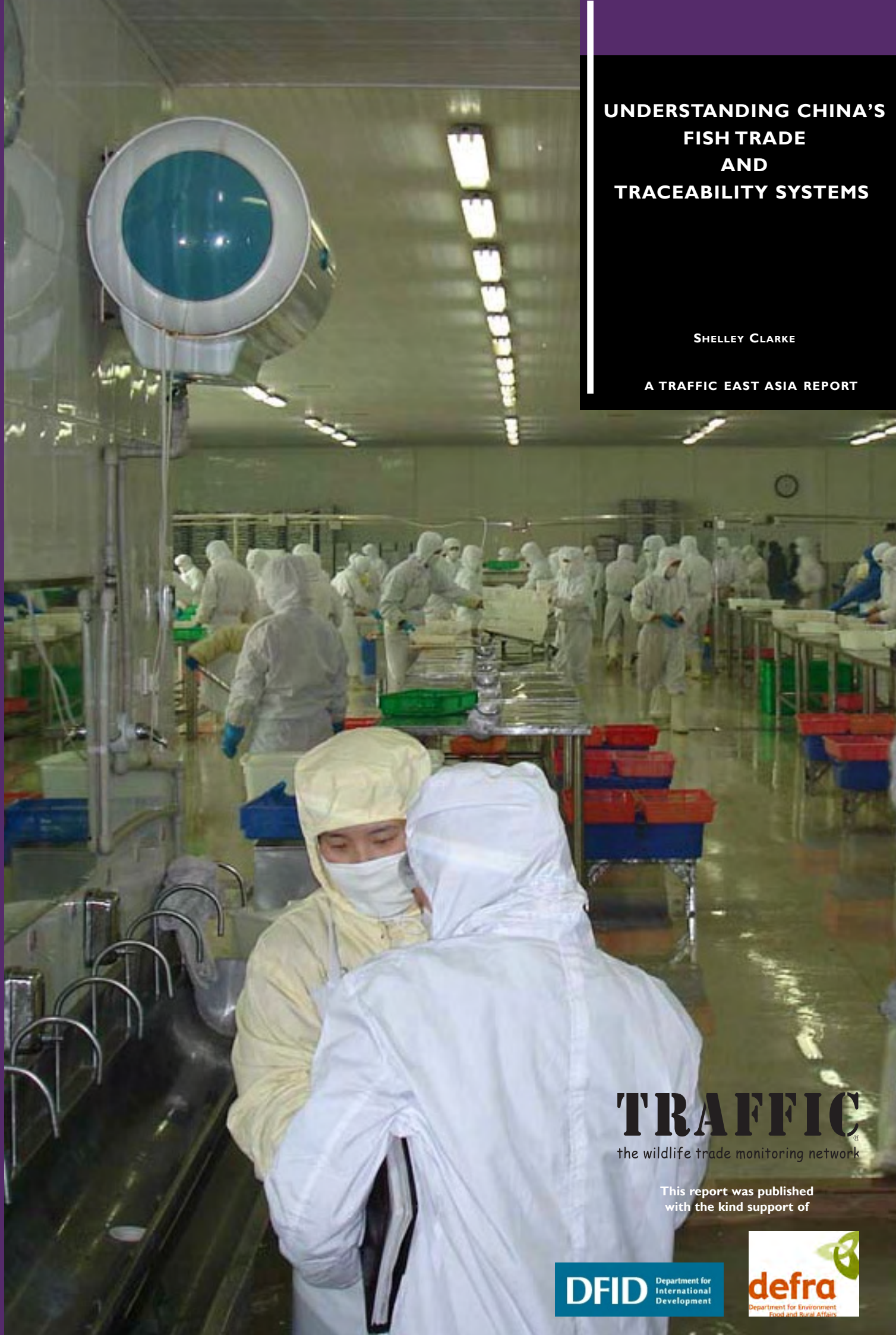

UNDERSTANDING CHINA'S FISH TRADE AND TRACEABILITY SYSTEMS

SHELLEY CLARKE

A TRAFFIC EAST ASIA REPORT

TRAFFIC
the wildlife trade monitoring network

This report was published with the kind support of

DFID Department for International Development

defra Department for Environment Food and Rural Affairs

Published by TRAFFIC East Asia, Hong Kong, China.

