix 1: Additional data tables

Table 8: Final sales prices (US$/tonne) used in the Phase 3 analysis for 2014

Final consumed prices in $	BB/P&L							GN							HL							LL							Other							PS							TR						
	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT
WCPO																																																
For loining/canning	6,227	5,502				4,305	6,750	6,227	5,502				4,305	6,750								6,227					4,305		6,227								5,502				4,305	6,750	6,227					4,305	
Canning byproducts	255	255				255	255	255	255				255	255								255					255		255								255					255		255					255	
For domestic (fresh or processing)	3,000	4,000				3,500	5,500	3,000	4,000				3,500	5,500	3,000					3,500								3,500																				3,500	
For fresh sashimi				46,666												17,438							17,438					14,724		17,438		46,666						46,666								17,438					14,724
For frozen sashimi																				14,254		15,114	15,114			57,645		14,254						14,254			15,114									15,114					14,254
For ranching																																															53,773				
EPO																																																
For loining/canning						4,305	6,750															6,227	5,502					6,750	6,227					4,305	6,750		5,502				4,305	6,750	6,227						
Canning byproducts						255	255															255	255					255	255					255	255		255				255	255	255						
For domestic (fresh or processing)																													3,000					3,500	5,500									3,000					
For fresh sashimi																							17,438					14,724					46,666																
For frozen sashimi																							15,114					14,254											57,645										
For ranching																																							57,645										
WIO																																																
For loining/canning		5,502				4,305	6,750		5,502				4,305	6,750								6,227	5,502				4,305								4,305	6,750	6,227	5,502				4,305	6,750						
Canning byproducts		255				255	255		255				255	255								255	255				255								255	255	255	255				255	255						
For domestic (fresh or processing)		4,000				3,500	5,500		4,000				3,500	5,500																																3,000	4,000			3,500	5,500
For fresh sashimi															13,856	17,438				13,856	14,724																												
For frozen sashimi															15,114	15,114				15,114	14,254	15,114	15,114					14,254																						
EIO																																																
For loining/canning						4,305	6,750	6,227	5,502				4,305	6,750								6,227								6,227					4,305			5,502				4,305	6,750	6,227	5,502				4,305	6,750
Canning byproducts						255	255	255	255				255	255								255								255					255			255				255	255	255	255				255	255
For domestic (fresh or processing)						3,500	5,500	3,000	4,000				3,500	5,500	3,000					3,500	5,500	3,000						3,500																				3,000	4,000			3,500	5,500
For fresh sashimi																					14,724		17,438					14,724		17,438					14,724															
For frozen sashimi																					14,254		15,114					14,254		15,114					14,254															
EAO																																																
For loining/canning	6,227	5,502				4,305	6,750						4,305							4,305		6,227					4,305								4,305		6,227	5,502				4,305	6,750	6,227						
Canning byproducts	255	255				255	255						255							255		255					255								255		255	255				255	255	255						
For domestic (fresh or processing)														3,704	3,000	4,000	4,010				5,500			3,876					3,000																	3,000					
For fresh sashimi			46,666														46,666							46,666																								
For frozen sashimi			57,645														57,645						15,114	57,645				14,254				57,645																	
For ranching																																						57,645										
WAO																																																
For loining/canning	6,227	5,502				4,305	6,750															6,227														6,227	5,502				4,305	6,750						
Canning byproducts	255	255				255	255															255														255	255				255	255						
For domestic (fresh or processing)	6,904	4,000				3,500	5,500						3,500	3,704		4,000				3,500									6,904	4,000				3,500	5,500											3,500	
For fresh sashimi																	46,666				14,724			46,666							46,666																14,724
For frozen sashimi																							15,114	57,645				14,254																					
For ranching																																							57,645										
Antarctic																																																
For ranching																																								49,042									
For frozen sashimi																										32,162																							

Source: Poseidon analysis

Table 9: Consumed sale values (US$) estimated during the Phase 3 analysis for 2014

