PART 2 – SASHIMI TUNA INDUSTRY

6 SASHIMI TUNA FISHING FLEETS

6.1 General Overview

This chapter provides an overview of the current status of the major fishing fleets supplying fresh-chilled and frozen tuna to the world’s principal sashimi market, Japan, as well as sizeable markets in the US, Asia, EU and other emerging markets.

Presently, 300,000-400,000 mt of tuna is supplied annually to the Japanese sashimi market. A further estimated 60,000-100,000 mt is supplied to other non-Japanese sashimi markets (i.e. US, Korea, EU, Taiwan, China). Hence, annual tuna supply to the global sashimi market is currently around 500,000 mt. The most valuable species for sashimi is bluefin, but supply volumes are low. After bluefin, bigeye is the next most valuable species and is the most highly targeted species, followed by yellowfin and then, to a lesser extent, albacore.

The majority of sashimi-grade tuna is supplied by longline vessels. The Japanese and Taiwanese longline fleets are the top two suppliers of sashimi-grade tuna, collectively accounting for over half of global longline catches. Other significant longline fleets include Korea, China and Indonesia.

The longline industry is generally characterised by two vessel types – large-scale distant water vessels (supplying frozen tuna) and small-medium scale offshore vessels (supplying fresh tuna).

Distant water vessels are typically around 400-500 GRT, are significantly greater than 24 metres in length, steel-hulled and have ultra-low temperature (ULT) freezer capabilities (-55-60°C) for storing catch. The target species are bigeye and yellowfin. Small volumes of high-value bluefin (Atlantic, Southern, Pacific) are also caught by vessels with ICCAT and CCSBT bluefin quota allocations. Distant water vessels can operate in all three oceans - Atlantic, Indian and Pacific. Previously, there was some seasonal movement of vessels between oceans. However, due to significantly rising operating costs in recent years, in particular, fuel, most vessels now generally limit fishing operations to one ocean. Trip lengths for most fleets are typically 18 months - 2 years, with transhipment, refuelling and re-supplying often conducted at sea. Unlike the purse seine fishery, where vessel ownership is often dominated by large companies, many distant water longline vessels are smaller, family-owned operations.

599 Author’s estimate based on market data and information collected from multiple sources during Japanese industry consultation, June 2010.
600 OPRT estimate, based on anecdotal data from OPRT members, media reports, trading companies, agents. Estimate is considered to be conservative, as it excludes newly emerging markets in South America and Eastern Europe. Interview, OPRT representative during Japan in-country consultation, June 2010.
602 A large proportion of the Indonesia longline catch is from small-scale coastal vessels, in contrast to other major fleets comprised of large distant water and offshore vessels.
603
Smaller-scale fresh tuna longliners are typically less than 100 GRT, below 24 metres in length, fibreglass reinforced plastic (FRP) or steel-hulled and use ice or refrigerated seawater (RSW) for storing catch.\footnote{An exception is a segment of the Taiwanese longline fleet measuring under 24 meters in length which have both fresh and ULT capabilities (see section 6.3.3). The number of Taiwanese vessels in this segment is believed to be increasing.} Operations are limited to one ocean area and given that the catch is marketed fresh, trip lengths are generally 25 days or less. The sashimi-grade portion of the catch is usually offloaded in ports with good air-freight connections to Japan and other markets, while the non-sashimi grade portion is either sold in local markets, processed into export-grade value-added fresh and frozen tuna products, or frozen whole round for export or shipping back to home ports.

Longline vessels targeting albacore for canning (e.g. Taiwanese, Chinese, PIC fleets) or other species such as sharks and swordfish, may also supply incidental bigeye and yellowfin catch to the fresh sashimi market.

Longline vessel numbers in most fleets have declined markedly over the past 5-10 years, in part due to serious profitability constraints stemming from increasing operating costs (especially fuel) and declining catches relating to overcapacity and stock sustainability issues. Further vessel number reductions relate to capacity reduction programs implemented by the Governments of the two largest distant water fleets, Japan and Taiwan, in an effort to reduce global longline fishing overcapacity. This trend is demonstrated by the number of large distant water longline vessels registered with the Organisation for the Promotion of Responsible Tuna Fishing (OPRT) (which accounts for 90% of distant water longline vessels globally).\footnote{The Organisation for the Promotion of Responsible Tuna Fishing (OPRT) was established in 2000 to address overcapacity, IUU fishing and by-catch issues in the global tuna longline fishery, as well as to promote responsible bluefin tuna farming. OPRT’s membership consists of over 1,000 large scale longline vessel owners and 21 organisations representing traders, distributors and consumers in Japan. For further information about OPRT activities: www.oprt.or.jp.} In 2004, 1,454 large distant water longline vessels were registered members. By 2010, this number was reduced to 1,067 (Table 6.1), with major reductions experienced in the Japanese and Taiwanese fleets, largely as a result of vessel buy-back and scrapping programs. A notable exception is the Chinese fleet which, contrary to vessel number declines in other major fleets (i.e. Japan, Taiwan, Korea), has increased in size, due largely to the purchase of ex-Japanese vessels which had ceased operations due to bankruptcy.
Table 6.1  Number of Distant Water Longline Vessels Registered with OPRT, 2002-2010

<table>
<thead>
<tr>
<th>Members</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
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<tbody>
<tr>
<td>Japan</td>
<td>490</td>
<td>495</td>
<td>473</td>
<td>434</td>
<td>381</td>
<td>363</td>
<td>360</td>
<td>254</td>
<td>275</td>
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<tr>
<td>Taiwan</td>
<td>562</td>
<td>599</td>
<td>597</td>
<td>600</td>
<td>526</td>
<td>420</td>
<td>392</td>
<td>369</td>
<td>359</td>
</tr>
<tr>
<td>Korea</td>
<td>183</td>
<td>176</td>
<td>174</td>
<td>172</td>
<td>172</td>
<td>160</td>
<td>156</td>
<td>148</td>
<td>146</td>
</tr>
<tr>
<td>Philippines</td>
<td>6</td>
<td>17</td>
<td>17</td>
<td>18</td>
<td>26</td>
<td>28</td>
<td>28</td>
<td>26</td>
<td>26</td>
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<tr>
<td>Indonesia</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>17</td>
<td>17</td>
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<tr>
<td>China</td>
<td>105</td>
<td>113</td>
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<td>117</td>
<td>121</td>
<td>136</td>
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<td>4</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Seychelles</td>
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<td>21</td>
<td>27</td>
<td>27</td>
<td>32</td>
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<tr>
<td>Vanuatu</td>
<td>48</td>
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<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
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<tr>
<td>Fiji</td>
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<td></td>
<td></td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>1,241</td>
<td>1,301</td>
<td>1,454</td>
<td>1,425</td>
<td>1,305</td>
<td>1,176</td>
<td>1,153</td>
<td>1,049</td>
<td>1,067</td>
</tr>
</tbody>
</table>

Source: OPRT 2011.

A number of key issues currently impacting longline vessel fishing operations globally include:

- **Longline fishing overcapacity:** Excess vessel numbers, coupled with operational and technological developments (e.g. at-sea transhipment, increased hook usage, improved freezer power/capacity) has resulted in longline fishing overcapacity on a global scale. This has placed increasing fishing pressure on vulnerable tuna stocks (particularly bluefin, bigeye and yellowfin) and has compromised (and continues to do so) vessels’ profitability.

- **Purse seine fishing overcapacity:** Excess fishing capacity in purse seine fisheries is also negatively impacting the longline sector, given purse seiners’ high levels of incidental by-catch of juvenile bigeye and yellowfin (particularly through use of FADs), which in turn is affecting adult biomass. There are widespread calls from the longline industry for more effective management of purse seine fisheries to minimise fishing impacts on bigeye and yellowfin stocks, including reductions in vessel numbers.

- **IUU fishing:** There has been a high incidence of IUU fishing activity by longline vessels, particularly during the 1980s and 1990s, when more restrictive fisheries management measures started to be implemented at the RFMO level, prompting some vessel operators to adopt flags of convenience or fish illegally. In 2000, an estimated 250 IUU large-scale longline vessels were in operation. In recent years, increased efforts by national governments, RFMO’s and the OPRT to address IUU longline fishing issues has helped to reduce the incidence of IUU fishing. The number of IUU distant water longline vessels is now estimated to be around 30.606 Two ongoing issues for concern are the monitoring and control of IUU fishing by small scale longline vessels (<24 metres) which currently fall outside the management mandate of most RFMO’s, as well as tuna ‘laundering’, where catch documentation on species and/or fishing ground is falsified.607

- **Stock sustainability:** Biological limits for longline vessels’ target species bigeye and yellowfin are being either approached or exceeded in all four oceans.

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606 Miyake 2010: 55.
Atlantic and Mediterranean bluefin stocks have reached critical levels and face collapse, if management measures implemented by ICCAT remain ineffective.

- **Fuel costs**: The rise in the global crude oil price experienced in recent years has seriously impacted the profitability of longline tuna fishing operations, given fuel is typically the most significant operating cost.

- **Stagnant prices and market demand**: In the early 1990s tuna prices fell when Japan’s economy entered into recession. The downwards trend in prices continued in the mid-1990s with the rapid influx of imports of farmed bluefin tuna from the Mediterranean. Since this time, sashimi-grade tuna prices have continued to remain stagnant, given Japanese consumers’ preference for lower cost food items and the substantial shift in sales volumes from the traditional auction system to supermarket chains (see Chapter 7).

- **Competition from ranched and farmed (cultivated) bluefin**: Longline operators are concerned about the expansion of bluefin tuna ranching and potentially, bluefin farming, should tuna cultivation become viable on a commercial scale. Ranched bluefin tuna (i.e. wild-caught tuna that are fattened in offshore pens) from the Mediterranean, South Australia and Mexico has resulted in increasing volumes of tuna with high fat content being sold in the Japanese market, which competes with longline-caught product and has influenced consumer taste preferences, as well as the sashimi pricing, market and distribution systems (see Chapter 7).608

Large distant water longline fishing operations have been, and continue to be, the most vulnerable to these issues. Smaller-scale vessels, particularly those capable of multiple targets (e.g. albacore and/or bigeye) have demonstrated greater resilience, as they have more flexibility to adapt to changing operating conditions.

6.2 Japan609

6.2.1 Current fleet status and WCPO fishing operations

Japan’s sashimi market is currently supplied with catch from the Japanese longline, pole and line and purse seine fleets.

Since prior to the Second World War, Japanese longliners have supplied fresh tuna to Japan’s sashimi market.610 While pole and line vessels traditionally supplied the majority of their catch to katsuobushi processors, increased competition from the expanding purse seine fleet in the mid-1970s-1980s resulted in pole and line vessels supplying an increasing portion of their catch to the sashimi market. In the past 15 years or so, Japanese purse seine vessels have also started supplying a small but increasing portion of their catch to the sashimi market, with the advent of ultra low temperature freezers on board vessels.

The WCPO is an important fishing ground for sashimi-grade tropical tunas for all three fleets. Japan’s pole and line, purse seine and offshore longline vessels operate exclusively in the WCPFC convention area (as well as in Japanese waters), while some of the distant water longline fleet operate in the region.

608 Miyake 2010: 37.
609 A useful discussion of the Japanese tuna industry is also provided in Campling et. al. 2007 (Chapter 16).
Longline fleet

The Japanese longline fishery is characterized by three major vessel classes – distant water, offshore and coastal. This system of classification was originally established to minimize geographic interaction between vessel classes.611

The distant water longline fleet is comprised of vessels greater than 120 GRT which, with some restrictions, are permitted to fish in all oceans (Atlantic, Indian and Pacific Oceans). These vessels utilize ultra-low temperature freezers for catch storage and mostly target bigeye (and to a lesser extent yellowfin and bluefin). Vessels are constructed from steel and the average size is around 400 GRT (by international standards), with hold capacities ranging from 300-400t. Annual average catch per vessel is around 300 mt for vessels targeting bigeye and yellowfin (around 1-1.5t/day), whereas catch volumes are lower for vessels targeting bluefin (around 0.5t/day).612 Japanese distant water longline vessel numbers have declined significantly since the mid-late 1990s. In 2000, 529 vessels were in operation; whereas in 2010, this number had decreased markedly to 268.613 High fuel prices coupled with stagnant fish prices have impacted negatively on vessel profitability and driven a considerable number of operations into bankruptcy. In addition, capacity reduction programs implemented to address global longline fishery overcapacity issues have also resulted in declining vessel numbers. In 1998-1999, 132 distant water longline vessels (around 20% of the fleet) were scrapped under a Japanese Government vessel buy-back scheme. A further 64 vessels were scrapped in 2009, under a similar scheme.614 Distant water longline operations are typically family owned businesses comprised of 1-3 vessels. Six or so larger companies collectively account for only 39 vessels in the fleet. In late-2010, the largest number of vessels owned by a single company was ten.615 Many distant water vessel owners are based in Kagoshima prefecture. Each vessel carries 22-24 crew, the majority of which are Indonesian, besides five to seven Japanese nationals who are required under Japanese Government regulations to fill officer-level positions.

Offshore longline vessels are separated into two sub-categories - small offshore vessels (10-20 GRT) and mid-sized offshore vessels (20-120 GRT). Both small offshore and mid-sized offshore vessels are permitted to fish beyond Japan’s EEZ in WCPFC waters. While the majority of small offshore vessels operate in Eastern Japanese waters, some venture further south around Palau and FSM. Larger offshore vessels typically operate in sub-tropical waters to the east of Japan to Hawaii and in tropical waters from east of the Philippines to around the international dateline.616 Vessels target albacore in sub-tropical waters, bigeye and yellowfin in equatorial waters and swordfish off Japan. In recent years, the catch composition of offshore longline vessels has changed significantly. In 1980s-1990s, yellowfin and bigeye were the main target species, with yellowfin accounting for the largest proportion of catch (around 40%). However, in the last ten years, albacore has become the predominant species caught (40% of catch), despite bigeye and yellowfin prices being higher than albacore. This relates largely to declining catch rates of bigeye and yellowfin in tropical waters, which has resulted in offshore vessels fishing more in temperate waters.617

611 Gillett & McCoy 2007.
612 Interview, Japanese longline industry representative, June 2010.
613 OPRT list of registered Japanese longline vessels, translated data provided by M. Nakada, FFA.
615 The major companies owning distant water vessels include: Sumioshi Gyogyo (10); Fukuseki (10); Korio (8); Taiyo A&F (5); Wakashio Maru (5); Fukuichi Gyogyo (1, formerly 3). The remaining vessels are owned by family businesses (1-3 vessels each).
617 KINKATSUKYO data. Provided during interviews, June 2010.
Catch is stored using RSW\textsuperscript{618} and is either landed fresh in Japan or offloaded to selected offshore longline bases in the WCPO (e.g. Guam) to be air-freighted to Japan. Given catch is sold into the fresh sashimi market, trip lengths are for a maximum of 25 days. In late 2010, there were reportedly 275 small offshore vessels and 51 mid-sized offshore vessels in operation.\textsuperscript{619} In a similar trend to the distant water vessel class, the number of mid-sized offshore vessels has reduced significantly (142 in 2000), while small offshore vessel numbers have remained relatively stable.\textsuperscript{620}

Catch and effort data is aggregated for mid-sized offshore and distant water vessel classes. In 2009, total catch in WCPFC waters was 29,505 mt. Yellowfin accounted for 33\% of total catch (9,806 mt), bigeye 26\% (7,699 mt) and albacore 21\% (6,261 mt). For small offshore vessels, total catch was 17,694 mt, with albacore accounting for almost half of the catch (8,049 mt), big eye 28\% (5,090 mt) and yellowfin (13\%). Total catch of the Japanese commercial longline fleet (excluding small coastal longliners) was 47,199 mt in 2009.\textsuperscript{621} Catches volumes have declined significantly in conjunction with the significant decrease in vessel numbers. In 1980, total longline catch was almost 140,000 mt and consistently exceeded 100,000 mt in the ten years following. By 2000, total annual catch had declined to around 70,000 mt and currently, is less than 50,000 mt.

With the drastic decline in Southern bluefin (SBF) quota allocated to the Japanese fleet from 6,065 mt to 3,000 mt (21 mt per vessel), vessels operating in this fishery have also sought licences to operate in WCPO waters (particularly Solomon Islands) to target bigeye and yellowfin after the SBF season ends.