This report has been grant-aided by the World Summit on Sustainable Development Implementation Fund (WIF) from the Department for Environment, Food and Rural Affairs.

Suggested citation: Clarke, S. (2009). *Understanding China's Fish Trade and Traceability*. TRAFFIC East Asia.

ISBN 978-1-85850-239-7

Front cover photograph: Salmon-processing factory, Qingdao, China.

Photograph credit: S. Clarke.

Printed on recycled paper.

UNDERSTANDING CHINA'S FISH TRADE AND TRACEABILITY SYSTEMS:

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Credit: Dmitry Shpilenok

Salmon harvest

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ACKNOWLEDGEMENTS

The author wishes to thank sincerely the officers of Defra and DFID without whose interest and financial support this study would not have been possible. Staff at TRAFFIC East Asia, including R. Craig Kirkpatrick, Sean Lam, Timothy F.N. Lam and Joyce Y.C. Wu, provided essential practical assistance in numerous tasks, both small and large, involved in this study and particularly in handling Chinese language materials. Cliff Morrison, Chairman of the UK Food and Drink Federation's Seafood Group, assisted in facilitating interviews with European industry participants and as a portal for information on EU regulations concerning traceability and food safety. The author also gratefully acknowledges the staff of the Qingdao branch of the China Inspection and Quarantine Bureau and the numerous traders, processors, inspection officials, industry representatives, shipping agents and researchers who so generously agreed to be interviewed for this study. Finally, the efforts of the peer reviewers, Gunnar Album, Matt Gianni, Simon Rilatt and Alastair Graham, in checking and making suggestions for improving the draft version of this report are greatly appreciated.

EXECUTIVE SUMMARY

It is widely acknowledged that developments in China, the fastest-growing major economy in the world, have a crucial influence on the future of a wide range of global industries. It should not therefore be surprising that China also plays a pivotal role in the global seafood industry. In fact, China is now the world's leading exporter of marine fish products, outranking Peru, Norway, the Russian Federation, the USA, Thailand and Chile in 2006. Despite these statistics, details of the fish re-processing industry (i.e. from imported materials) are not well understood owing to a lack of publicly available data. Better understanding of how fisheries resources are used by China, and the extent to which these processes are controlled by national and international regulations, is an essential component of effective global fisheries management. By illuminating the role China plays in fish re-processing, the extent to which China must be involved in solutions to the problems of overfishing and illegal, unreported and unregulated catches (IUU) is highlighted.

This study has aimed to compile information comprehensively from a wide variety of sources in a fair and consistent manner around two major themes. The first describes the historical development and current structure and operation of China's fish re-processing trade. This trade is examined by species and product by working backwards to source fisheries and forwards to end-markets. The regulation of the trade using product yield is then described and assessed. The second theme documents current systems for fish traceability in China to understand where there may be weaknesses which allow infiltration of illegally sourced fish. The ability of these systems to comply with existing and pending international fish certification and documentation schemes is also discussed. Under both of these topics, the scope of this study is limited to fish from marine capture fisheries caught or re-processed by mainland China. Aquaculture and domestic consumption within mainland China are not covered. Although Hong Kong, Macau and Taiwan have special links with the mainland, these areas maintain their own systems of governance, regulations and trade statistics and thus are also outside the scope of this report.

China's fish re-processing trade

Determining which species in what quantities are being re-processed in China is not a simple matter. This is because of potential mis-declaration of imported raw materials, a lack of species-specific Customs commodity codes for exported fish fillets, and large and growing amounts (nearly 400 000 t in 2006) of unspecified frozen fish imports. In this analysis, China's import statistics for fish raw materials, which are reasonably species-specific, were compared with "imports from China" as recorded by trading partners for salmon, whitefish and tuna. For these three groups combined, pollock and cod comprise 71–83% of the total raw material input and 74–78% of the total processed output annually for 2004–2007. Salmon, redfish, haddock, whiting, coalfish, hake and toothfish appear to be processed in considerable, but smaller, quantities. Overhaul of China's commodity coding system for fish products, as well as better integration of the China Inspection and Quarantine Bureau (CIQ), tasked

with food safety monitoring, and the China Customs Administration (CCA), tasked with import and export control, both of which are believed to be under way, would allow for a much improved level of understanding of both China's and the world's global fish trade.