Total final sales values in $	BB/P&L							GN							HL						
	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT
WCPO																					
For loining/canning	146,148,388	17,312,443				384,074,978	89,009,449	144,615	12,306,507				211,940,785	25,269,813							
Canning byproducts	1,805,856	242,096				6,864,370	1,014,568	1,787	172,093				3,787,906	288,036							
For domestic (fresh or processing)	30,404,700	5,434,800				134,835,750	31,317,000	7,800	1,001,600				19,290,250	2,305,050	522,000					64,078,000	
For fresh sashimi				233,330												141,227,224					
For frozen sashimi																					797,993,244
For ranching																					
EPO																					
For loining/canning						0	0														
Canning byproducts						0	0														
For domestic (fresh or processing)																					
For fresh sashimi																					
For frozen sashimi																					
For ranching																					
WIO																					
For loining/canning		415,022				85,723,144	36,801,984		9,873,165				149,353,020	303,315,474							
Canning byproducts		5,804				1,532,085	419,485		138,066				2,669,308	3,457,320							
For domestic (fresh or processing)		912,000				210,661,500	90,638,625		1,808,000				30,585,800	62,252,300							
For fresh sashimi															3,038,680	64,356,996				259,171,132	1,163,238,592
For frozen sashimi															584,919	9,843,865				49,888,127	198,730,722
EIO																					
For loining/canning						4,531,837	1,633,001	20,703	443,146				14,026,841	3,078,417							
Canning byproducts						80,995	18,614	256	6,197				250,694	35,089							
For domestic (fresh or processing)						21,036,225	7,596,875	190,950	6,167,400				218,312,850	48,017,750	4,767,000					96,687,500	
For fresh sashimi																					105,039,411
For frozen sashimi																					237,275,522
EAO																					
For loining/canning	74,019,445	46,526,199				98,032,788	63,296,799						4,883,694							2,187,621	
Canning byproducts	914,608	650,619				1,752,088	721,484						87,284							39,098	
For domestic (fresh or processing)														1,167,557	48,000	888,000	0				6,721,000
For fresh sashimi			3,324,951														8,329,878				
For frozen sashimi			1,369,058														3,429,850				
For ranching																					
WAO																					
For loining/canning	616,468	710,726				113,921,670	3,137,707														
Canning byproducts	7,617	9,939				2,036,062	35,765														
For domestic (fresh or processing)	27,132	27,400				4,911,550	135,575						255,500	44,268		6,752,000				399,000	
For fresh sashimi																	39,666,086				48,161,468
For frozen sashimi																					
For ranching																					
Antarctic																					
For ranching																					
For frozen sashimi																					

Continued overleaf

Total final sales values in $	LL							Other							PS							TR						
	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT	ALB	BET	BFT	PBF	SBF	SKJ	YFT
WCPO																												
For loining/canning	452,301,640					8,485,579		2,626,556								316,849,971				7,188,870,267	2,572,497,679	17,514,495					162,548,821	
Canning byproducts	5,588,783					151,658		32,455								4,430,804				128,482,897	29,322,434	216,415					2,905,150	
For domestic (fresh or processing)													33,309,500														57,065,400	
For fresh sashimi		626,986,795					679,472,769		4,777,906		23,286,326							315,508,712					53,934,535					226,135,098
For frozen sashimi	276,538,094	543,445,433		68,885,229			657,803,123							92,224,716		219,240,240							46,748,157					218,923,231
For ranching																									55,009,727			
EPO																												
For loining/canning	178,451,322	38,320,769					10,298,459	818,868					392,234	2,137,138		325,464,963				1,118,015,575	1,560,237,958	107,421,207						
Canning byproducts	2,205,001	535,875					117,386	10,118					7,010	24,360		4,551,276				19,981,704	17,784,263	1,327,331						
For domestic (fresh or processing)								397,500					2,891,700	1,754,500								5,793,900						
For fresh sashimi		183,550,053					33,950,080				46,666																	
For frozen sashimi		265,155,605					54,778,916											197,199,101										
For ranching																		106,184,131										
WIO																												
For loining/canning	109,269,684	0				294,816							85,454	1,165,712	3,967,645	122,863,024				587,098,642	995,805,769							
Canning byproducts	1,350,171	0				5,269							1,527	13,287	49,025	1,718,107				10,492,905	11,350,622							
For domestic (fresh or processing)																						0	0				0	0
For fresh sashimi																												
For frozen sashimi	66,807,696	488,067,080					290,429,458																					
EIO																												
For loining/canning	99,450,690							376,988					16,234,117			35,134,926				163,409,343	39,527,002	0	0				0	0
Canning byproducts	1,228,844							4,658					290,144			491,324				2,920,529	450,546	0	0				0	0
For domestic (fresh or processing)						9,870,000	154,020,900	183,000					13,298,250									0	0				0	0
For fresh sashimi		176,869,704					240,520,963		18,536,182					18,102,881														
For frozen sashimi		153,303,121					33,264,329		16,066,373					17,525,547														
EAO																												
For loining/canning	16,161,046					269,180							803,267		370,808	134,767,615				762,048,542	491,856,593	20,607,651						
Canning byproducts	199,691					4,811							14,356		4,582	1,884,579				13,619,693	5,606,393	254,635						
For domestic (fresh or processing)			751,295					20,130,000														10,003,500						
For fresh sashimi			25,297,629																									
For frozen sashimi		230,642,377	62,498,214				27,296,805			160,597,698																		
For ranching																	472,397,034											
WAO																												
For loining/canning	72,653,636														191,584	660,759				4,618,787	17,291,388							
Canning byproducts	897,732														2,367	9,240				82,549	197,095							
For domestic (fresh or processing)			0					12,883,824	48,000				10,500	110,000													630,000	
For fresh sashimi			8,903,870							5,506,586																		2,149,671
For frozen sashimi		332,587,517	21,997,158				155,128,530																					
For ranching																	2,421,071											
Antarctic																												
For ranching																			204,406,706									
For frozen sashimi					248,608,395																							