The majority of distant water longliners are members of the Japan Tuna Fisheries Cooperative Association (NIKKATSUKYO) (178 vessels in 2010). Most offshore longliners are members of the National Offshore Fisheries Association of Japan (KINKATSUKYO). The remaining offshore longliners (possibly less than 10 vessels) are represented by the National Ocean Tuna Fishing Association (ENKATSUKYO). These associations play a significant support role in representing Japanese longline industry interests to the Japanese Government, RMFO’s and coastal states.

Vessels in the coastal longline category are less than 20 GT and mostly fish within Japan’s EEZ. A few Okinawan-based vessels may fish beyond the Japanese EEZ. These vessels use ice or RSW for catch storage. Little data is available concerning the operational characteristics of these vessels (i.e. catch, vessel numbers).

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\textsuperscript{618} Previously, there were some ULT vessels in the 20-120 GRT category, but these vessels ceased operations in the early 2000s, as they were unable to compete with larger ULT distant water vessels who were supplying the same market. Interview, Japan longline industry representative, June 2010.

\textsuperscript{619} Of these 51 vessels, 30 are based in Oita Prefecture and target bigeye and yellowfin tuna; 20 are based in Kesennuma are mainly fish in the Eastern Japan area targeting shark and billfish, with only a small volume of catch being tuna. KINKATSUKYO data; provided during interview. June 2010.

\textsuperscript{620} One of the major contributing factors to small offshore vessel numbers remaining comparatively stable has been less stringent periodic inspection requirements under the International Convention of Safety of Life at Sea (SOLAS). Vessels in the 20-120 GT class are required to have major inspections every 5 years (inspection fee ¥ 15 million) and intermediate inspections every 2.5 years (¥ 7-8 million), which is a major financial burden for vessels in this size class. In comparison, requirements for vessels less than 20GT are less stringent, with inspections being conducted every six years and costing ¥ 3-6 million. Interview, Japanese longline industry representative, June 2010.

\textsuperscript{621} JFA 2010.
**Pole and line fleet**

Japan’s pole and line fleet is also comprised of two major commercial vessel classes – offshore (20-120 GT) and distant water (>120 GT). Both vessel classes only operate within the WCPO region and rely on live bait stored within purpose-built wells on board.

The Japanese distant water pole and line fleet is currently comprised of 26 vessels over 200 GT, with ULT capability. Vessels have access arrangements with Kiribati, FSM, Marshall Islands and also operate in high seas areas off Japan. From October-April, the vessels operate in tropical waters, targeting skipjack (ULT). From May-September (kinkai season), the vessels fish in northern sub-tropical waters closer to Japan (30-35°N, 140-160°E), traditionally targeting skipjack for toro katsu (i.e. skipjack with higher fat content, particularly in the belly region, for which a price premium exists). More recently, vessels have been increasingly targeting albacore, due to reportedly lower migration rates of skipjack from equatorial waters to waters above 20°N (potentially due to declines in the skipjack resource and/or La Nina fishing conditions). Average annual catch per vessel is between 800-1,400t, with roughly 40% of the catch sourced from tropical waters and 60% in sub-tropical waters above 20°N. The majority of the catch is offloaded at Yaizu, with a small volume offloaded at Makurazaki. Each vessel employs 30-35 crew members, half of which are foreign workers from Kiribati and Indonesia. All distant water pole and line vessels are family owned businesses based in Kesennuma, Yaizu and Kagoshima. Vessel numbers have decreased over time. In the 1980s, over 80 distant water vessels were in operation, however, the fleet reduced to 40 vessels in 1991 after a Japanese-Government funded scrapping program to reduce fleet capacity. In 2004, a further 10 vessels were scrapped and since this time, 3 vessel operations have gone bankrupt. Currently, 26 distant water pole and line vessels remain in operation. The majority of distant water pole and line catch is sold for sashimi (80-90%), with only small volumes of high quality skipjack marketed for katsuobushi production (around 10%).

The offshore pole and line fleet currently consists of 67 vessels; a decrease from 89 vessels in 2005. Vessels target skipjack, which is marketed fresh for sashimi through three main ports – Omaezaki (Shizuoka), Katsuura (Chiba) and Kesennuma (Miyagi). During the first quarter of the year, vessels generally fish in the sub-tropical international waters east of the Northern Mariana Islands and then move northward in conjunction with the migration of skipjack stocks to waters above 20°N. Industry representatives reported that recent catch volumes of skipjack have declined overall, with a much larger portion of the catch being low value, smaller-sized fish (i.e. below 1.8kg, ¥50/kg). According to industry sources, offshore pole and line vessels collectively caught over 60,000 mt in 2005. By contrast, in 2009, total catch was around 21,000 mt.

Total catch of the Japanese pole and line fleet for vessels larger than 20 GRT (which includes both offshore and distant water vessels) was around 95,000 mt in 2009.

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622 Unless specified otherwise, information presented in this section is sourced from interviews with Japanese pole and line fishing industry representatives, June 2010.
623 At the time of conducting in-country consultation in Japan (June 2010), there were 27 registered distant water pole and line vessels. In April 2011, one vessel (Dai Ichi Shoei Maru) caught fire and sank, reducing the fleet to 26 vessels. Pers. comm., industry source 2011.
624 All vessels employ at least ten Kiribati crew members; some have 15-18 on board.
626 The most desired skipjack size class ranges from 1.8 kg – 3.1 kg.
Catch volumes have declined markedly over the past five years. In 2005, total catch was 150,000 mt. Catch composition has also changed significantly. In 2005, skipjack and albacore accounted for 86% and 10% of total catch, respectively. By 2009, the proportion of skipjack declined to 60%, while albacore increased significantly to 34% of total catch. This trend relates to a decrease in skipjack availability (potentially due to lower skipjack migration rates and competition from the purse seine fleet), as well as growing popularity of albacore in the lower-end sashimi market.

Distant water pole and line vessels are members of the Japan Tuna Fisheries Cooperative Association (NIKKATSUKYO), while offshore vessels are members of the National Offshore Fisheries Association of Japan (KINKATSUKYO).

**Purse seine fleet**

In the mid-1990s, Japanese purse seine vessels introduced ultra-low temperature freezers on board to enable a portion of their catch to be frozen for sale as sashimi (i.e. bigeye and large yellowfin) at the lower end of the market. This portion of the catch is termed ‘purse seine special’ and currently accounts for around 10-20% (20,000-40,000 mt) of the fleet’s total catch. (See Section 2.2 for further details concerning the Japanese purse seine fleet).

### 6.2.2 Global fishing operations

Japanese distant water longline vessels are permitted under Japanese regulations to fish in the Atlantic, Indian and Pacific Oceans, provided they have the necessary authorizations in place to fish and observe domestic regulations. Hence, in theory, a single vessel may fish in all three oceans. In practice, some vessels may shift between two oceans (i.e. between WCPO & Indian Ocean, WCPO & Atlantic), but on the whole, most vessels usually operate in one ocean.

In 2008, total catch by Japanese distant water longline vessels (172 vessels) in IOTC waters was 33,699 mt (comprised of 41% bigeye, 30% yellowfin, 14% albacore). In ICCAT waters, total catch was 38,500 mt (46% bigeye, 18% yellowfin, 8% Atlantic bluefin, 5% albacore, 12% sharks). In IATTC waters, total tuna catch was 21,182 mt (70% bigeye, 25% yellowfin).

In contrast, while total Japanese longline catch in WCFPC waters for all vessel classes is the highest of all three oceans (around 90,000 mt in 2008), the Indian and Atlantic Oceans account for higher catch volumes for large distant water longliners than the WCPO. In 2008, total Japanese distant water longline catch in WCPO waters was less than 33,000 mt.

Japanese involvement in overseas sashimi-fishing operations has been extremely limited, particularly in Pacific Island countries. To date, only one joint venture longline operation is established in FSM.
Around 30 small offshore vessels are based in Guam (20) and the Philippines (10). Currently, ten Japanese longline vessels are based in South Africa under charter arrangements.

### 6.2.3 Major markets

The primary market for catch from the Japanese longline fleet is the higher-end domestic sashimi market. Frozen bigeye and yellowfin is supplied by the distant water longline fleet, while the offshore fleet supplies fresh sashimi (bigeye, yellowfin, albacore). Both fleets also supply very small volumes of bluefin (Atlantic and Southern).

Around 80-90% of catch from the Japanese pole and line fleet (skipjack and albacore) is supplied to Japan’s sashimi market. Industry sources indicated that around 60% of the skipjack catch is used for lower-end sashimi products (i.e. tataki, minced sashimi) and 20% for sashimi. The remaining skipjack catch is utilised for katsuobushi production. Albacore is used for sashimi and sushi products.

Similarly, purse seine’s ULT catch (purse seine special) (20% of total purse seine catch) is used for lower grade sashimi products (minced sashimi, saku blocks, tataki), primarily for sale to supermarkets and sushi-train style restaurants (kaiten-zushiya). Purse seine special catch competes directly with pole and line catch in the low-end sashimi market.

Fresh catches are generally marketed whole round through wholesaler auctions (e.g. Tsukiji), whereas the bulk of frozen catch (70-80%) is sold outside the auction system to trading companies (e.g. Mitsubishi, Yashima) and processors.

### 6.2.4 Recent developments and future prospects

The dramatic decline in vessel numbers experienced by the Japanese longline fleet stems from a number of factors – high fuel prices, stagnant fish prices, declining sashimi consumption levels in the Japanese market, increased competition from farmed bluefin, a significant reduction in Southern and Atlantic bluefin quota allocations and declining bigeye and yellowfin catches due to stock sustainability issues, piracy issues in the Indian Ocean, high vessel maintenance costs, reluctance of banks to grant loans for constructing replacement vessels and difficulties attracting young Japanese crew members.

In the case of the distant water fleet, industry sources indicated that currently only 30% of distant water longline vessels are profitable, 30% are borderline and 30-40% are struggling and on the road to bankruptcy, with a prediction that only 100 or so vessels will survive in the next few years. Those vessel owners (mostly the larger companies) with diversified business interests (i.e. vertically integrated tuna operations with complimentary processing and/or retail operations and/or other non-tuna related businesses) are likely to be in a stronger position, than small family-run businesses consisting exclusively of only one, at most, three vessels. Industry sources also felt that several of these factors may potentially result in some distant water vessels changing their traditional fishing grounds. In particular, vessels operating in the Indian and Atlantic oceans may seek to shift to the WCPO.

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634 Interview, KINKATSUKYO, June 2010.
Some owners of large vessels may also seek to switch to small-medium scale longline vessels with lower operating costs. The current key industry priorities identified by Japan Tuna Fisheries Cooperative Association (NIKKATSUKYO) are: i) to secure fishing grounds; ii) to attract new, young crew members; iii) facilitate new vessel construction to replace aging vessels; and, iv) sashimi market stimulation.

‘Islandisation’ projects (i.e. Pacific Islands-based joint venture fishing operations) were identified as a potential means of addressing several of these issues, if suitable local partners can be identified. It is believed that islandisation could assist in securing access to fishing grounds, with potentially cheaper licence fees. In addition, basing operations outside of Japan would enable vessels to avoid restrictive Japanese Government regulations concerning crewing, vessel construction, maintenance and safety. Being in closer proximity to fishing grounds would also reduce fuel costs.

Concern was raised by industry representatives about the potential of further WCPFC conservation and management measures introduced for bigeye and yellow which might apply to longline vessels. Some industry representatives support the view that the deterioration of bigeye and yellowfin stocks largely relates to the incidental by-catch of juveniles from purse seine vessels fishing on FADs and as such, further limits placed on longline vessels would be both unfair and could end up completely crippling the industry. Apprehension was expressed concerning the introduction of a PNA longline vessel day scheme, as well as the banning of at-sea transhipment under WCPFC.

High fuel prices, as well as the ageing of experienced officers and problems with recruiting young Japanese crew members were identified as the two most serious factors which will continue to impact the Japanese longline (and likely pole and line fleet) in the future.

A major earthquake and tsunami in the Sendai Province in March 2011 caused serious destruction to fishing vessels, particularly the coastal pole and line and longline fleets. Sendai region fishing ports are major landing points for fresh skipjack and albacore. Processing facilities, cold storage facilities and port infrastructure also sustained serious damage or were destroyed. In addition, thousands of lives were lost, including those of vessel crew members, as well as family members of tuna fishing crew members. At the time of writing, it was too early to quantify the full impacts of this natural disaster on the Japanese tuna industry, but the effects are likely to be major.

**Key Points: Japan**

- Japan’s sashimi market is supplied with catch from the Japanese longline, pole and line and purse seine fleets.
- The Japanese longline fishery has three major vessel classes – distant water (>120 GRT), offshore (10-120 GRT) and coastal (<20 GRT). Total longline catch (excluding coastal vessels) was 47,199 mt in 2009, with catch volumes declining significantly in conjunction with decreases in vessels numbers.

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635 Unlike the Korean and Taiwanese distant water longline fleets which generally tranship at sea into ULT carriers, Japanese vessels operating in WCPO waters typically return to Japanese ports at the end of a voyage or offload in selected Pacific Island country ports. Hence, an at-sea transhipment ban is likely to impact less on Japanese longline fleet operations in the WCPO than other fleets.

Key Points: Japan cont.

- In 2000, 529 distant water longline vessels were in operation; by 2010 this number had decreased to 268. Around 30% of Japan's distant water longline vessels are profitable; only 100 or so vessels are predicted to survive in the next few years. In late 2010, there were 275 small offshore vessels (10-20 GRT) and 51 mid-sized offshore vessels (20-120 GRT) in operation. The number of mid-sized offshore vessels has reduced significantly (142 in 2000), while small offshore vessel numbers have remained relatively stable.

- Japan's pole and line fleet is comprised of two major vessel classes – distant water (>120 GT) and offshore (20-120 GT). In 2010, the fleet consisted of 26 distant water and 67 offshore pole and line vessels; vessel numbers have decreased over time. Total catch in 2009 was 95,000 mt; a significant decrease from 150,000 mt in 2005. Catch composition has also changed significantly with higher catch volumes of albacore (i.e. 10% albacore in 2005, 34% in 2009).

- High fuel prices, as well as the ageing of experienced officers and problems with recruiting young Japanese crew members were identified as the most serious factors which will continue to impact the Japanese sashimi fishing fleets in the future.

- Following the March 2011 earthquake and tsunami, vessel numbers in the coastal longline and pole and line fleets have declined due to wreckages sustained from the natural disaster. Lives of fishing crew members and employees in shore-based tuna businesses have also been lost.

637 The measures are approximate, as there are several length measurements and at least two systems of determining tonnage that may be applicable to vessels under 24 meters in Taiwan.

638 Tung Kang is also transliterated as Dongguan.

6.3 Taiwan

Taiwan's sashimi-grade tuna longline fishing fleets consist primarily of two classes of vessels, large-scale and small-scale, both of which were briefly described in relation to the production of canny-grade albacore (Section 2.3).

Large-scale longliners are steel-hulled vessels greater than 24 meters in length and over 100 GT. These vessels freeze and maintain sashimi grade tuna catch (major target species is bigeye) at ultra low temperatures of -55°C (±5°C). Transhipment and re-supply, including refuelling, is undertaken at sea.

Small-scale longline vessels have hulls of fibreglass reinforced plastic (FRP) and are generally 24 meters or less in length and measure less than 100 GT. Many of the vessels under 100 GT fishing in the western part of the WCPO are equipped with bait wells to carry live bait. Immature farm-raised milkfish are the preferred bait, and are most often used when targeting yellowfin. The sashimi-grade catch is usually landed fresh in ports with good air freight links to major markets. A sub-component of this group consists of smaller vessels under 20 GT, as well as some in the 30-50 GT category, that utilize ice or refrigerated seawater and are based in Tung Kang and other coastal ports, fishing in waters close to Taiwan.
In addition to the targeted sashimi-grade catch from vessels described above, some of the albacore-targeting longliners of both size classes may also produce sashimi-grade fish from their incidental catch of bigeye and yellowfin.

Two major operational characteristics define Taiwan longline activity. The first is the ability to switch target species and in some cases freezing and holding temperature to maximize value of a particular segment of the catch. This is particularly true for vessels of around 20-24 meters in length. This flexibility is enhanced by an ability to adjust areas of operation between oceans, particularly between the Indian and Pacific oceans.

Taiwanese large-scale longline vessel. Photograph: WCPFC.

Taiwanese small-scale tuna longline vessel. Photograph: Palau Observer Program.