Information on the source countries of imported fish materials indicates that 97% of China's total salmon, whitefish and tuna supply derives from just 10 countries and 57% derives from the Russian Federation alone. Further raw material supplies are provided by the Russian Federation in non-species specific categories. Salmon and whitefish production relies heavily on these imported materials, but tuna-processing may be proportionally more dependent on supplies landed by Chinese fishing vessels. Given the lack of information on fish landings in China, the situation for tuna remains unclear. Several instances of suspected mis-declaration of species were observed in which either the routing country (for example, the Netherlands, a commonly-used consignment point for north Atlantic raw materials), or China itself, was listed as the country of origin. In addition to these issues with species identity and origin, mis-declaration of quantities was also explored, but no evidence for systematic under-reporting of imported quantities by China was found.

China's fish re-processing industries are based primarily in Shandong and Liaoning Provinces, with additional capabilities in other coastal areas such as Guangdong, Zhejiang and Fujian. Together, Shandong and Liaoning account for over 90% of China's imports of both salmon and whitefish and the top 10 importers in these two provinces account for over 30% of the total imports. Shandong and Tianjin appear to be the main areas for tuna processing in China, 34% of which is based on yellowfin (according to Customs declarations). Tuna-processing operations appear to be separate, and perhaps more specialized, in comparison to those for salmon and whitefish, as only four of the top 50 importers of salmon and whitefish raw materials also import frozen tuna.

Some of China's largest importers of fish raw materials are not processors but diversified import–export companies. These companies are sometimes servicing a variety of industries, such as textiles and machinery, and often supply to, and distribute fish on behalf of, large, and probably small, re-processors. Although this service comes at a price, it may offer essential flexibility in the dynamic channelling of raw material to a network of factories as market conditions change. Although this situation is perfectly legal, the fact that fish may change hands one or more times while in China has implications for traceability by complicating the chain of custody.

Whether or not the imported fish raw material is owned by the processor determines its status with regard to import duties. If the material is foreign-owned, import duty need not be paid as long as the finished products are re-exported. If the material is owned by a Chinese party, 26% duty may be levied and then rebated, or the traders/processors may qualify for an exemption from the duty if they maintain a clean trade record and the material remains under bond. It appears that as much as 60–70% of the salmon and whitefish raw materials used in China's re-processing industry are Chinese-owned despite the apparent drawbacks of high capital cost of materials and the potential tariff liability. In contrast, 70–85% of the tuna processed in China is foreign-owned.

The regulatory system for Customs duties is important because it alone provides a check on whether all material imported for processing is subsequently exported and thus, if effective, it should ensure an import–export mass balance is attained. The CCA monitors whether processed fish is re-exported through Trade Processing Manuals (TPMs) and the application of yield ratios to imported and exported amounts. For this study, salmon and whitefish gross (national) mass balance calculations were performed for 2004–2007. For salmon, the calculated yields (i.e. ratio of exported to imported quantity) ranged from 26–36% annually, which appears low compared to industry norms and will be even lower if polyphosphates and/or heavy glazing are being used to bulk product weight. A similar analysis for whitefish showed different patterns for 2004–2005 and 2006–2007. A yield of 48% was observed in the earlier period, but in the latter period the yield suddenly increased to 60–70%, close to the yield claimed by traders in interviews (65–73%). Tuna is not well suited to this type of analysis because exports from China of processed tuna loins or other non-fillet portions may be recorded under the same codes as whole fish offloaded (imported) to foreign ports by Chinese vessels. It is thus not clear how to define tuna quantities for the purpose of a re-processing mass balance exercise.