Source: Poseidon analysis

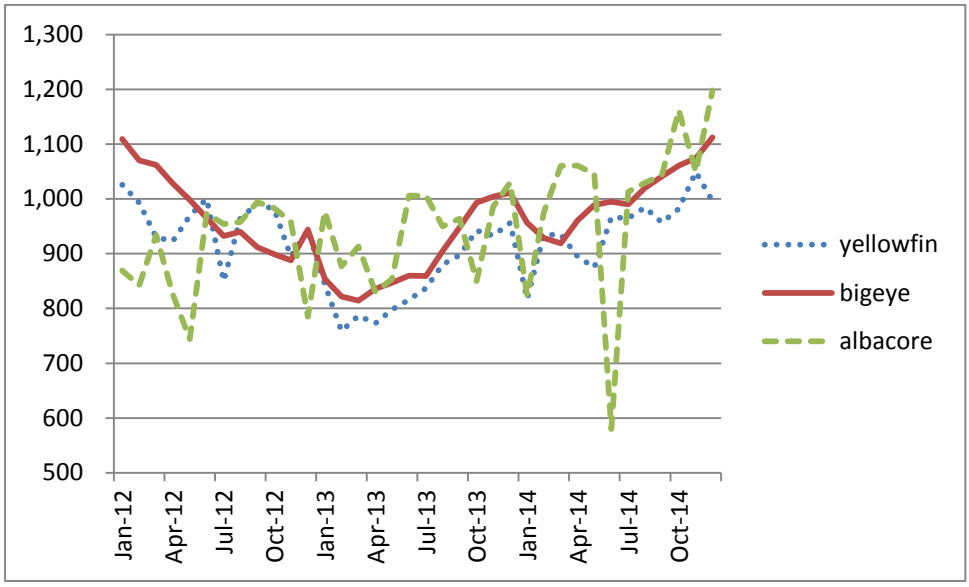
Table 10: Global sales value of tuna in 2014 by species, market segment, ocean area, and fishing gear (US$), using total retail price of canned tuna not just the value of the drained weight of tuna in cans

Species	US$	% of species total	Market segment	US$	% by market segment
ALB	$ 2,364,803,336	6%	Canning	$ 28,916,167,677	68%
BET	$ 5,174,473,255	12%	fish meal/pet food	$ 299,864,791	1%
BFT	$ 816,490,378	2%	Domestic	$ 1,433,360,476	3%
PBF	$ 766,353,222	2%	Fresh sashimi	$ 4,479,324,174	11%
SBF	$ 453,015,101	1%	Frozen sashimi	$ 7,085,296,117	17%
SKJ	$17,722,088,336	42%			
YFT	$14,916,789,605	35%			
Total	**$42,214,013,235**		**Total**	**$ 42,214,013,235**	
Ocean Area	**US$**	**% by ocean**	**Gear**	**US$**	**% by gear**
WCPO	$22,683,697,145	54%	Pole and line	$ 2,275,555,067	5%
EPO	$ 5,812,303,083	14%	Gillnet	$ 1,482,677,847	4%
WIO	$ 6,562,501,642	16%	Handline	$ 3,314,094,404	8%
EIO	$ 2,158,117,403	5%	Longline	$ 7,579,652,861	18%
EAO	$ 3,583,928,018	8%	Other	$ 478,321,355	1%
WAO	$ 960,450,843	2%	Purse seine	$ 25,949,538,224	61%
Antartic	$ 453,015,101	1%	Troll	$ 1,134,173,477	3%
Total	**$42,214,013,235**		**Total**	**$ 42,214,013,235**	

Figure 1: Purse seine frozen tuna import prices, Thailand (cif) 2005 to 2015 (US$/tonne)