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Footnote: Taiwan flag vessels under 24 meters are believed to be prohibited from operating in the Atlantic by Taiwan government regulation.
An undetermined number of these vessels are capable of multiple targeting for different markets, with albacore and bigeye/yellowfin being the two most common. Some vessels may also seasonally target swordfish, or on occasion switch to sets targeting shark when fishing for tunas is unproductive. Some Taiwanese vessels operating in the Indian Ocean may also target escolar (*Lepidocybium flavobrunneum*), a non-tuna species with export value.

The second major characteristic is the retention where possible of much of the incidental catch. This occurs to a greater extent on vessels less than 100 GT due to their more frequent use of ports that provides an opportunity for transhipment of this segment of the catch. Most of the non-tuna incidental catch is transhipped via container or in some cases by carrier vessel back to Taiwan, where a steady and guaranteed market exists.

### 6.3.1 Current fleet status

The number of vessels in Taiwan’s large-scale longline fleet has decreased significantly in recent years. Attrition in the industry can be ascribed to reduced catches and high operating costs, as well as both voluntary and mandatory capacity reduction programs. A current account of large-scale longline vessels by the Organization for the Promotion of Responsible Tuna Fishing (OPRT) in 2010 puts the size of the global Taiwan large scale fleet at 359, a decrease from 562 in 2004.

A possible indication of the financial status of vessels in this fleet is the number of times the catch is transhipped in a year. According to non-Taiwan industry sources, Taiwanese distant water longliners targeting bigeye in the WCPO tend to tranship from two to four times per year at sea, up to double the rate of similar sized vessels in other Asian fleets. The higher transhipment frequency is said to reflect the greater need for cash flow by the Taiwanese, rather than a lack of vessel operational autonomy.

Of the 1,900 FRP small-scale tuna longline vessels believed to be potentially operating in 2008 (see Section 2.3), it is estimated that around 1,400 are between 20 and 100 GT. Of those 1,400, about 45% are 20-50 GT and 55% are 50-100 GT. An industry participant familiar with the domestic-based longline fishery in Taiwan estimated that roughly 150-200 of the smaller vessels under 50 GT operate from ports in Taiwan and are classified as coastal vessels. In addition to targeting yellowfin, bigeye, sharks, swordfish and other species, these vessels participate in a short but financially important bluefin season in coastal Taiwan waters from about May to July. In this fishery the catch is quickly returned to port to maintain quality for export to Japan.

Taiwan’s vessel registration designations of different vessel size classes provide a short-hand means to describe a vessel’s size and capabilities. Table 6.2 identifies six size classes of longliners with their associated general operational capabilities. The catch held in freezers on CT-3 and CT-4 vessels at -20°C is normally incidental catch (sharks, marlin, smaller tunas, wahoo, etc.). Nearly all vessels in classes CT-4 and below are FRP hulled, while CT-5 and above are built of steel.

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640 OPRT 2010: 3.
Table 6.2 **Classification and Operational Capabilities of Taiwanese Longliners**

<table>
<thead>
<tr>
<th>Registration Designation</th>
<th>GT</th>
<th>Operational and Fish Storage Capabilities for Target Sashimi Catch</th>
<th>-20°C</th>
<th>-40°C</th>
<th>-55°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Live bait</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage Method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT-2</td>
<td>Under 20</td>
<td>Most Ice/RSW</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>CT-3</td>
<td>20-50</td>
<td>Most Ice/RSW</td>
<td>Most</td>
<td>None-few</td>
<td>None</td>
</tr>
<tr>
<td>CT-4</td>
<td>50-100</td>
<td>Some RSW/freezer</td>
<td>Most</td>
<td>Some</td>
<td>None</td>
</tr>
<tr>
<td>CT-5</td>
<td>100-200</td>
<td>None Freezer</td>
<td>--</td>
<td>--</td>
<td>Most</td>
</tr>
<tr>
<td>CT-6</td>
<td>200-500</td>
<td>None Freezer</td>
<td>--</td>
<td>--</td>
<td>Most/all</td>
</tr>
<tr>
<td>CT-7</td>
<td>500-1000</td>
<td>None Freezer</td>
<td>--</td>
<td>--</td>
<td>most/all</td>
</tr>
</tbody>
</table>

Sources: Interviews, industry representatives 2010; author’s own knowledge.

In addition to the vessels described above, there is also significant Taiwanese ownership of non-Taiwan flag vessels fishing for sashimi-grade tunas. Industry sources indicated that since around 2000, some Taiwanese operators were allowed to purchase financially-troubled distant water longliners already in operation in Japan and operate them as Japan flag vessels. Later, some of these vessels were transferred to registration in China.641

### 6.3.2 Global fishing operations

Taiwan’s distant water tuna longline vessels are licensed by the Taiwan government with some important distinctions. Large-scale vessels are licensed according to ocean of operation and target species, and cannot change without government authorization. The exception is the fishery for southern bluefin managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Small-scale vessels under 24 meters in length have greater freedom to move between the Indian and Pacific Oceans and can shift target species more easily.

In 2005, ICCAT reduced Taiwan’s bigeye quota by about 70% and imposed other major sanctions on Taiwan’s fleet for under-reporting catch and misreporting catch location. The sanctions were removed after two years of positive efforts by Taiwan, including commencement of a national observer program and the scrapping of a significant percentage of the fleet. All Taiwan-registered vessels authorized to fish in the Atlantic Ocean are larger than 24 meters, with most 40-56 meters in length (>300 GT). The number of vessels operating in the Atlantic in 2008 was 109, about two-thirds of the fleet size in 2003. The 2008 tuna catch of 24,000t was more than 50% lower than catch volumes five years earlier (52,000t in 2003).642

The Indian Ocean has historically hosted the largest contingent of Taiwan’s large scale longline fleet. There were 182 large-scale vessels active in 2008, down from a high of 325 vessels in 2005. In 2008, most fishing activity took place in the western Indian Ocean, and the catch of bigeye and yellowfin combined was about 27,500t, with bigeye comprising 75%.

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641 Although there appears to be no definitive information in the public domain on Taiwan ownership of vessels in these distant water fleets, it is believed that up to 100 vessels may be owned by Taiwan interests, with perhaps 50-60 in the Chinese distant water longline fleet and the remainder in the Japanese distant water fleet.

642 ICCAT 2010: Tables 8, 49.
Swordfish comprised a significant component of catch in 2008 (4,000t).\textsuperscript{643} Besides operational constraints, piracy issues in the Indian have also deterred vessels from operating in the region.

Some large-scale vessels are also seasonally active in the southern bluefin longline fishery. The quota allocation under the Convention for the Conservation of Southern Bluefin Tuna for Taiwanese vessels for the 2011 fishing season is 859t, the same as for 2010.\textsuperscript{644}

Small-scale longline vessels operating in the eastern Indian Ocean utilise bases in Indonesia, Malaysia (Penang) and Thailand (Phuket), preferring locations with suitable support facilities, a potential local market for lower grade fish and good air freight connections to major markets for top grades. Vessels tend to avoid locations that become too expensive and typically sell the entire catch to a trusted local agent who exports the best quality fish via air to markets in Japan. The 2008 catch of bigeye and yellowfin by Taiwan’s small scale longline vessels in the Indian Ocean was reportedly around 13,300t, with yellowfin comprising 72% (9,543t).\textsuperscript{645}

6.3.3 WCPO fishing operations

The number of Taiwan’s large-scale tuna longline vessels operating in the WCPFC Convention Area in 2009 was 75, a steep decline from 133 active in 2005. It is estimated by industry sources that about two-thirds of those operating in 2009 were ULT vessels that targeted bigeye for sashimi use, while the remaining one-third targeted albacore for canny use. According to one industry source, an estimated 10% of the catch by albacore-targeting large-scale vessels is bigeye that may qualify to be sold as sashimi. The total bigeye catch for the large-scale fleet was reported to be 8,863 mt in 2009,\textsuperscript{646} reflecting the reduced number of vessels in the fleet compared to 2005 when the catch was around 10,000 mt.\textsuperscript{647}

About 1,220 small-scale tuna longline vessels fished in the WCPFC Convention Area in 2009. Much of the activity of small-scale vessels directed at fresh sashimi targets yellowfin and is believed to take place in the WCPO west of about 165°E. Preliminary catch data for 2009 show a yellowfin catch by the small-scale vessels of about 16,500 mt and bigeye of around 4,500 mt.\textsuperscript{648}

Vessels fishing in the western portion of the Convention Area utilize bases in Taiwan, Indonesia (Bitung), Philippines (Toril), Guam, Palau, and Port Moresby. In the western portion of the WCPO, many of the CT-3 size vessels utilize milkfish live bait that is obtained in the Philippines and perhaps Indonesia. Vessels may unload fresh fish held in refrigerated seawater at Toril, near Davao in the southern Philippines, Palau, FSM and occasionally, Bitung in Indonesia.

According to industry sources, about 20 of the small-scale CT-4 size vessels targeting albacore in the Fiji/Solomon Islands/Vanuatu areas of the WCPO have freezers capable of maintaining their bigeye and yellowfin incidental catch at −45°C. This provides an alternative market for this component of the catch, which is typically transhipped by container from Suva to Japan.

\textsuperscript{643} IOTC 2009: 8.
\textsuperscript{644} CCSBT 2011.
\textsuperscript{645} IOTC 2009: 2, 3.
\textsuperscript{646} Williams & Terawasi 2010: 21.
\textsuperscript{647} SPC 2009: 26.
\textsuperscript{648} Taiwan Fisheries Agency and Overseas Fisheries Development Council 2010: Table 4.
6.3.4 Major markets

The major market for Taiwan’s sashimi-grade tuna production remains Japan. The catch of the large-scale vessels operating in the Pacific, Indian, and Atlantic Oceans is almost exclusively for the Japanese market. Due to the high cost of air freight, only the higher grades are sent from various ports servicing the small-scale longliners in the Pacific and Indian Oceans. Lower grades are either sold locally or processed and frozen for export.

An undetermined amount of deep frozen (but not fully ULT) tuna at -40°C, possibly in the order of 50t per year per vessel, is also transhipped to Japan in containers from albacore unloading ports (e.g. Fiji and Mauritius). This supply, which is increasing as demand increases and a newer generation of vessels become suitably equipped, is reportedly destined for primarily low-end sushi restaurants or sold in supermarkets.

6.3.5 Recent developments and future prospects

Among the two fleets, the large-scale component is the most vulnerable to increased operating costs. The fleet, which reportedly does not receive any subsidy from the Taiwan government, has continued to shrink in the last five years. Fuel is the largest single item of expenditure, but other costs including bait and transhipment have all increased in the face of stagnating sashimi prices in Japan and a deteriorating bigeye resource situation.

Although also facing operating cost increases like the large-scale vessels, small-scale vessels exhibit greater flexibility and are in a better position to adapt to changing conditions in the fishery. The design and construction of small-scale longliners has continued to evolve in recent years. As with similar situations elsewhere, regulatory limits to length and tonnage challenge designers and shipbuilders to maximize freezing and carrying capacity. The carrying capacity of newer CT-4 class vessels is around 80t, with refrigeration improvements added to enhance catch value of bigeye, in particular. Such vessels are reportedly being constructed in Taiwan for around the equivalent of US$1 million. Financing is available to successful operators and interest rates remains low in Taiwan at less than 2%.

A continuing challenge to small-scale vessels targeting sashimi grade tuna is finding the most appropriate bases from which to operate and minimizing operating costs from those locations. Since much of the fishing activity takes place in the EEZs of coastal states in the WCPO, access to resources is also a continuing concern.

**Key Points: Taiwan**

- Taiwan’s sashimi-grade longline fishing fleet consists of two classes of vessels - large-scale (>100 GT, primarily targeting bigeye) and small-scale (<100 GT, primarily targeting yellowfin). Some of the albacore-targeting longliners of both size classes may also produce sashimi-grade fish from their incidental catch of bigeye and yellowfin.
- Two major operational characteristics define Taiwan longline activity - the ability to switch target species and in some cases freezing and holding temperature to maximize value of a particular segment of the catch; and, the retention where possible of much of the incidental catch.
Key points: Taiwan cont.

- The number of vessels in Taiwan’s large-scale longline fleet has decreased significantly in recent years – in 2010, the fleet consisted of 359 vessels, a decrease from 562 in 2004. In 2008, an estimated 1,400 small-scale longline vessels between 20-100 GT were in operation and around 500 vessels less than 20 GT. There is also significant Taiwanese ownership of non-Taiwan flag longline vessels fishing for sashimi-grade tunas.

- The number of Taiwan’s large-scale tuna longline vessels operating in WCPO waters in 2009 was 75, a steep decline from 133 active in 2005. The total bigeye catch for the large-scale fleet was reported to be 8,863 mt in 2009. About 1,220 small-scale tuna longline vessels fished in the WCPO in 2009, catching an estimated 16,500 mt of yellowfin and 4,500 mt of bigeye.

- Among the two fleets, the large-scale component is the most vulnerable to increased operating costs. Similarly, small-scale vessels are challenged by operating cost increases, but exhibit greater flexibility and are in a better position to adapt to changing conditions in the fishery. The design and construction of small-scale longliners has continued to evolve in recent years.

6.4 Korea

6.4.1 Current fleet status and global fishing operations

In 2008, the global Korean tuna longline vessel fleet was 158 vessels, steadily decreasing from 202 in 1999, and 276 in 1990. The global catch of these vessels was almost 38,000 mt. Of these vessels, 108 were fishing in the Pacific Ocean, 24 in the Atlantic Ocean, and 24 in the Indian Ocean. Other vessels (19) were also registered with the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) to fish for southern bluefin tuna, which also includes some of the vessels above. Many more vessels are authorized to fish in all ocean areas, but are not currently active.

Most Korean longline vessels are large ULT (ultra-low temperature) vessels, storing sashimi-quality fish at temperatures around -55°C. Typically 350-500 GRT in size, they undertake trips of twenty months or more in length, with refuelling, bait replenishment and transhipment occurring at sea. One and a half to two transhipments per year is typical. Previously, there was some seasonal movement of vessels between oceans (e.g. Indian and Western and Central Pacific Oceans), but this seems to occur less often nowadays, largely due to rising fuel and operational costs. Unlike the Taiwanese longline fleet, there is no Korean Government regulation in place that restricts vessel movements between oceans.

Unlike the purse seine fishery, where three large companies dominate completely, many more smaller companies own and operate longline vessels (e.g. thirteen companies are on the FFA vessel register), although the three large Korean fishing companies are still the most significant operators, controlling 70% of Korean’s longline vessels operating in the WCPO – Dongwon
The Korean Overseas Fisheries Association (KOFA) acts on behalf of Korea’s large-scale longline fleet. There are also other fresh tuna longline operations overseas with Korean involvement (e.g. Fiji\(^{656}\), as well as reports of Korean companies buying fresh tuna in Philippines\(^{657}\), but these appear to operate outside the KOFA purview.

### 6.4.2 WCPO fishing operations

In late 2010, there were 105 Korean longline vessels listed on the FFA Vessel Register, with 111 operating in the WCPO in 2009\(^{658}\), slightly up from the 108 vessels fishing in 2008. The 2009 catch in the WCPO was over 31,000 mt, similar to 2008, but with a larger Pacific Ocean catch overall, as a result of more fishing activity in the Eastern Pacific Ocean, as well as a increase in the number of vessels fishing.

Korea is a major contributor to the WCPO high-value (sashimi) longline catch. Vessels target bigeye tuna; in 2009 bigeye comprised around 50% of retained catch, yellowfin 30%, billfish 11% and albacore 5%.

Most of the Pacific catch (85%) continues to be taken in the WCPO, west of 1500W, but as noted, the slightly larger number of vessels fished further east during 2009 than was the case in 2008, presumably reflecting fish availability. Korea has longline access agreements with Solomons Islands, Kiribati, Cook Islands, Tuvalu and Vanuatu, but much of the catch is taken in high seas areas.

The bulk of the catch is either transhipped at sea to ULT carriers or unloaded in Busan at the end of a voyage. At-sea transhipment is critical to the viability of the Korean fleet, with areas of operation usually far removed from ports where transhipment might take place.