Fish product traceability in China

Even if traceability systems are well designed and generally well implemented, they can fail with lack of implementation at a single step. Recognizing this, in combination with China's integral role in global seafood supplies, it is important to consider whether China's current traceability regulations are adequate to support international traceability expectations. In particular, the extent to which China's traceability system can support new international schemes for documenting the legal provenance of fish raw materials was investigated. This analysis required an examination of the required documentation for fish imports into China; an explanation of how traceability of fish in the Chinese processing trade is maintained between import and re-export; and the documentation and procedures applicable when material is re-exported from China to its destination market. Four specific catch documentation schemes were then assessed to determine what requirements they placed on China's traders and regulators and to what extent these requirements were currently being met.

The importation into China of fish raw material for processing requires a Certificate of Origin and a Health Certificate, neither of which currently meets most catch documentation programme objectives. Despite its name, the Certificate of Origin mainly serves to document the country of origin for the purposes of assigning tariffs and often provides no information about the exact location and circumstances of fish catch. Health Certificates are primarily concerned with sanitary issues and do not always contain information on the exact area of catch, vessel identification numbers, and whether the fish are whole or primary-processed (i.e. necessary to cross-check against quotas). Both documents would require substantial modification, including standardization of formats among issuing authorities, before they could serve a catch documentation purpose. Of the two documents, the Health Certificate would have an advantage in that it is better standardized and issued by a smaller number of recognized authorities.

Once imported, fish raw materials for processing are regulated by the CCA and by the Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) through its local CIQ offices. Perhaps the most important regulation from a traceability perspective is the CIQ requirement that each shipment of imported raw material be assigned a unique raw material batch number and that there be no mixing of material from different batches during processing. When material is exported, the export application lists the original raw material batch and the import application numbers. In theory, both CIQ and the importer should maintain files which link these identification numbers to the original (i.e. source country) Certificate of Origin and Health Certificate. However, there is no requirement to reference or attach these documents to the export application.

Considerable advances in China's traceability systems appear to have occurred over the past few years. However, implementation will certainly vary between large and small, and urban and rural enterprises. AQSIQ and CIQ are driving these advances but they are fundamentally focused on sanitary concerns and may be unwilling or unable to shoulder additional responsibilities associated with documenting fish provenance. The CCA is primarily concerned with tariffs and may also not welcome additional responsibilities for checking fish provenance documentation. In many cases, traceability of fish provenance once fish is exported from China is obscured under China's current rules of origin which classify all products which have changed four-digit tariff classification (e.g. from frozen fish (0303) to fillets (0304)) as products of China.

The first of the international schemes for documenting legal fish provenance considered by this study was the MSC eco-label. Although the scope of MSC certification goes well beyond simple legality, documenting that the products derive from an MSC-certified fishery should in theory also document that the fish were legally caught. The MSC chain-of-custody standard imposes a number of traceability requirements which are similar to those required by CIQ; those MSC requirements which are stricter than CIQ regulations should pose no problems for Chinese processors already compliant with these regulations. Conversely, some MSC chain-of-custody certificates held by Chinese processors have been withdrawn in recent months for reasons which appear to suggest there may be problems with day-to-day implementation of basic, CIQ-mandated traceability requirements. In this sense, continued strengthening of oversight by CIQ should deliver improved traceability in general, as well as better compliance with MSC chain-of-custody standards.

The second international scheme examined was the Northeast Atlantic Fisheries Commission (NEAFC) Port State Controls. These allow NEAFC fish to be landed in designated ports only after confirmation from a foreign fishing vessel's flag State to the port State that the catch is legal. Since this scheme does not provide any documentation to accompany legally landed fish through the supply chain, if the standard import paperwork appears credible, Chinese import officials may inadvertently clear IUU fish from the NEAFC area for processing, allowing subsequent entry to external markets as a product of China. Traders interviewed for this study stated that they would like to be able to access NEAFC documentation in order to confirm that fish they bought had been cleared by the Port State

Control Scheme. NEAFC may also consider specific outreach to Chinese regulators to alert them to irregular shipment patterns which may suggest IUU activity.

Under a new ICCAT Catch Documentation Programme for bluefin tuna landings and trade, China will be required to issue a catch document for all bluefin tuna it lands or imports (i.e. lands in a foreign port); track the catch documents associated with any tuna raw materials it processes through to re-export; and issue a re-export certificate when the tuna leaves China. It is unclear whether China would consider CIQ, CCA or another agency (e.g. the Bureau of Fisheries) as the responsible authority for validating these documents. Designation of the responsible authority in response to the ICCAT requirements will provide useful insight into the nature of China's response to the demands of other international catch certification programmes.