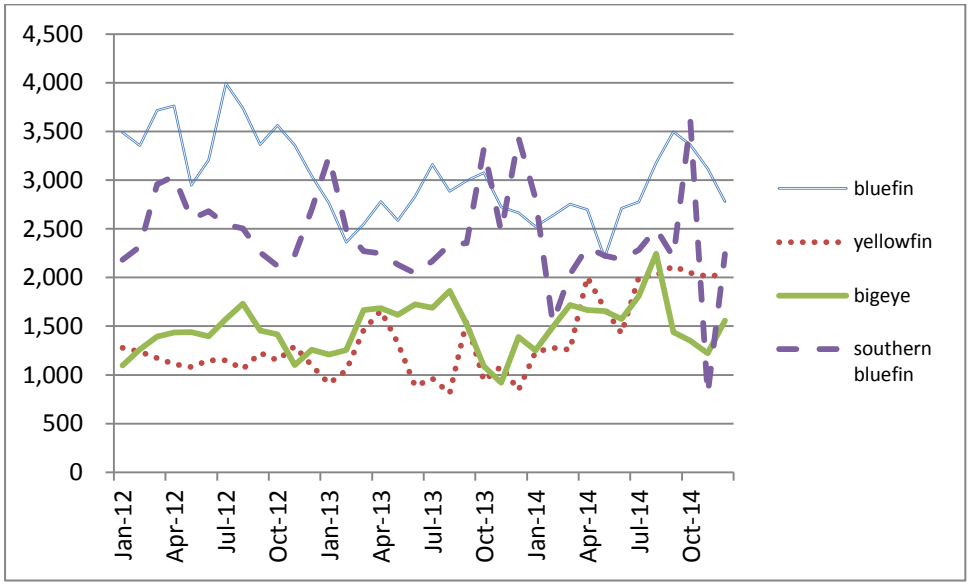
NB: prices based on weighted average value of imports to Thailand from various countries. Cif = carriage, insurance and freight (costs); source: http://www.customs.go.th. Prices in nominal terms

Figure 2: Prices of frozen tuna at Tokyo Tsukiji Market, 2012 – 2014 in Japanese Yen/kg



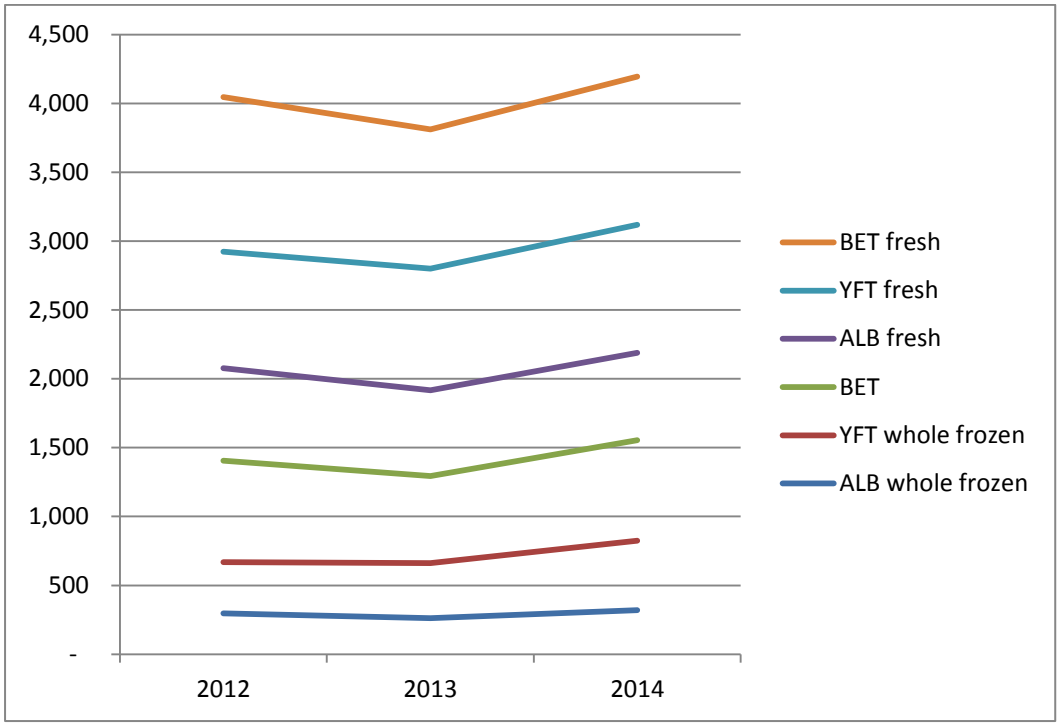
Source: http://www.shijou-tokei.metro.tokyo.jp/index.html. Prices in nominal terms.

Figure 3: Prices of fresh imported tuna at Tokyo Tsukiji Market, 2012 – 2014 in Japanese Yen/kg



Source: http://www.shijou-tokei.metro.tokyo.jp/index.html. Prices in nominal terms

Figure 4: Japanese tuna import prices in Japanese Yen/kg, 2012 to 2014



Source: http://www.customs.go.jp. Prices in nominal terms