### 6.4.3 Major markets

Although the domestic sashimi market is growing (one estimate suggests that this is now 15,000 t of longline-caught fish per year and will continue to grow\(^{659}\)) Japan remains the main market for Korean sashimi tuna, accounting for approximately 70% of Korean sashimi exports.\(^{660}\) Virtually all high quality tuna intended for export is processed and packed at cold storage plants in Busan port, following grading, skinning and slicing. At Sajo CS, which accounts for nearly half of the production for export\(^{661}\), the product breakdown was 50% loins, 30% blocks of various shapes and 20% saku blocks. Product destined for EU markets was generally vacuum-packed. Red meat and off-cuts are also processed into by-products (i.e. petfood, fish paste) and a small amount of albacore (~1,600t) is believed to be canned and exported.

\(^{656}\) Pers. comm., Fiji longline industry representative, 2010.  
\(^{657}\) GMA News 2010.  
\(^{658}\) Kim et. al. 2010.  
\(^{659}\) Lee 2009.  
\(^{660}\) Interview, Korean industry representatives, May 2010.  
\(^{661}\) Supply from 53 vessels globally, with 48 in the WCPO.
Seventy per cent of the product landed in Busan is re-exported, with 70% of these exports destined for Japan, 20% to the EU and the rest to China and the US (10%). Total exports of longline fish in 2008 (all oceans) were close to 26,000 tonnes, worth US$ 199 million. It is assumed tuna sashimi comprises most of this, from fleets of all longline fishing companies and oceans. It is not known how much of this is WCPO fish, but it is assumed to be close to 20,000t.

The remaining 30% of landed (tuna) product is directed to local sashimi consumption, with billfish and other by-catch also going to local buyers. The overall figure of 15,000 t for local sashimi consumption is accepted by industry players, but is believed to include billfish and perhaps small amounts of other species (e.g. Pacific bluefin) taken in the mackerel fishery. A recent higher figure (20,000t) for domestic sashimi consumption was tabled, but the source agreed that this included all tuna and tuna-like species.

6.4.4 Recent developments and future prospects

Vessel numbers in the longline fishery have continued to fall, in the face of increased regulation, increased operational costs and uncertainties regarding the resource base. It is believed that they have stabilized for the time being and indeed, the number of vessels in the WCPO has increased slightly from 2008 to 2009. There appear to be no plans to replace vessels or build new vessels, but deployment of vessels may shift between oceans to some extent, depending on catch rates and changes in the operating environment.

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662 Interview, industry representatives, May 2010.
663 KOFA 2010.
664 Interview, industry representatives, May 2010.
665 Lee 2010.
Demand in the main market (Japan) reportedly remains strong for the ULT Korean product, with traditional ties and respect for the quality of Korean product, but there is some unease about high reliance on a single market, impacts of the economy on high-grade sashimi consumption and a perceived softening of demand for sashimi amongst younger Japanese. The development/expansion of alternative markets (EU, US and China) is seen as very desirable, although it is unclear how realistic these aspirations might be.

Given most of the Korean longline catch is taken in WCPO waters, future prospects for the Korea’s longline fleet relate very much to ongoing developments in the region. There was concern expressed by industry about the ability (and international will) to sustainably manage bigeye tuna (many of the key longline operators are also purse seine operators), apprehension about the Longline Vessel Day Scheme (VDS), now under trial by PNA, and the difficulty of accommodating PIC development aspirations in a complex, ULT longline fishery, given long trip lengths, the general lack of necessary infrastructure in PIC ports and the lack of obvious commercial partners. Particular concern was expressed regarding the possible prohibition of at-sea transhipment (as opposed to transhipment undertaken in designated ports), as this practice is integral to the economic viability of this fishery, where vessels cover large operating distances extending to the eastern WCPO, far from the few ports in the region that can support longline operations.

**Key Points: Korea**

- In 2008, the global Korean longline fleet was comprised of 158 vessels (compared with 276 in 1990), with a total global catch of almost 38,000 mt. Most are large ULT vessels, typically 350-500 GRT in size.
- In 2009, 111 Korean longliners operated in the WCPO, catching around 31,000 mt; 50% of the retained catch was bigeye and 30% yellowfin.
- The majority of Korean longline catch is exported to Japan, but increasing volumes are supplied to the growing domestic sashimi market.
- Vessel numbers in the longline fishery have continued to fall due to increased regulation, increased operational costs and uncertainties regarding the resource base, although vessel numbers are believed to have stabilised for the time being.
- Given most of the Korean longline catch is taken in WCPO waters, future prospects for the Korea’s longline fleet closely relate to ongoing developments in the region. At-sea transhipment is critical to the viability of the Korean fleet. Hence, Korean vessel owners are particularly concerned about the possible prohibition of at-sea transshipment in the WCPFC convention area.

### 6.5 China

Sashimi-grade tuna is produced from two Chinese longline vessel categories: i) smaller vessels under about 30 meters in length based in Pacific island ports delivering fresh fish using ice or refrigerated seawater (RSW); and ii) larger distant-water vessels up to 70 meters in length capable of maintaining the frozen catch at -55°C. In addition to these two general classifications, an undetermined amount of fresh sashimi-grade fish from the last 10 to 15 sets of a trip is held on ice and landed by Fiji-based Chinese longliners targeting albacore for the cannery market (see Section 2.7).

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Global bigeye catches by Chinese longliners, as reported to the four relevant RFMOs, totalled around 21,800 mt for 2008 (Figure 6.1).

**Figure 6.1** Global Bigeye Catches by Chinese Longliners, 2008

State-owned enterprises dominate the ownership of the large distant-water vessels, reflecting their investments in other capital-intensive fisheries such as tuna purse seining, pelagic trawling and squid jigging. Privately held companies or individual entrepreneurs appear to be most prevalent in the ownership of the smaller vessels delivering fresh fish to Pacific island ports. The smaller vessels deliver fresh fish to bases in Pohnpei and Majuro operated by Luen Thai Fishing Ventures (LTFV). LTFV is a subsidiary of Luen Thai International Group, a Hong Kong-based conglomerate with clothing manufacturing, hotels, real estate, air freight and logistics among its other business activities.

The China Bureau of Fisheries grants fishing licenses for large vessels, as well as for fishing on the high seas, and must approve all licenses for those who wish to engage in fishing in the waters under the jurisdiction of other states. Vessels must possess a valid fishing vessel inspection certification and a valid fishing vessel registry certificate, as well as having met other requirements of the Bureau before being eligible for basing overseas or operating in international waters.

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667 An exception is Zhejiang Ocean Fisheries, formerly an SOE, but now controlled by a privately-held conglomerate that operates 28 large ULT longliners worldwide (see Section 2.7 re: purse seine ownership).

668 McCoy and Gillett 2005: 25.
6.5.1 Current fleet status

There are about 138 Chinese large-scale distant water tuna longliners operating worldwide. About 90 or so were said to be active in the Pacific in mid-2010, with some fishing in both the WCPO and EPO. There are 44 vessels fishing in the Atlantic, but only a handful remain in the Indian Ocean due to piracy problems and the resultant government directive that requires vessels to cease all fishing within 1,000 miles of Somalia. Since most of the catch comes from the western Indian Ocean, vessels have shifted operations to the Pacific during the last two years.669

In 2004, the Distant Water Fisheries Branch of the China Fisheries Association first became a member of OPRT, registering 105 distant water vessels. The number of vessels registered increased to 138 by March, 2010, mainly through the importation of second-hand vessels from Japan. A survey of the 123 Chinese longliners listed in the IATTC vessel database in September 2010 shows that of the 13 large-scale longline vessels that joined the Chinese fleet in 2009, 11 were previously registered in Japan and two were former Korean vessels. During the first half of 2010, six vessels formerly registered in Japan also joined the Chinese fleet. It is believed that much of the increase in overall vessel numbers during the past five years involves investment in China by Taiwanese owners of formerly Japanese-flagged vessels as well as some direct investment by Chinese operators.

Some large-scale vessels were built in China during the 1990s and early 2000s; however, no new large scale distant water ULT vessels are currently being built.

Distant water longliner constructed in China (2002). Photograph: WCPFC

In 2009, there were about 70-80 small-scale vessels from China delivering to the LTFV bases in Pohnpei and Majuro.670 The number of vessels at these two bases has remained stable for the past 3 to 4 years, with a slight increase in 2010.671 The composition of the fleet delivering fresh iced fish has changed during the last 10 years.

670 In a few cases vessels are registered in FSM or Marshall Islands, but the vast majority carry Chinese flag and all are believed to be beneficially owned by Chinese interests.
Whereas many vessels earlier in the decade were those adapted to longlining from other fisheries, most in operation now are purpose-built longliners, some with improved refrigeration systems built with RSW or coils for holding ice. Construction materials have also changed, from wooden or ferro-concrete hulls 5-10 years ago to predominantly vessels with steel hulls. Designs for vessels delivering fresh, iced fish remain distinctly Chinese: generally longer and narrower with less carrying capacity than Taiwanese longliners delivering fresh fish, but requiring smaller engines than their Taiwanese FRP counterparts of roughly equal length.

6.5.2 Global fishing operations

Large-scale Chinese ULT longliners have operated in the Indian, Atlantic and Pacific Oceans for the past two decades. Transhipment and vessel re-supply is undertaken on the high seas, following the pattern of other Asian longliners utilizing ULT refrigerated carriers and high seas tankers for refuelling.

From 2000 to 2008 the number of small-scale fresh sashimi vessels operating in the Indian Ocean dropped from 98 to just 16. The current status of this segment of the Chinese longline fleet is not clear; however it is believed that few, if any operate any longer in the Indian Ocean after having experienced continued poor fishing conditions.

From 2005-2007, approximately 40 ULT longliners operated in the Indian Ocean targeting primarily bigeye. In 2008, the number of large longliners dropped to about 30. The total bigeye catch in 2008 was 4,963 mt, with an additional 898 mt of yellowfin reported. According to the Distant Water Fisheries Branch of the China Fisheries Association, only “a few” large longliners remained in the Indian Ocean during 2010 due to the piracy problems prevalent in the western Indian Ocean. It is believed that most of the vessels shifted operations to the Pacific Ocean.

In 2009, ICCAT approved a transfer of 2,000 mt of the bigeye quota from Japan to China, bringing China’s total bigeye quota to 7,900 mt in the Atlantic Ocean, or about 9% of the total allowable catch for all ICCAT parties. The quota increase granted to China did not affect a vessel limit of 45 applicable to China in the Atlantic Ocean.

In mid-2010, there were 38 active ULT longline vessels in the Atlantic from 8 different companies. CNFC, a large SOE, had the largest number of Chinese longliners in the Atlantic with 21 vessels. The company’s strong presence reflects a history of CNFC fishing in the Atlantic, mainly near West Africa where the company has been active in shrimp trawling for many years. In 2008, the most recent year for which catch data is available, Chinese longliners caught 5,686 mt of bigeye and 649 mt of yellowfin in the Atlantic Ocean.

Vessels that fish in the EPO may also fish in the WCPO. The exact number of ULT longline vessels that operated in the EPO in 2009 is difficult to determine from available public information. The bigeye quota allocated by IATTC, currently around 2,500 mt, limits the amount of effort that may be expended in the EPO. Quota is allocated by the Bureau of Fisheries to vessels for fishing in the EPO in accordance with prior activity.

672 IOTC 2010.
673 ICCAT 2010.
674 ICCAT 2009b.
676 ICCAT 2010.
677 The reported catch reported by China of bigeye in 2009 was 2,481 mt. IATTC 2010c.
6.5.3 WCPO Fishing Operations

China’s report to WCPFC in 2010 indicated that 99 large-scale vessels operated in the Convention Area during 2009, an increase of 45 vessels from that reported for 2008. Overall longline catches in 2009 of bigeye and yellowfin were approximately 9,800 mt and 6,300 mt respectively. The 2009 catches of these two species represented increases from 2008 catch levels of 11% for bigeye and 38% for yellowfin.

Since 2008, China has aggregated the Convention Area catch of its longliners of all sizes into one category when reporting to the Commission, making it impossible to determine the amounts attributable to the separate fleet components. In the previous two years, 2006 and 2007, it was reported that the large scale ULT vessels caught an average of about 75% of the bigeye, with the smaller longliners based in Pacific island ports contributing the remainder.

Although distant water longliners do not require extensive support from shore bases, Suva, Fiji has become the preferred port for re-supply and general support of Chinese ULT longliners, when required. There is a strong presence in Suva by SOEs that also operate Fiji-based albacore longliners for the canny market and ship repair facilities are also available. The large amount of international shipping activity in Suva can provide a useful support link to Asia.

Fresh bigeye and yellowfin are landed from vessels utilizing the bases operated by LTFV in Pohnpei in FSM and Majuro in the Marshall Islands. The company is vertically integrated, with a subsidiary believed to own about half of the 70-80 vessels operating from these two bases. Likewise, another sister company owns and operate an air cargo service (Asia Pacific Airlines) that provides airfreight services to markets in Japan and Hawaii, with additional affiliated companies handling the processing and marketing (wholesaling) of tuna in those markets.

6.5.4 Major markets

According to sources in China, all of the ULT catch by Chinese vessels is for export to Japan. The catch is purchased by Japanese trading companies and transshipped at sea to refrigerated carriers that also service the Taiwanese, Korean and Japanese distant water fleets. An undetermined amount of the catch is also bought back to China for processing and re-export to Japan. This portion of the catch is processed under contract by several facilities in northern China and stored in ULT warehouses until favourable prices can be obtained in the Japanese market.

The fresh sashimi-grade yellowfin and bigeye landed by vessels associated with the LTFV operations in Pohnpei and Majuro are directed to several markets depending upon demand, prior sales contracts or obligations and price. Almost all of the fish from the Majuro operation is sent to Hawaii and the US mainland. Some fish from Pohnpei is directed to Japan, but increasingly more is being sent to markets in Hawaii and onward to the US mainland. LTFV also operates processing plants in Majuro and Pohnpei that produce frozen tuna treated with carbon monoxide (CO) shipped by container to buyers in the US.

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Dai et. al. 2010: 4.
In Fiji, there are currently about five separate processors of fresh and frozen sashimi-grade fish obtained from Chinese, Taiwanese and other albacore-targeting longliners operating from Suva. The fresh sashimi-grade fish landed by the Chinese vessels is usually loined and exported by air to the US or European markets. Frozen sashimi-grade, if kept at -40°C, is sold to a local buyer and is then shipped via container to markets in Japan.

### 6.5.5 Recent developments and future prospects

Newer vessels for the albacore-targeting fleet based in Fiji are being built in China for the CNFC Overseas Fishery Company that will have -35°C to -40°C capabilities for the bigeye and yellowfin portions of the catch for sashimi use. This will minimize the use of ice for that portion of the catch and is expected to result in an ability to stay at sea longer than similar-size vessels currently in use.

One current processor and vessel operator in Fiji, Golden Ocean, deals extensively with Chinese vessels and has recently built a new ULT cold store in Suva with 250 mt capacity. In partnership with a large Chinese SOE already active in the Marshall Islands, the company is planning to base longliners in Kiribati for the export of sashimi-grade tuna.

In late 2010, a large project to be funded by a soft loan from China is pending in FSM that would refurbish longline base facilities in all 4 states (Pohnpei, Yap, Chuuk, and Kosrae) and increase the number of Chinese longliners based in the country.

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**Key Points: China**

- Sashimi-grade tuna is produced from two Chinese longline vessel categories - smaller vessels (<30 metres) based in Pacific Island ports, and larger distant-water ULT vessels (up to 70 metres) operating in the Pacific, Atlantic and Indian Oceans. Fiji-based Chinese longliners targeting canning-grade albacore also supply fresh sashimi-grade fish from the last 10-15 sets of a trip. Global bigeye catch by Chinese longliners totalled around 21,800 mt for 2008.
- About 138 Chinese large-scale distant water tuna longliners operate worldwide.
- In 2010, 90-100 distant water longliners were active in WCPO waters; an increase from a reported 45 vessels operating in 2008. In 2009, 70-80 small-scale vessels delivered fresh fish to fish bases in FSM and Marshall Islands. Total longline catch by Chinese longliners in WCPO waters in 2009 of bigeye and yellowfin was around 9,800 mt and 6,300 mt respectively.
- Although distant water longliners do not require extensive support from shore bases, Suva (Fiji) has become the preferred port for re-supply and general support of Chinese ULT longliners, when required.

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679 In addition to yellowfin and bigeye, these processors also purchase opah, mahi-mahi, wahoo and other commercially valuable incidental catch species.