A forthcoming European Union (EU) regulation to combat IUU fishing will require that China obtain and manage catch certificates for all fish raw materials potentially destined for EU markets. It will also be necessary for China to designate an authority and develop a mechanism to link catch documents with import and re-export applications. Such initiatives by China may require time and support. Another issue that will confront a number of countries, including China, is how to document the use of partial amounts under the same original catch certificate when shipments are split by fish size or for processing at different factories. Unless otherwise foreclosed, discrepancies between catch certificate amounts and shipment amounts could lead to some processors claiming certified status for the entire amount on the attached catch certificate even though they received only a portion of those fish. Under a worst case scenario, non-certified fish could be added until the full amount on the catch certification is reached and then the entire amount could be claimed to be certified.

Recommendations

Recommendations resulting from this study are as follows:

- The CCA should reform its import and export commodity codes to conform to the specificity implemented by its main trading partners (i.e. the EU, USA and Japan) and in accordance with the importance of China's fish imports and exports to the global fish trade.

- The CCA and CIQ should continue to improve their co-ordination of responsibilities with the goal of combining quantity monitoring for tariff control and batch-by-batch (consignment-by-consignment) tracking for export food hygiene into a single integrated and effective traceability system.

- The CCA or CIQ (or both) should develop formal mechanisms and requirements for any catch certification or similar documentation accompanying incoming shipments of fish for re-processing to be carried through to re-export in anticipation of requirements by ICCAT and the EU.

- Authorities implementing catch certification/documentation procedures (e.g. ICCAT and EU) should, given China's importance in the global fish trade, develop special co-ordination mechanisms to provide information and materials which will assist China in complying with new requirements and potentially feedback useful intelligence for fisheries enforcement. Such mechanisms could include consultative forums, information sheets for inspection personnel, and watch lists for specific products and sources.

- Academic and research organisations should continue to accumulate knowledge and understanding of China's role in global fish trade and fishing activities, thereby highlighting and prioritizing issues requiring international co-operation and management.

INTRODUCTION

China and fish

It is widely acknowledged that developments in China, the fastest-growing major economy in the world, have a crucial influence on the future of a wide range of global industries. It should not therefore be surprising that China also plays a pivotal role in the global seafood industry.

While many will be familiar with the fact that China has been a top producer of cultured freshwater species such as shrimp, carp and tilapia for many years, China is now also the world's leading exporter of marine fish products, outranking Peru, Norway, the Russian Federation, the USA, Thailand and Chile in 2006 (FAO, 2008b), largely based on its large re-processing trade (i.e. from imported materials). Despite these statistics, details of the re-processing trade are not well understood, on account of a lack of publicly available data.

This has in turn resulted in misunderstandings and misperceptions. One case in point is a recent US Government report which appears to have been motivated by a desire to explore a booming market for US seafood in China, only to conclude that more than 90% of US seafood exports to China are re-exported by China for consumption elsewhere, often back to the US (Sánchez *et al.*, 2008). Another example is the escalation of concern regarding the "food miles" issue represented by processing foreign-caught fish in China for foreign markets. As explained by the Seafish Authority (2008) it is greenhouse gas emissions rather than the distance itself which is the key issue, and in some cases higher fish processing yields in China, even accounting for emissions associated with sea freight to and from China, may result in a lower CO_2 equivalent emission per unit weight of fish. Anxieties over the safety of foodstuffs produced in China have also been a major news topic over the past year. While there are undoubtedly real concerns, the Chinese Government has released food import inspection figures for 2006 from the Japanese Government showing that the acceptance rate for Chinese-produced food products (99.42 %) was comparable to, and actually slightly higher than, acceptance rates for food imported to Japan from the EU (99.38 %) and the USA (98.69 %) (China State Council, 2007).