680 From 2008-early 2011, the export of fish and fisheries products from Fiji to the EU was suspended, due to Fiji losing its ‘List 2’ EU-approved status. During inspections conducted during 2007 and 2008, EU inspectors identified issues with the EU-accredited Competent Authority and fishing/processing facilities in meeting EU standards.

Key Points: China cont.
- ULT catch by distant water longliners is exported to Japan. Fresh sashimi-grade yellowfin and bigeye from smaller-scale vessels is air-freighted to the Japanese and US markets.

6.6 Indonesia

Indonesian longline and handline fisheries operate in both the Indian and Pacific Oceans, with individual vessels often fishing and unloading in ports in both oceans. Available information on fishing patterns in the Indian Ocean and WCPO are treated in turn.

Indonesia has long been a major exporter of fresh-chilled sashimi grade tuna. A large number of Taiwanese and Indonesian joint-venture vessels have been based in Jakarta and Benoa and mostly fish in the Indian Ocean. A smaller number of vessels are based in Bitung and other Pacific Ocean ports.

The Indian Ocean longline catch peaked at around 81,000 mt in 1999, with yellowfin comprising 50% of the catch, bigeye 35-40% and the remainder being albacore, southern bluefin tuna and billfish. A total of 18,000 mt of longline-caught tuna was exported from Indonesia in 2002, with 62% fresh airfreight (mostly to Japan) and the remaining 38% frozen (50% of which was exported to the US). The fishery has since declined, reportedly as a result of increased fuel prices and operational costs, as well as resource depletion. IOTC data suggest that the 2009 Indian Ocean longline catch declined to around 25,000 mt, about one third of late 1990s levels. As in the past, yellowfin and bigeye have continued to dominate the catch.

Typical Indonesian tuna longliner unloading in Bitung. Photograph: Antony Lewis.

682 Lewis 2006.
On the Pacific side, most longliners appear to operate from Bitung, although they may fish in the Banda Sea and in the Indian Ocean seasonally. Some catch of larger yellowfin is also taken by vertical handlines (tuna rawai) around FADs (rumpons).

In 2008, the estimated catch of longliners based in Bitung and fishing in EEZ waters was 12,607 mt. Total catch has been relatively stable since 2005. Exact figures are not available, but the catch is likely primarily lower grade frozen tuna. Some fresh chilled tuna is exported, although airfreight opportunities from Manado are costly and infrequent. With the catch in Indonesia’s archipelagic waters included, the total Pacific longline catch may be closer to 20,000 mt, with a total Indonesian longline catch (Pacific EEZ, Indian Ocean and archipelagic waters) of approximately 45,000 mt.

The US is the primary market for Indonesia’s sashimi-grade exports. In 2009, Indonesia was the largest source of frozen yellowfin and bigeye tuna to the US (47% of imports, ~11,000 mt). Exports to the US were mostly frozen fillets (9,546 mt) and eviscerated frozen yellowfin (1,505 mt). Exports to the EU are minor, since a series of SPS-related detentions in 2006.

Limited data are available on fresh sashimi grade exports. In 2004, exports of fresh tuna were 28,155 mt, however, export volumes would likely have declined considerably since that time with the decline in the Indian Ocean catch. Indonesia’s total fresh and frozen tuna exports were 65,500 mt in 2007, but it is assumed that much of this is frozen whole round tuna for canning, since, for example, Indonesia exported 35,000 mt of tuna to Thailand in 2009.

In summary, Indonesia has declined considerably in importance as a supplier of sashimi-grade tuna since the late 1990s, with the reduction in the Indian Ocean catch, but remains a significant source of lower grade frozen tuna, especially for the US market.

**Key Points: Indonesia**

- Indonesian longline and handline fisheries operate in both the Indian and Pacific Oceans. In 2009, total sashimi-grade catch by Indonesian vessels was around 45,000 mt; 25,000 mt of which was caught in Indian Ocean waters (one-third of late 1990s levels) and around 20,000 mt in Pacific waters.
- Indonesia has declined considerably in importance as a supplier of sashimi-grade tuna since the late 1990s, particularly with the reduction in Indian Ocean catch. However, it remains a significant source of lower grade frozen sashimi-grade tuna to the US market.
6.7 United States

6.7.1 Current fleet status

The US fleet for sashimi grade production includes longline fisheries for bigeye tuna, swordfish, albacore and associated species. Albacore troll, small-scale troll, handline, and a pole-and-line fisheries operating around Hawaii and the US Participating Territories of American Samoa, the Commonwealth of the Northern Mariana Islands and Guam contribute a relatively small amount of fresh product (see Table 6.3).691

6.7.2 WCPO fishing operations

US (including US Territories) longline fisheries in the WCPO are based in Hawaii and American Samoa. The total number of longline vessels in the WCPO declined from 166 in 2004 to 156 vessels in 2005 and has remained at that level. The Hawaii-based fleet consistently has the highest number of vessels in operation. The American Samoa-based fleet, which declined from 36 in 2005 to 26 vessels in 2009, supplies cannery-grade, not sashimi-grade albacore.

In 2009, the Hawaii-based fisheries continued to target bigeye and expanded fishing effort into the east as compared with the fishing effort of 2007 and 2008. Total catch of all tuna species caught by the US longline fleets in WCPFC Statistical area in 2009 was 9,203 mt, a significant reduction from the 12,753 mt caught by the US longline fleet in 2007.

Table 6.3 Estimated Catch by Species and Gear Type of US Vessels in the WCPFC Convention Area, 2009.

<table>
<thead>
<tr>
<th>Species</th>
<th>Longline</th>
<th>Albacore troll</th>
<th>Tropical troll</th>
<th>Handline</th>
<th>Pole and line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albacore, North Pacific</td>
<td>171(^a)</td>
<td>0</td>
<td>3</td>
<td>96</td>
<td>0</td>
</tr>
<tr>
<td>Albacore, South Pacific</td>
<td>3,915</td>
<td>237</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bigeye</td>
<td>4,029</td>
<td>0</td>
<td>63</td>
<td>143</td>
<td>0</td>
</tr>
<tr>
<td>Pacific bluefin</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Skipjack</td>
<td>266</td>
<td>0</td>
<td>347</td>
<td>10</td>
<td>214</td>
</tr>
<tr>
<td>Yellowfin</td>
<td>820</td>
<td>0</td>
<td>469</td>
<td>314</td>
<td>17</td>
</tr>
<tr>
<td>Other tuna</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>9,203</td>
<td>237</td>
<td>895</td>
<td>566</td>
<td>232</td>
</tr>
</tbody>
</table>

Notes: Includes US mainland and US territory vessels; provisional estimates; totals may not match sums of values due to rounding to the nearest metric ton.
\(^a\) Likely associated by-catch from bigeye or swordfish targeting, sold as sashimi-grade product.
\(^b\) Product destined for canning, not sashimi.
Source: NOAA-NFMS 2010: 5

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6.7.3 Major markets

North Pacific-based longline vessels store their catch on ice and deliver their product fresh. Products are primarily sold locally to restaurants and retail markets, or exported to the US mainland (see Sections 7.3 and 8.3). A small proportion of high quality bigeye tuna are exported to Japan. The American Samoa-based longline albacore is delivered frozen (gilled and gutted) to the canneries in American Samoa (see Chapter 4.4). Other associated catch is either marketed fresh (for those vessels making day trips) or frozen. The albacore troll fishery in the South Pacific freeze their catch whole and sell to canneries in American Samoa and Tahiti. Small scale fisheries chill their products with ice and sell them mainly to local markets.

6.7.4 Recent developments and future prospects

The Hawaii-based longline fleet targets not only bigeye, but also swordfish. However, swordfish catch was prohibited from 2001 through early 2004 before the fishery was reopened with new regulations, including time closures and limits on sea turtles by-catch. Suppliers based in Hawaii indicate that the swordfish closure and concomitant management restrictions have harmed not only their swordfish, but also their tuna business because following the closure, buyers perceived that suppliers could not consistently provide product. According to one industry representative, “Consistency is the key for our long-term relationships. I have lost entire books of business based on two months of closure [of fishing activities]”. Some suppliers based in Hawaii have gone as far as to consistently source tuna from other parts of the WCPO, indicating that there is demand for sashimi grade tuna beyond what the US fleet can provide.

High fuel costs and increasing prices of supplies are generally constraining the economic performance of most of the US pelagic fisheries and driving reduced participation and declining catches. The US longline fishery will continue to be limited by the bigeye tuna limit established under the WCPFC and in effect through 2011. The US longline fisheries stayed within the limit of 3,763 short tons of bigeye tuna in 2009. In the EPO there is a limit of 500 short tons for vessels greater than 24 metres through 2011. The limit was not reached in 2009.

The Hawaii-based component of the US longline fishery is likely to continue to target tuna species. However, RFMO directives to implement output-based catch limits on bigeye tuna have resulted in static landings on an annual basis. The timing of catch limits (fishing is closed in the WCPO in mid-November, prior to the holiday season where prices in Honolulu and Asia are historically highest) has led vessels to fish in the Eastern Pacific, which requires longer transit times, yields smaller catches, and often, smaller financial returns to vessels.

US small-scale fisheries are stable, though sensitive to the slow economy and high fuel prices. Small-scale fisheries are expected to continue to make single day trips to supply local markets with fresh catch.

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**Key Points: US**

- US longline fisheries in the WCPO are based in Hawaii and American Samoa. In 2010, 156 vessels operated in the region. The Hawaii-based fleet, comprised of around 130 vessels, targets sashimi-grade bigeye. The American Samoa-based fleet (26 vessels in 2009) supplies canning-grade albacore, although incidental bigeye and yellowfin may be marketed for sashimi.

- Total catch of all tuna species by the US longline fleet in the WCPFC convention area was 9,203 mt in 2009; a marked decline from 2007 catch volumes of 12,753 mt. Around 4,000 mt of bigeye and 820 mt of yellowfin was caught in 2009.

- The Hawaii-based longline fleet targets not only bigeye, but also swordfish. A three-year closure of the swordfish fishery from 2001-2004 and the subsequent introduction of stricter management regulations has harmed vessel operators’ swordfish and tuna businesses, due to a buyer perception that vessels could not consistently provide product.

### 6.8 Others – Indian Ocean

#### 6.8.1 Sri Lanka

Sri Lanka is growing in importance as a supplier of sashimi-grade tuna to European markets. The total catch, comprising 89-95% skipjack and yellowfin, reached close to 100,000 mt in 2005, after having expanded rapidly in the decade between 1993-2002. Based on export performance since 2005, it is assumed that the fishery has continued to grow. The value of tuna exports has increased from USD 63 million in 2005 to 138 million in 2009, an annual growth rate of close to 20%. The tuna fishery, previously consisting mostly of drift gillnets, pole-and-line and surround nets, now includes a growing longline fleet which supplies the sashimi-grade tuna for export.

Tuna is exported fresh and frozen, with a variety of sashimi-quality product forms including whole fresh, loins, saku, steaks and toppings. It assumed the product is processed in the many ports in the south of Sri Lanka prior to air-freight export. Recently, 20 longline vessels were certified in a responsible fishing scheme and export whole fresh fish for processing into retail packs in the UK. The Top Ten tuna importers from Sri Lanka, in value terms, are as shown below, with UK, France and Italy the main importers in the predominantly EU market (Figure 6.2)

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693 Dammangoda 2007.
694 Naradeniya 2010: 9,13.
695 FishNewsEU 2010b.
Sri Lanka ranks ninth (3.37%) in the list of tuna suppliers to the substantial EU market, presumably for fresh and frozen tuna products.\textsuperscript{696} Further growth of the Sri Lankan industry (and tuna exports) is anticipated since new fishing ports and infrastructure projects are underway, development targets include a doubling in employment in the sector and in domestic per capita fish consumption, and a trebling of export value.\textsuperscript{697}

There appear to be few recent statistics available for the Sri Lanka tuna fishery, with almost no recent data available on the IOTC database and no annual reports submitted to IOTC, which indicates the potential for improvement in management of the longline fishery.

\textbf{6.8.2 Maldives}

The Republic of the Maldives has long been known for its large domestic pole-and-line fishery with the traditional sail-powered vessels. During the 1990s, a handline fishery targeting larger yellowfin tuna also developed. Only these two gears are allowed to operate in the Maldives commercial tuna fishery. Total catch in 2007 was estimated to be 118,000 mt (Table 6.4), with skipjack caught by pole-and-line gear dominating the overall catch. Yellowfin catches, often larger fish suitable for higher quality markets, dominated the handline fishery.\textsuperscript{698}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6.2.png}
\caption{Top Ten Tuna Importers from Sri Lanka ($ US million)}
\end{figure}
Table 6.4 Maldives Total Tuna Catch By Species and Gear (mt), 2007

<table>
<thead>
<tr>
<th>Species</th>
<th>Pole and line (mt)</th>
<th>Handline (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skipjack</td>
<td>95,807</td>
<td>1,054</td>
</tr>
<tr>
<td>Yellowfin</td>
<td>13,243</td>
<td>7,418</td>
</tr>
<tr>
<td>Bigeye</td>
<td>932</td>
<td>(5)</td>
</tr>
<tr>
<td>Total</td>
<td>109,982</td>
<td>8,472</td>
</tr>
</tbody>
</table>

Source: MSC 2010.

Pole and line-caught skipjack is mostly canned/pouched in the Maldives for export, mainly to Europe, whereas yellowfin (and bigeye) catch is usually sold as fresh or frozen whole fish to international markets, mostly in Asia. Some of the larger fish are loined in Maldives prior to export to these same markets. Handline-caught tuna, mostly yellowfin, is sold fresh and frozen to domestic (tourism) and international markets, some as fresh chilled fish of sashimi quality.

The Maldives remains a minor supplier of sashimi grade tuna but has some potential to expand, within the constraints imposed by distance from markets, transport and operational costs.

Key Points: Others – Indian Ocean

- Sri Lanka is growing in importance as a supplier of sashimi-grade tuna to European markets. Total catch reached close to 100,000 mt in 2005 and is anticipated to continue to grow given national tuna fishery development plans for tuna fisheries expansion which include new fishing ports and infrastructure development.
- The Maldives remains a minor supplier of sashimi-grade tuna (at best, ~20,000 mt), but has some potential to expand.

6.9 Others – Western and Central Pacific

6.9.1 Vietnam

Small vessel longliners operating in Vietnam’s central provinces (Binh Dinh, Phu Yen and Khanh Hoa) land an estimated 10,000t of tuna, mostly yellowfin. An additional estimated 5,000 mt may also be landed in other provinces to the north and south.\(^999\) Large vessel longliners based around Ho Chi Minh also landed good quantities, possibly approaching 5,000 mt in the mid-2000s,\(^700\) but production has declined in recent years as increased operational costs and declining catches have resulted in fishing effort.

Vietnam is a significant exporter of fresh and frozen tuna, mostly yellowfin, in various processed forms (e.g. loins, saku blocks, steaks). Exports are processed by a large number of firms, possibly 20 or more, located both in the central provinces close to the supply source where longliners land fish and the Ho Chi Minh/Mekong delta area, where supply is trucked from landing sites.

\(^999\) WCPFC 2010b.
\(^700\) Lewis 2005.
Much of the product processed in Vietnam is CO-treated, a controversial treatment that intensifies the red colour of the flesh and is banned in the European Union. Fresh chilled eviscerated bigeye and yellowfin is also exported from the international airports of Ho Chi Minh and possibly Da Nang, though data on quantities or value are limited.

Vietnam’s total value of fresh and frozen exports was USD 100 million in 2009. A proportion of this was re-exports: tuna that were imported to Vietnam, value-add processed (e.g. into saku blocks) then re-exported to major markets. Data were not available on re-export quantities.

Vietnam’s major export markets are the US and the EU, which together, as noted in Section 4.12 account for 70% of the total export value of Vietnam’s exports. Vietnam was the largest exporter of fresh tuna to the diverse US market in 2009 (2,600 mt, 12% of total US imports), as well as a significant proportion of frozen yellowfin and bigeye (~ 1,400 mt, 6%).

In 2009, the EU imported 2,260 mt of frozen tuna fillets, 3,036 mt of whole frozen tuna and 350 mt of loins. There were no data available to estimate what portion of imports was sashimi-grade.

Tuna exports from Vietnam in 2010 surged, with a 70% increase in total export volume by mid-June 2010. This surge was absorbed primarily by the US market. Exports to the EU have declined due to difficulties with implementation of the EU-IUU fishing regulation which came into effect on 1 January, 2010.

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701 Globefish 2010a: 35.
702 Walsh 2010.
Exports are primarily fresh/frozen tuna, rather than canned tuna, on account of favourable longline catches in the central provinces.

Vietnam has potential to further develop its domestic longline fisheries and value-added processing for export markets. Recent growth in production by the longline sector has been dramatic and Vietnam is now a significant supplier of fresh and frozen tuna, particularly to the US market.

6.9.2 Philippines

Philippines operates a number of large distant water longliners (less than 20 in total) which fish in all oceans, though mostly in the Atlantic and Indian Oceans (see Section 2.6.2). Details of catch volumes are not available, but it is likely that catch is transhipped at sea and destined for sashimi markets. Chinese (Luen Thai Fishing Venture) longliners also unload some catch in Philippines at the single designated port of Toril (Davao) (see Section 6.5).

The Philippine handline fishery comprised of large outrigger vessels known as pump boats or bancas, accounts for considerable production of adult tuna. The 2009 handline catch was 8,200 mt, whereas catches in the recent past has been over 16,000 mt. The fishery is based in General Santos (southern Mindanao), where the catch (> 90% yellowfin, with smaller quantities of bigeye and billfish) is processed onshore in twelve or more factories, mostly in General Santos, and typically using CO (carbon monoxide) to produce “frozen smoked” product for export. During the 1990s, much of the catch was exported as sashimi-quality fresh chilled whole fish, often to Japan utilizing airfreight via Davao. However, with an increasing shift to value added CO-treated frozen tuna products, possibly less than 25% of exports is now fresh-chilled whole round.

In addition to CO-treated tuna, there has been recent interest in a new low-temperature processing method - oxygen-frozen (O2) tuna. High-grade handline-caught fish is being processed in General Santos by deep-freezing in liquid oxygen to -600C. Processing volumes are unknown, but are currently probably small, given operations are largely experimental at this stage and challenging logistical cold-chain issues will need to be dealt with.

The Philippine handline fishery fleet size has dropped from 2,500-3,000 vessels to around 1,000 since 2000. Reportedly, the remaining vessels are making longer trips to achieve acceptable catch levels, and the long trips result in lower quality of iced fish, reducing the proportion of first grade product suitable for sashimi export.

Fresh/chilled/frozen exports from Philippines in 2009 were 23,504 mt, down from 32,000t the previous year, with most of the frozen whole exports likely destined for canning. The fresh sashimi grade quality and higher-value frozen proportion of these exports is small, probably less than 6,000 mt. The US and EU are the major markets for Philippine tuna exports. In 2009, the Philippines was the second largest exporter of frozen yellowfin and bigeye to the US (~ 4,000 mt, 17%).

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705 WCPFC 2010a.
706 Lewis 2004: 22.
707 Infofish 2010: 38.
708 NSO data, in Barut & Gervilleges 2010: 8.
709 Author’s estimate, based on discussions with General Santos fish exporters.
710 Walsh 2010.
In the same year, frozen fillet imports were 3,829 mt and fresh yellowfin imports were 1,462 mt.\textsuperscript{711}

In 2009, EU imports from Philippines were 6,821 mt of whole frozen tuna, most likely, the majority of which being yellowfin destined for canning. EU imports have been higher in previous years. For example, in 2007, the EU imported 11,573 mt of whole frozen tuna from the Philippines.\textsuperscript{712}

Although the handline fishery is in decline, demand for sashimi-quality fish from Philippines remains high. A recent deal between a Korean company and local producers seeks to source 200 mt of sashimi-grade tuna a month from Philippines.\textsuperscript{713} A sustainably certified handline fishery is being encouraged in Mindoro, with reported (but unverified) catches of ~ 4,000 mt per year.\textsuperscript{714}

6.9.3 Fiji

The Fiji domestic longline fleet is one of the largest in the region. In 2009, 13,849 mt was caught in the Fiji EEZ and adjacent waters by 97 Fiji-based vessels. Albacore accounts for 52\% of the catch, yellowfin 18\% and bigeye 5\%, with a relatively high proportion of landed by-product (25\%).\textsuperscript{715}

Albacore is either sent frozen to Pa'fco in Levuka, Fiji or Pago Pago, American Samoa for loining and/or canning. High quality fresh-chilled bigeye and yellowfin are air-freighted using consistent and well-established flight connections to the Japanese and US markets.

\textsuperscript{711} NMFS 2010.
\textsuperscript{712} Eurostat 2010.
\textsuperscript{713} GMA News 2010.
\textsuperscript{714} WCPFC 2010a: 18
\textsuperscript{715} Amoe 2010.
Fiji is a major exporter of fresh tuna to the US (1,500 mt in 2009)\(^\text{716}\), including 1,092 mt of fresh yellowfin, 324 mt of fresh albacore and 60 mt of bigeye.\(^\text{717}\) Fiji is also the top supplier of albacore loins (cooked) to the US (see Section 2.12). No data are available for Japanese imports from Fiji, but 87\% of tuna exports went to the US and Japan in 2009, with exports to Japan presumably less than those to the US. Significant quantities were exported to the EU in the past (880 mt whole frozen fish and 200 mt fillets in 2008). However, in 2008, Fiji lost access to the EU market due to deficiencies identified with Fiji’s EU-accredited Competent Authority in being able to effectively guarantee that Fiji’s fish exports meet the EU’s strict SPS regulations. Approval to re-commence exports to the EU was gained in early 2011.

6.9.4 Other PICs

Tonga, Solomon Islands and Papua New Guinea all produce or have produced small quantities of sashimi quality tuna for export to US and Japan markets, mostly yellowfin and some bigeye.

The Tonga longline catch recorded for 2009 was 321 mt (taken by seven registered vessels). Fresh yellowfin and bigeye were exported to the Japanese and US markets (90\% of Tongan exports), whereas albacore were consumed locally.\(^\text{718}\) Total export volumes appear to have been less than 100 mt, of which 15 mt of fresh yellowfin and 3 mt of bigeye went to the US market.\(^\text{719}\)

There has been no domestic longline fishery in Solomon Islands since 2005, although licensed foreign longline vessels have continued to take good catches in Solomon Islands waters (175 vessels, ~ 16,500 mt in 2009).\(^\text{720}\) None of this catch is currently landed in the Solomon Islands and exported as air-freighted sashimi-quality catch. In early 2010, close to 150 longline vessels\(^\text{721}\) were licensed under a charter agreement with Solomon Islands government to fish throughout the EEZ, including in archipelagic waters, although catch data is not available for these vessels. In early 2011, reportedly ~157 vessels were fishing in Solomon Islands waters.\(^\text{722}\) All catch has been transhipped or transported by the fishing vessels out of the Solomon Islands. No onshore processing of longline catch for export has occurred, although a processing facility is reportedly under construction in Honiara.\(^\text{723}\)

The Papua New Guinea domestic tuna longline fleet\(^\text{724}\) has declined from 38 vessels in 2005 to 20 vessels fishing in 2009.\(^\text{725}\) Under PNG fisheries policy, only domestic longliners are allowed to fish in PNG waters. The 2009 domestic catch was 2,117 mt, dominated by yellowfin (66\%) and albacore (20\%), 600 mt of which was exported as fresh-chilled and frozen tuna to Japan, Australia, the US and other destinations. PNG exported approximately 150 mt of eviscerated frozen and fresh yellowfin to the US in 2009;\(^\text{726}\) no data are available on exports to other markets.

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\(^\text{716}\) Globefish 2010a: 35.
\(^\text{717}\) NMFS 2010.
\(^\text{718}\) Halafihi 2010.
\(^\text{719}\) NMFS 2010.
\(^\text{720}\) MFMR 2010.
\(^\text{721}\) WCPFC Circular 2010/20
\(^\text{723}\) Pers. comm., Solomon Islands industry source, 2011.
\(^\text{724}\) Some vessels (~ 9) target shark, but also catch small volumes of tuna.
\(^\text{725}\) Kumoru 2010: 15-16.
\(^\text{726}\) NMFS 2010.
French Polynesia has a large domestic longline fleet (68 vessels, both fresh and frozen longliners), as well as pole-and-line (bonitier) and multi-purpose troll vessels (poti marara). No foreign fleets have fished inside the EEZ since 2000. In 2009, total domestic catch was around 6,000 mt; of this, around 18% (1,080 mt) was exported (the majority of which was frozen). Most French Polynesian longline vessel landings are utilised for local consumption, given uniformly high prices prevailing for fresh produce in Tahiti generally exceed returns that can be realised from exports. Minor quantities of frozen fillets, likely albacore, are exported to the EU, with the remainder of frozen fillets likely supplying the US market. Very little chilled sashimi-quality tuna is believed exported. In 2009, the US imported 176 mt of fresh albacore from French Polynesia.

**Key Points: Others - WCPO**

- Vietnam’s small-scale longline fleet lands an estimated 15,000 mt (mostly yellowfin), while larger vessels land less than 5,000 mt annually. Vietnam is a significant exporter of fresh and frozen tuna (mostly yellowfin) in various processed forms and was the largest exporter of fresh tuna to the US market in 2009 (2,600 mt, 12% of total US imports). Potential exists to further develop the domestic longline fishery and value-added export processing sector, with recent dramatic growth experienced in these sectors.

- While the Philippines has a small fleet of less than twenty large distant water longliners, it has a significant handline fishery of around 1,000 vessels (total catch 8,200 mt in 2009; 90% yellowfin). During the 1990s, much of the catch was exported as sashimi-quality fresh chilled whole fish to Japan. However, with the increasing shift to value-added processing (typically CO-treated tuna products), less than 25% of exports are now marketed in whole round fresh-chilled form.

- In 2009, 97 Fiji-based longline vessels caught 13,849 mt of tuna (52% of which (7,200 mt) was canning-grade albacore; 3,185 mt of bigeye/yellowfin). High quality fresh-chilled bigeye and yellowfin is exported to the Japanese and US markets. Significant quantities were also exported to the EU market (880 mt whole round, 200 mt fillets in 2008), prior to Fiji losing EU market access in late 2008.

- Tonga, Solomon Islands and Papua New Guinea all produce (or have formerly produced, in the case of Solomon Islands) small quantities of sashimi quality tuna for export to the Japanese and US markets. French Polynesia has a large domestic longline fleet (68 vessels), although the majority of catch (80%; ~5,000mt) is utilised for local consumption.

### 6.10 Implications for PICs

The longline fishing industry for the sashimi market has been in a precarious state in the past 5-10 years and this situation is likely to continue in the short-medium term. While considerable effort has been put in place to reduce global overcapacity in the fishery, further capacity reductions are still required. The operating environment will remain difficult given a number of ongoing issues including tuna stock sustainability concerns, ongoing expansion in purse seine fishing activity, high operating costs, stagnation in the Japanese sashimi market, increasing fishing regulations

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727 Service de la Peche 2010: 5.
728 129 mt in 2009; Eurostat 2010.
Inevitably, longline vessel numbers will continue to decline as more operations exit the industry due to bankruptcy. Given bigeye and yellowfin are the most highly targeted species for sashimi and sustainable fishing limits are being reached in all oceans, the ability of RFMO’s and coastal states to effectively manage these stocks will be critical in the next few years.

With stocks fully exploited in the Atlantic and Indian oceans, as well as escalating piracy issues in the Indian Ocean, some vessels currently operating in these fishing grounds may seek to shift operations to the WCPO. This could potentially lead to increased demand for fisheries access to PIC EEZs, particularly if high seas area closures in the WCPO are extended to longline vessels. However, increased longline fishing activity in WCPO waters will require extremely careful management at the national, sub-regional (i.e PNA) and regional levels, given the fragile condition of bigeye and, to a lesser extent, yellowfin. The introduction of a vessel day scheme for the tropical longline fishery by PNA members, offers potential for enhanced longline fishery management, if it is implemented effectively and adopted as a WCPFC conservation and management measure.

In a situation with parallels to the WCPO purse seine fishery, a VDS that introduces effort limits and creates competition for fisheries access, also offers potential to increase the value of the fishery in terms of driving up the price of access, as well as providing a mechanism for leveraging increased domestic development. PICs will need to be mindful, however, that the capacity of many longline vessel operators to make investments in onshore developments will be very limited, given serious profitability constraints currently faced by the majority of operations, and the fact that many longline operations are small, family-run entities. Small-medium scale longline operations supplying fresh sashimi lend themselves more to operating from offshore bases in PICs than large distant water vessels. However, reliable air-freight connections to major sashimi markets (i.e. Japan and US) are critical, as well as adequate infrastructure and cost-effective vessel support services (e.g. fuel, bait, vessel provisioning, vessel repairs), which only a few PICs are able currently able to provide.

As long as large distant water longliners are permitted to tranship at-sea, opportunities for increased activity and/or onshore investment in designated PIC ports will remain limited.

Some fleet-specific implications for PICs concerning the four major longline fleets are as follows:

- **Japan:** Japanese longline fishing activity is likely to continue to reduce, both globally and within the WCPO region, given the inevitable decline in vessel numbers. Some vessels currently operating in the Atlantic and Indian Oceans may opt to shift fishing grounds to WCPO waters, and in doing so, would need to approach PICs to establish fisheries access agreements. Provided suitable local commercial partners can be identified, some Japanese longline vessel operators may look to establish joint venture fishing operations in Pacific Island countries, primarily as a means of securing access to WCPO fishing grounds, as well as a means of avoiding restrictive Japanese Government regulations. On the other hand, a lack of experience by vessel operators in dealing directly with foreign partners and particularly with those in Pacific island countries may cause some to shy away from such arrangements. This would seem to open the door for middle-men or facilitators who could bridge the gap between vessel operators and Pacific island interests.
- **China**: China is continuing to increase its presence in the WCPO through ULT longlining and increased basing activity centering on the production of fresh sashimi. This comes at a time when Japanese longline fishing activity is continuing its accelerated decline. Due to a number of factors, Chinese vessel operators are able to survive and even prosper in adverse economic conditions that have forced other operators, both foreign and domestic in the Pacific Islands, to drastically cut back or exit the fishery.

An awareness of China’s fishing activities and the driving forces behind them will become more important if FFA member countries desire to obtain greater direct benefits from Chinese longline activities.

For logistical, financial and political reasons, the center of activity for distant water longlining will continue to be focused on Fiji. Various attempts are being made by the Chinese to expand beyond the Fiji base, however their success will depend upon their ability to overcome serious deficiencies in infrastructure and available support facilities, including the logistical hurdles of cost-effective transportation to markets.

- **Taiwan**: As much of the fishing activity of Taiwan’s small scale vessels takes place in the EEZs of PNA members, long-term access to WCPO fisheries resources is an ongoing concern. In terms of opportunities for basing vessel small-scale operations in the WCPO region, cost-effective bases are required with appropriate facilities from which to operate and with ready access to markets. The availability of cost-effective overseas shipping (both air and sea freight) is thus an important consideration in basing Taiwanese longliners in the WCPO region. As with the Japanese small-scale fleet operators, Taiwanese operators have little experience in dealing directly with Pacific island nations. Middle-men who are able to facilitate access and provide the necessary linkages are probably a necessity in organizing and executing basing operations.

- **Korea**: As most of the Korean longline catch is taken in WCPO waters, future prospects for the Korea's longline fleet depend heavily on ongoing developments in the region. As the Korean fleet is mainly comprised of large distant water vessels, the potential for accommodating PIC development aspirations will be constrained on account of long trip lengths, lack of necessary infrastructure in PIC ports and a lack of suitable commercial business partners. The Korea fleet will also be adversely affected by high seas area closures, if these are extended to longline vessels, as well as the potential banning of at-sea transhipment.
7 PRINCIPAL SASHIMI MARKETS

7.1 General Overview

Japan is the world’s principal and pioneer market for fresh-chilled and frozen sashimi-grade tuna, given sashimi and sushi are food dishes which are unique to Japanese cuisine.

In Japan, the term ‘sashimi’ refers to fresh raw seafood which is sliced into thin bite-sized pieces and traditionally served with soy sauce, wasabi (horseradish paste) and condiments (e.g. fresh ginger, radish). Tuna flesh (maguro) and the fatty belly portion of tuna (toro) are very popular sashimi dishes. ‘Sushi’, a term which is often confused by non-Japanese consumers and used interchangeably with sashimi despite being distinctly different, refers to a Japanese dish comprised of cooked cold vinegar-flavoured rice (shari) which is moulded into various shapes and is garnished with other ingredients (neta), most commonly raw seafood (sashimi), egg or vegetables. Tuna sashimi is a popular sushi ingredient. Sashimi-grade tuna is also served in other forms including tataki (loins that are lightly seared on the outside, raw on the inside and then sliced), saku blocks (pre-cut loins that are later sliced into sashimi) and minced sashimi.

In other markets, the definition of what constitutes ‘sashimi’ or sashimi-grade tuna is often blurred. Fresh and frozen tuna used in value-added products (e.g. fillets, steaks, loins) for cooking are difficult to separate from tuna intended for raw consumption as sashimi. This makes estimating the size of sashimi markets outside of Japan difficult, as data on catches, imports/exports and consumption are generally aggregated into ‘fresh’ and ‘frozen’ categories. For the purposes of this report, an attempt has been made to separate the major sashimi and non-sashimi markets; other value-added fresh/frozen tuna products are discussed in Chapter 8.

729 Unless otherwise stated, references to sashimi in this chapter apply specifically to tuna.
Despite the consumption of sashimi-grade tuna being firmly engrained in Japan’s culinary culture, interestingly, its origins only date back to the 1940s. Prior to this time tuna was viewed as a low-quality fish. Several factors have contributed to the increasing popularity of sashimi-grade tuna in Japan – the development of ultra-low temperature (ULT) freezing technology for Japan’s tuna fishing vessels and onshore cold storage facilities; clever promotion of tuna by central market wholesalers during the 1960s; strong consumer demand for high quality sashimi tuna during the economic boom (mid 1980s to early 1990s); the attractiveness of the Japanese tuna market to foreign fishing operators given the rising strength of the Yen relative to the US dollar; and strengthened airfreight links for imported sashimi-grade tuna, facilitating year round availability.

Until the 1990s, sashimi tuna was almost exclusively consumed in Japan. Today, Japan still remains by far the largest sashimi market, accounting for at least 80% of global consumption. By comparison, the second most significant sashimi market, the US, accounts for an estimated 8-10% of total sashimi consumption. Annual tuna supply to the global sashimi market is currently estimated at around 500,000 mt; 300,000-400,000 mt of which is supplied to Japan.

Annual consumption of sashimi in Japan is declining (see Section 7.2). However, the sashimi tuna market is becoming increasingly globalised, with markets expanding outside of Japan as consumers seek out healthy eating options and become more adventurous in eating international foods. A Japanese industry source explained “Once upon a time, Japan was the only sashimi eating nation – it was the ‘big stomach’. Now markets are developing elsewhere, so the future of the sashimi market is bright because of globalization!”

An estimated 60,000-100,000 mt is currently supplied to other non-Japanese sashimi markets (Table 7.1). The first sashimi markets to develop outside of Japan in the 1990s were the US and Europe (particularly, the UK). Sizeable markets have since developed elsewhere in Asia, with consumption in Korea, China and Taiwan already exceeding that of the European Union. The growing popularity of Japanese food is also evident in Australia and New Zealand, with a huge boom in the past several years of fast-food retail sushi outlets. Markets are also emerging in Eastern Europe (i.e. Russia) and South America (i.e. Ecuador).
Table 7.1 Estimated Global Sashimi Consumption, 2010

<table>
<thead>
<tr>
<th>Market</th>
<th>Volume (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>300,000 ~ 400,000</td>
</tr>
<tr>
<td>United States</td>
<td>30,000 ~ 50,000</td>
</tr>
<tr>
<td>Europe Union</td>
<td>4,000 ~ 8,000</td>
</tr>
<tr>
<td>Korea</td>
<td>15,000 ~ 20,000</td>
</tr>
<tr>
<td>China</td>
<td>6,000 ~ 10,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>5,000 ~ 8,000</td>
</tr>
<tr>
<td>Total</td>
<td>360,000 ~ 496,000</td>
</tr>
</tbody>
</table>

Source: OPRT data provided to author, 2010.
Note: Total estimate is conservative, as sashimi/sushi markets in Australia, New Zealand and newly emerging markets in Eastern Europe and Latin America are not included.

The following chapter presents an overview on the two largest markets for sashimi-grade tuna, Japan and the US, as well as China, one of the emerging markets.

7.2 Japan

7.2.1 Current Market Status & Trends

As mentioned, Japan is the world’s largest market for sashimi-grade tuna, consuming an estimated 80% of total global production and was valued at US $3.4 billion in 2006.737 Around 60-70% of total tuna consumed in Japan is sashimi, while katsuobushi accounts for around 20% and canned tuna 10%.738

Sashimi consumption in Japan peaked in 2002 at around 650,000 mt, but has declined significantly since this time. In 2006, the total estimated supply of sashimi-grade tuna to the Japanese market was 408,000 mt. By 2009, this had declined markedly by 100,000 mt to 308,000 mt (Table 7.2). Industry sources predict that by the end of 2011, the Japanese sashimi market could reduce to around 280,000 mt.

According to official data from Japan’s Ministry of Agriculture, Fisheries and Forestry (MAFF), an estimated 149,000 mt of sashimi-grade tuna was supplied by Japanese domestic landings in 2009 (see Section 6.2). The remaining supply (159,000 mt) was met from imports from other longline and handline fleets, as well as bluefin tuna ranching operations in the Mediterranean, Mexico and South Australia. The volume of both domestic landings and imports has consistently declined each year (Table 7.2).

737 De Pietro 2008: 16.
Table 7.2  Total Supply of Sashimi-Grade Tuna to Japan, 2005-2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Landings</th>
<th>Imports</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fresh</td>
<td>Frozen</td>
<td>Total</td>
</tr>
<tr>
<td>2006</td>
<td>72,000</td>
<td>123,000</td>
<td>195,000</td>
</tr>
<tr>
<td>2007</td>
<td>66,000</td>
<td>123,000</td>
<td>190,000</td>
</tr>
<tr>
<td>2008</td>
<td>57,000</td>
<td>115,000</td>
<td>173,000</td>
</tr>
<tr>
<td>2009</td>
<td>51,000</td>
<td>98,000</td>
<td>149,000</td>
</tr>
</tbody>
</table>


Roughly, 30% of total sashimi-grade tuna supply to Japan is fresh-chilled, while 70% is frozen. Fresh-chilled sashimi-grade tuna is supplied by Japan’s offshore longline fleet and air-freighted imports from various other fleets, while frozen tuna is supplied by Japan’s distant water longline vessels, as well as other distant water fleets (e.g. Taiwan, Korea, China) (see Section 6.2). Farmed bluefin is imported in both fresh and frozen form.

Taiwan remains the largest supplier of frozen tropical tuna imports (bigeye and yellowfin) to the Japanese sashimi market, while Indonesia supplies the majority of fresh imports. Japan’s tariff regime has little bearing on import volumes, as the import duty charged for both fresh and frozen sashimi-grade tuna is relatively low (3.5%).

Fresh sashimi-grade tuna, Tsukiji Fish Market. Photograph: Amanda Hamilton

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739 Miyake et. al. 2010: 65.
In the past few decades, Japanese consumers have developed a strong preference for fatty tuna, with the fatty belly portion (toro) being the most prized cut. Hence, the most valuable and sought after tuna species for sashimi is bluefin (Atlantic, Pacific and Southern) followed by bigeye, as these species have the highest fat content. After bluefin and bigeye, yellowfin is the next most popular species. Albacore is becoming increasingly attractive as lower-value sashimi (particularly, ‘poor man’s’ toro) and reportedly accounts for two-thirds of tuna sales through supermarkets. The majority of skipjack is consumed as tataki. In 2007, bigeye accounted for 32% of the total supply volume of sashimi grade tuna, followed by skipjack (21%), yellowfin (19%), bluefin (13%), albacore (9%) and others (6%).

The estimated volume of Japanese imports of farmed Atlantic, Pacific and Southern bluefin tuna in 2007 was around 34,000 mt. Over the past ten years, the volume of farmed bluefin imports has more than doubled (around 15,000 mt in 2001). Japan’s domestic farmed tuna production is also growing, with at least 67 tuna farms, producing a combined 9,200 mt in late 2010. This has impacted negatively on prices for wild-caught bluefin and bigeye, as farmed product has provided a lower-cost source of competition for high-value fatty tuna.

The Japanese sashimi market is highly complex and prices are influenced by a number of factors: fresh-chilled vs. frozen product (with fresh product being higher value); quality (i.e. freshness, flesh colour, texture, fat content, size); species (i.e. bluefin, bigeye, yellowfin, albacore, skipjack in descending order of value); country of origin; market location (regional price variations exist given different taste/species preferences); and, cold storage inventories.

Since the mid 1990s, sashimi prices in the Japanese market have been depressed due to oversupply. According to a Japanese Government tuna market specialist, in the 1980s, the equilibrium supply point for Japan’s sashimi market (all species excluding squid) was 200,000 mt. When supply exceeded this point, prices started to decline. Supply of sashimi tuna alone reached as high as 650,000 mt in the early 2000s, creating a major oversupply problem and price stagnation. Price stagnation has been further exacerbated by economic recession in Japan and the recent global economic crisis, which has depressed food prices generally and influenced Japanese consumer’s preference for cheaper, lower-end sashimi and sushi products. Competition from cheaper farmed product has also placed pressure on prices. Figures 7.1 and 7.2 present fresh and frozen sashimi-grade tuna prices from 1995 to 2010.

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740 The Suisan Times 2010a.
741 In the late 1990s, Japanese consumers started consuming frozen skipjack sashimi in small volumes, following a strong promotional campaign launched by the Japanese tuna industry. Miyake et. al. 2010: 64.
742 Shima & Kawamoto 2010.
743 Miyake et.al. 2010: 36.
744 The Suisan Times 2010b.
Market supply and price data generated by MAFF indicates that while tuna supply in the Japanese market is decreasing, prices are not responding and remain largely stagnant, rather than increasing as they theoretically should. In 2010, research was undertaken by Prof. Lou Xiaobo (Tokyo University of Marine Science & Technology) to research this anomaly. Results of the research indicated that while in decline, supply volumes are likely not reducing as drastically as MAFF’s estimate, with supply in 2009 potentially 350,000–370,000 mt, rather than 308,000 mt.
According to Prof. Xiabo, this discrepancy relates to issues with the data collection system employed by the Japanese Government which was developed over 20 years and excludes a number of sources of supply of sashimi-grade tuna, namely – increasing volumes of imported processed ULT products (e.g. fillets, saku blocks), particularly from Korea and the Mediterranean, as they are statistically classified as processed, rather than primary products; small-sized bluefin (meiji) and other small tuna\(^{746}\) caught by domestic vessels that is landed at small fishing ports which are not catch data collection points; intermittent supply of sashimi-grade tuna from domestic coastal purse seiners; and, increasing supplies of sashimi-grade albacore (only bluefin, bigeye and yellowfin are included in official statistics). In addition to these data issues, industry sources indicated that there is no data collection mechanism in place for tuna sold by domestic vessels through unofficial channels (i.e. directly to trading companies).\(^{747}\) Also, while pole and line-caught fresh skipjack is supplied to the sashimi market, the Japanese market does not classify skipjack as ‘tuna’; rather skipjack is classified in the tuna-like species group comprised of species such as bonito and frigate tunas.\(^{748}\) Hence, while consumed as sashimi, skipjack is excluded from production/consumption statistics relating to the tuna sashimi market.

\(^{746}\) In MAFF landings data, the volume of other small tuna is assumed to be around 20,000 mt per year. In reality, this volume is likely to be higher (but cannot be quantified).

\(^{747}\) Interview, CPRT, June 2010, reporting on presentation outcomes at OFGF-sponsored seminar concerning sashimi prices on 1 June, 2010.

\(^{748}\) Mikyake et. al. 2010: 62.
The Japanese sashimi market is characterized by multiple complex market arrangements and distribution systems, but these can largely be distinguished into two channels according to the fresh and frozen sashimi market segments:749

- ‘Traditional’ channels – trade of fresh (and to an increasingly lesser extent, frozen) sashimi-grade tuna through government regulated wholesale market systems.
- ‘Unofficial’ channels – trade of frozen sashimi-grade tuna that either by-passes or only partly flows through the traditional wholesale market system.

Under the traditional wholesale market system, whole round tuna is traded on a fish by fish basis by auction through markets based at either fishing/landing ports (producers’ wholesale markets (e.g. Yaizu)) or in populous areas (consumers’ wholesale markets (e.g. Tsukiji)). Tuna sold through wholesale markets is purchased by intermediate wholesalers (i.e. wholesalers licenced to resell from a shop/stall within the market area), authorized buyers (i.e. large trading companies, supermarkets, processing firms, restaurant chains) or third party unlicenced buyers (i.e. smaller supermarkets and convenience stores). Auctions are conducted by auction houses on a commission basis on behalf of fishing vessel owners, importers or marketing companies.

The majority of tuna auctioned through producers’ wholesale markets is catch which is offloaded by Japanese vessels, although technically, foreign-flagged vessels offloading in Japanese ports could also be marketed through this channel. Some product purchased by trading companies through producers’ wholesale markets, may in turn be re-sold through consumer wholesale markets. Imported product (including imports from PICs) that is marketed through traditional channels is sold through consumer wholesale markets. Sales to small restaurants and bars are dominated by consumers’ markets intermediate wholesalers.

749 Commentary on Japan’s sashimi market and distribution system is largely based on Campling et. al. 2007: 242-257.
Historically, both fresh and frozen tuna was marketed through the traditional wholesale market system. This market channel remains significant for high quality fresh-chilled tuna. However, with large advances in freezing technology and development of the cold chain over the past 20-30 years, coupled with the growing significance of trading companies in tuna sashimi trading, there has been a considerable shift in the volume of frozen sashimi-grade tuna sold through unofficial channels, rather than the traditional wholesale market channel. Unofficial channels dominate sales to supermarkets and large retailers (i.e. restaurants, sushi bar chains).

Large volumes of frozen tuna are now purchased directly by trading companies (and some large retailers) from vessels, which is offloaded straight into cold storage facilities and then delivered direct to customers. A major benefit to vessel owners of such a marketing arrangement is that trading companies purchase the entire vessel’s catch at one time (i.e. 200-300 tonne consignments), often before the catch is even offloaded, and are able to pay straight away.

According to industry sources, 70-80% of trading companies’ sales are through unofficial (direct) channels to larger retailers and supermarket chains (generally lower quality bigeye, as well as yellowfin and albacore, sold in both whole round and processed forms). High quality frozen tuna (20-30%) (i.e. bluefin, bigeye) is marketed by trading companies through traditional consumer wholesale auctions (80% through Tsukiji, 20% through Sapporo and other markets).

Trading companies have become increasingly significant in Japan’s sashimi distribution system. In 2006, four major trading companies controlled an estimated 65% of sashimi supply in the Japanese market. The most significant sashimi trading company is Toyo Reizo, which is a subsidiary of the general trading company giant, Mitsubishi. Other notable trading companies include Yashima, Nissho Iwai, Itochu Fresh and Marubeni.

With the growing dominance of trading companies and large retailers in the trade of frozen sashimi-grade tuna, distribution systems have become increasingly complex and opaque. According to one industry representative, “Distribution systems have now become very, very complicated – we cannot understand them. Mitsubishi can store product for 1-2 years and the quality won’t change because of -60°C storage…..they can stockpile and control price and only they know where their product goes”.

Over the past twenty years, Japanese consumers’ purchasing preferences for sashimi tuna have changed markedly. During the economic boom of the 1980s and early 1990s, Japanese consumers’ expenditure on eating out was high and their exposure to, and subsequently, consumption levels of high quality of fresh sashimi tuna increased. However, since the mid 1990s, economic recession prompted Japanese consumers to eat at home much more, which has had a major influence on the rise in supermarket sales of lower-priced and lower quality frozen sashimi-grade tuna (particularly longline and pole and line-caught albacore and purse seine special-caught yellowfin). Hence, the buying power of large supermarkets chains has increased dramatically and has contributed significantly to the decline in market prices for sashimi tuna. Low-cost sushi rotary bars (kaiten-zushi-ya) have also risen in popularity with Japanese consumers, in preference to high-end sashimi and sushi restaurants.

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750 Interviews, Japanese industry representatives, June 2010.
751 Toyo Reizo (Mitsubishi) 35%; Try (Nissho Iwai) 15%; Itochu Fresh 5-8%; Maruco (Marubeni) 5-8%. Campling et. al. 2007: 256.
752 Interview, Japanese industry representative, June 2010.
Despite the trend in increased food consumption at home, Japanese household consumption of tuna in Japan is in decline, in both volume and value terms. In 1993, total household consumption per person of tuna (excluding skipjack) was 951 grams and steadily increased until 2002. From 2002, consumption levels declined annually to 798 grams per person. Similarly, the value of household expenditure on tuna has declined, in conjunction with smaller volumes purchased, as well as declining tuna prices. In 1993, the total value of household expenditure on tuna was ¥ 9,122, whereas in 2009, this had declined markedly to ¥ 5,757 (Figure 7.3).\textsuperscript{753} The decline in tuna consumption stems from competition from other protein sources, both seafood and non-seafood. Other marine species, in addition to tuna, are used for sashimi (e.g. other fish species, squid, shrimps etc.) and can serve as substitutes when tuna prices are high. Also, the retail price of beef, once the highest cost (and hence, most ‘luxury’) protein source has declined since the 1990s, when strict import quotas on foreign supply were limited, resulting in increased consumption. Beef is particularly popular amongst the younger generation of Japanese, whose taste preferences are more westernized than the older generation.\textsuperscript{754}

Figure 7.3  Volume and Value of Household Tuna Consumption in Japan, 1993-2009

Source: Database provided to authors by M. Nakada, FFA.

\textsuperscript{753} Data provided to authors by M. Nakada, FFA; originally sourced from Ministry of Internal Affairs and Communications.
7.2.2 Recent Developments and Future Prospects

The increasing volume of frozen sashimi tuna traded through unofficial market channels is impacting some of the key players within the traditional wholesale auction system. The number of intermediate wholesalers is reducing annually due to a decrease in throughput of frozen fish through wholesale auction markets. In 2006, there were 850 intermediate wholesalers, which had reduced to around 700 by mid-2010. This trend is likely to continue as intermediate wholesalers are suffering significantly from competition with large-scale buyers operating outside the traditional auction system. In conjunction with the decline in intermediate wholesalers, auction houses are being forced to adapt their business model to operate more like trading companies, in order to survive. A representative of one of Tsukiji’s five auction houses handling sashimi tuna indicated that rather than focusing on supplying intermediate wholesalers, auction houses are also starting to ‘join forces’ with trading companies and sell to large retail chains.

In terms of market arrangements for high value fresh sashimi-grade tuna, Tsukiji Fish Market and other consumers’ wholesale auction markets will continue to serve their purpose. However, the volume of fresh fish traded through wholesale markets is likely to continue to decline, due to strong consumer demand for lower-cost frozen sashimi (i.e. albacore and purse-seine special caught yellowfin). For frozen sashimi-grade tuna, the role of the traditional market channels will continue to decline, as the market becomes increasingly like contemporary market and distribution systems in the US and EU, whereby the supply chain is dominated by large retailers.

The declining overall trend in sashimi consumption (both in restaurants and homes) is likely to continue given continued low population growth, declining household expenditure on food items generally, and changing consumer taste preferences of the younger generation away from seafood to non-seafood protein sources.
In an effort to re-stimulate tuna consumption levels, the longline fishing industry has been actively promoting the virtues of tuna to consumers (e.g. OPRT has been distributing a glossy brochure to supermarket customers that promotes the health benefits of tuna compared with other non-tuna protein sources).

No major increases in sashimi tuna prices are anticipated in the next twelve months. Despite expected continued declines in sashimi tuna supply from local vessel landings and imports, reduced supplies are expected to be supplemented by increasing volumes of domestic farmed bluefin tuna, which will keep prices in check at current levels.

With the elimination of the threat of the listing of Atlantic bluefin tuna under the Convention on the International Trade in Endangered Species (CITES), supplies of Atlantic bluefin from the Mediterranean to Japan will continue, albeit in reduced volumes, given a reduction in catch quota implemented by ICCAT, in an effort to rebuild heavily depleted stocks. Similarly, supplies of Southern bluefin will also reduce due to quota reductions implemented by CCSBT.

Currently, the majority of farmed bluefin tuna, both domestic and imported, is produced from fattening wild-caught tuna in offshore pens (often referred to as ‘tuna ranching’). In anticipation of ongoing reduced supplies of wild-caught and ranched bluefin tuna, Japan’s tuna farming industry has been carefully positioning itself to fill this gap with cultivated bluefin tuna, with considerable advances made in closing the breeding cycle. If tuna cultivation becomes viable on a commercial scale, the number of domestic tuna farms and subsequent volume of supply of farmed bluefin tuna to the sashimi market is likely to increase markedly.

In response to growth in overseas sashimi markets and the oversupply situation in the Japanese market, some large Japanese companies, including general trading companies (e.g. Itochu), marine products giants with trading divisions (e.g. Maruha Nichiro, Kyokyo Co. Ltd) and large fishing companies (e.g. Fukuichi Gyogyo) have commenced marketing tuna overseas.

It is too early to determine the medium-long term impacts on Japan’s sashimi market of the recent earthquake and tsunami (March 2011). In the first few weeks following the disaster, fresh exports to the Japanese market declined significantly due to issues with Japan’s cold storage capability stemming from electricity rationing. Due to concerns of radiation contamination of seafood caught in surrounding Japanese waters as a result of leakage from the Fukushima Daiichi Nuclear plant, some overseas buyers have opted to source tuna from alternative markets for the time being. Japanese consumption may also shift from fresh/frozen tuna (and other seafood products) to shelf-stable products in the short-medium term due to radiation concerns.\footnote{Atuna 2011a; Atuna 2011b.}

\section{United States}

\subsection{Current Market Status & Trends}

The US market for sashimi-grade tuna products has grown in significance. In the mid-1990s, albacore was the primary imported product,\footnote{Campling et.al. 2007: 299.} but by 2009, yellowfin and bigeye were the dominant products by volume and value. Bluefin has also been a significant product, not least because of its high value, but consumption levels are likely to decline given the influence on
There is a small, but growing, domestic market for albacore consumption as steaks and sashimi/sushi.\textsuperscript{757}

The US price for imported fresh tuna has generally been on the increase since 2000 (see Figure 7.4). In recent years, high prices have increasingly centred on sales of fresh tuna in upscale restaurants and supermarkets. As retail prices increase (up to US $20/lb in some cases), sales volumes decline. The future growth of fresh tuna (in volume terms) in the US is expected to be very limited due to rising demand (and competition) for fresh product in markets outside the US, the relative present weakness of the US dollar, and lack of sources to increase supply. Wholesalers and distributors note that their business is limited not by demand, but by supply.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure7.4.png}
\caption{US Fresh Tuna Import Prices ($US/kg), 2000-2010}
\end{figure}

\textsuperscript{757} Redmayne 2008a: 5-6.
\textsuperscript{758} Globefish 2010: 2

Despite the general growth trend, the US market for fresh tuna was significantly impacted by the economic recession in 2008-9. The high range sashimi and sushi bar market came to a complete standstill as a result of the economic crisis. With the fragile economic recovery in the US, the restaurant segment has reported improved sales figures, including in expensive restaurants.\textsuperscript{758}

The US market is supplied by a wide range of sources. In 2009, the US recorded domestic landings of bigeye and yellowfin of approximately 9,900 mt and 19,100 mt respectively, primarily from Hawaii (see Chapter 6.7), but the vast majority of product is imported (see Table 7.3).
### Table 7.3  US Imports of Fresh Tuna (‘000 mt), 2004-2009

<table>
<thead>
<tr>
<th>Species</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albacore</td>
<td>1.0</td>
<td>0.7</td>
<td>0.9</td>
<td>0.9</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Yellowfin</td>
<td>15.6</td>
<td>17.1</td>
<td>17.8</td>
<td>18.0</td>
<td>15.9</td>
<td>14.2</td>
</tr>
<tr>
<td>Bigeye</td>
<td>6.8</td>
<td>5.0</td>
<td>4.9</td>
<td>5.6</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Bluefin</td>
<td>1.6</td>
<td>1.7</td>
<td>1.1</td>
<td>1.1</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Skipjack</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Others</td>
<td>1.4</td>
<td>1.0</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>26.4</td>
<td>25.5</td>
<td>25.2</td>
<td>25.7</td>
<td>22.7</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Source: Globefish 2010: 3

In 2009, Ecuador was the leading supplier of fresh bigeye to the US market, followed by the Marshall Islands and Vietnam (Figure 7.5). In the yellowfin market, which is supplied by a larger number of countries than the bigeye market (reflecting the high volume of yellowfin imports), Vietnam, Trinidad and Tobago and the Philippines are the three largest suppliers (Figure 7.6). The notable trend for both markets is that supply is global.

### Figure 7.5  Market Share of US Imports of Fresh Bigeye By Volume, 2009

Ecuador 21%
Fed. States of Micronesia 8%
Fiji 1%
Indonesia 7%
Marshall Is. 15%
Panama 8%
Trinidad & Tobago 5%
Vietnam 13%
Others 16%
Brazil 5%

Source: NMFS 2009.
The fresh tuna commodity chain in the US is highly fragmented. Large wholesalers and distributors have a very 'hands on' relationship with both their supply sources and their market outlets. Firms buy from sources around the world in order to stabilise supply. Though the fresh tuna market is known for its volatility, most distributors and wholesalers interviewed for this project indicated that they are able to secure supply and predict prices consistently on account of maintaining strong relationships with suppliers and market outlets. Different species, grades and types of tuna products are in demand by a wide range of end sellers. Wholesalers and distributors suggest that the high-end market is becoming increasingly sensitive to quality issues, though quality is still mainly dictated by colour and individual cities vary in their quality sensitivities.

7.3.2 Recent Developments and Future Prospects

As noted above, the fresh segment of the tuna market has proven sensitive to economic downturns and also to be limited not by demand, but by supply. The expected economic upturn should result in consumers returning to high-end restaurants, including sashimi and sushi outlets. Demand and imports of fresh tuna, which suffered in 2008-2009, will likely increase to former levels as the economy recovers.

Buyers and distributors also note growing interest in sustainability certifications or assurances for high quality tuna products. Though certification is not considered essential, buyers and distributors note that they are taking care to implement traceability measures, and in several cases, internal sustainability principles and guidelines. Several noted that retail markets selling fresh products are indicating that they want sustainability assurances, though they have not adhered to any one policy. Some distributors are looking into the feasibility of Marine Stewardship Council certification processes for their supply sources (see Chapter 10).

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According to one distributor, ‘MSC might be a market advantage, but it’s not a price advantage because no one will pay more for it.’  

There is increased interest in ultra-low temperature tuna, which when frozen at -60°C retains sashimi-grade quality. There are a few firms in the US market trading in ULT tuna. However, the lack of cold chain facilities across the production chain has limited more comprehensive adoption. Further, while buyers like the idea of energy savings and market stabilization that ULT could offer, buyers and distributors indicate unease at the idea of a fish being graded on board a vessel and then frozen at ULT before buyers can check the grade. As a means of increasing product value, one firm in the US has begun to enhance the colour of ULT yellowfin with an oxygen (O2) treatment that takes place in the Philippines.

7.4 Emerging Markets – China

The market in China for tuna used as sashimi is said to be small but growing. Reliable quantitative estimates of the current consumption of tuna as sashimi are not available. Japan has long recognized the potential for sashimi market expansion, and has promoted the consumption of ULT tuna in the past. In its promotion of tuna sashimi in China, Japan early provided technical expertise and some ULT cold store facilities. Japan’s Organization for the Promotion of Responsible Tuna Fisheries (OPRT) has estimated the size of China’s sashimi market at from 6,000 to 10,000 mt/annum.

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763 OPRT 2010.
With recent economic expansion in China most upscale seafood restaurants in major cities offer a selection of sashimi that now includes tuna. All or almost all the sashimi tuna marketed in China is frozen. The nascent tuna sashimi market was earlier damaged by low quality tuna treated with carbon monoxide (CO), leading to reports in 2005 that China was banning tuna treated in that manner. It is recognized by many in the industry that the ban is widely ignored as CO-treated tuna can still be found in some restaurants and shops. Nevertheless, the market for high quality (ULT) tuna sashimi is growing. One observer of the fish marketing industry in China noted that there is no doubt China will become a major market for sashimi-grade tuna. The reasons given include:

- China can and has quickly impacted seafood trade trends (examples being markets for other luxury fishery products such as lobster, geoduck clam, sea bass, and abalone);
- China must keep increasing seafood imports to meet growing demand;
- Red meat tuna is now well accepted by knowledgeable Chinese consumers; and
- The Chinese concept of mianzi (‘face’)

According to industry participants both within and outside of China, the major impediments to growth are marketing and infrastructure. Although a generally-held belief is that Chinese people will not eat raw fish, this is not the case in some coastal areas. Optimists in the industry in China point to the importation of salmon from Norway about ten years ago, and the fact that it is now well established in large coastal cities as a desirable food item, in both its raw and cooked state.

On the other hand, an international fish trader with extensive experience in China cites a major impediment to large-scale market growth as the lack of a reliable cold chain and distribution system for frozen foods, particularly deep frozen (ULT) products. Where such distribution systems do exist, they are compromised by poor handling practices and a lack of expertise in seafood.

### 7.5 Implications for PICs

While Japan will maintain its dominant position as the world’s largest market for sashimi-grade tuna, this market is likely to continue to contract in the future. This has implications for both PIC longline vessel operators who export fresh-chilled tuna to Japan, as well as foreign vessels fishing in WCPO waters also supplying fresh-chilled and frozen product to this market. In addition, sashimi market prices in Japan have been rather stagnant and look set to remain so in the short term at least, which will continue to place considerable pressure on the profitability of sashimi fishing fleets’ operations, given ever increasing operating costs. Competition from farmed bluefin tuna, particularly for longline-caught tropical bigeye tuna, is likely to continue and potentially increase, if tuna cultivation becomes commercially viable.

The Japanese sashimi market is very complex and is not particularly well understood by many potential domestic PIC industry operators and policy makers. With the significant increase in the volume of frozen sashimi-grade product passing through unofficial channels, this market will only serve to become more difficult to understand, particularly as Japanese industry participants themselves have indicated that over the past five years or so, their understanding of the distribution networks for frozen sashimi tuna has diminished markedly.

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764 One definition of Mianzi refers to the kind of prestige or reputation achieved through success in life and including a degree of ostentation. Chan 2006.
765 Redmayne 2008a.
Japan’s market for fresh-chilled tuna is by far the most price sensitive in the world, particularly to factors influencing quality. PIC exports have often been downgraded and received below average prices due to issues relating to poor post-harvest handling, logistical issues concerning air-freight services, lower fat content, weak reputation and poor market presentation.\textsuperscript{766} To ensure returns are maximized from sales in the Japanese market, PIC exporters must continue to channel considerable effort into maintaining quality levels, which may also require the assistance of governments in providing and maintaining necessary supporting infrastructure (e.g. cold storage facilities at airports).

Given supply volumes from PICs are fairly low and often inconsistent, limited opportunity exists for PICs to market product directly to trading companies, supermarkets and other large buyers outside of the traditional wholesale auction market. For those PIC exporters selling through traditional channels, prices received will continue to fluctuate widely and be subject to demand and supply on the day of auction. Opportunities may exist in some PICs to work with a large volume wholesaler, with existing marketing links in Japan (e.g. Luen Thai in Palau, Marshall Islands and FSM).

Rising demand for sashimi-grade albacore presents opportunities for PIC longline fleets operating in the Southern Albacore fishery (i.e. Fiji, Samoa, Tonga, Cook Islands and Niue), provided adequate and cost-effective air-freight services are available. To date, Fiji has dominated fresh-chilled albacore imports into Japan.

Fresh tuna products have become year-round fare in high-demand in the US markets, despite tuna fisheries often being seasonal and unable to provide steady streams of supply which creates a key opportunity for PIC suppliers. US buyers have indicated high interest in securing new supply outlets. However, one of the biggest constraints facing PIC firms is remaining competitive despite high airfreight costs and inconsistent connections to the US market.

Expanding markets for sashimi-grade tuna outside of Japan present alternative opportunities for PIC exporters, particularly markets which are in fairly close proximity to the region (i.e. Australia, New Zealand and China). While the Taiwanese and Korean sashimi markets are growing, currently demand is met by catch from their respective domestic longline fleets, rather than imports.

\textsuperscript{766} Campling et. al. 2007: 272.