This study cannot aspire to distinguish, let alone untangle, all of the threads which link China to global seafood markets. It is nevertheless guided by a desire to compile information comprehensively from a wide variety of sources in a fair and consistent manner, and thereby to inform and broaden the perspective on China's sphere of influence. It is hoped that better understanding of China's activities can thus serve as a platform for much needed international co-operation on a wide range of fisheries issues.

Study brief and specific objectives

The UK Department for Environment, Food and Rural Affairs (Defra) wishes to improve transparency in the fish supply to the European Union (EU), and to the UK in particular, and at the same time provide areas of shared information with other interested parties, such as the Government of China, as it also works to develop traceability and documentation systems within China. As part of these efforts, the UK Government is supporting a special initiative on monitoring and combating illegal, unreported and unregulated (IUU) fishing through establishment of the IUU Monitoring Network and various other special projects.

This study is designed to support these initiatives in several ways. Through compilation and integrated analysis of all available information on China's fish processing industries, this study is designed to be an important reference, in particular as the UK seeks to implement new certification requirements under *Council Regulation (CR 1005/2008)*, establishing an EU system to prevent, deter and eliminate IUU fishing (European Union, 2008). By benchmarking China's existing standards for fish product supply chain traceability, the study can provide a basis for further domestic and bilateral dialogue between Chinese regulators and foreign parties interested in ensuring the provenance of seafood processed in China.

This study is framed around two main objectives:

1) *The description of China's fish re-processing trade*. This involves examining and documenting the scope of China's fish processing industry in the global context, including its historical development as well as its current structure and operation. Using available trade data, the re-processing trade is quantified by species and product, including working backwards to source fisheries and forwards to end-markets.

2) *Documentation of the current systems for fish traceability in China*. Systems which support the traceability of fish products in China are reviewed to understand where there may be weaknesses which allow infiltration of illegally-sourced fish. Interactions between China's systems and those of major trading partners are described and the extent to which China's existing systems can comply with existing and pending fish certification and documentation schemes (e.g. the EU import regulations, the ICCAT catch document programme, etc.) is assessed.

Scope and structure of this report

Given the potential breadth of the topic, it has been necessary to define the scope of this study in a practical yet relevant manner. As a general rule, this study uses the term "China" to be synonymous with "mainland China", i.e. not including the Hong Kong or Macau Special Administrative Regions or Taiwan. (While these Special Administrative Regions are part of China, they maintain their own systems of governance, regulations and trade statistics.)

The first portion of this study covering China's fish trade is focused by source and fish species. Specifically, the analyses in this report cover marine fish imported to China for processing with the understanding that the processed products will be re-exported to foreign consumer markets. The term "re-processing trade" is used in this study as shorthand for such fish. Species produced by China's aquaculture industry are excluded, as are marine fish imported to China for domestic consumption (to the extent to which they can be distinguished).

The second portion of this study covering traceability issues is defined primarily around China's traceability regulations and how these compare with and link to international traceability requirements. Because this study was conducted while the EU was developing important new import regulations designed to curb IUU fishing, a secondary focus is the nexus between China and the EU. Topics relating to China's compliance with requirements specific to the USA and Japan are not covered.

The structure of this report is based on the two main objectives outlined above. Sections are summarized to highlight the key findings, and overarching conclusions and recommendations are provided in the closing section of the report. A full reference list and appendices of supplemental material are also provided.

METHODS AND DATA SOURCES

In tackling the subject of China's fish processing activities, there was no doubt that sourcing data would be one of the most difficult challenges faced. This study was, however, based on the idea that there was sufficient information available to advance the current understanding of the subject and that, through documenting remaining data gaps and unknowns, a foundation would be laid for further studies.

Data gathering for this study differed from expectations in two ways. First, it was anticipated that since the study was sponsored by the UK Government, which is engaged with China in a co-operative programme to improve fishery resources management, this would encourage Chinese Government officials to provide information for use in the study. However, with the exception of assistance from the Qingdao branch of the China Inspection and Quarantine Bureau (CIQ), which agreed to a comprehensive interview, it proved impossible to obtain information directly from any government entity. At least some of this reticence was attributable to a heightened sensitivity towards international scrutiny ahead of the Olympic Games in August 2008: research for this project was conducted October 2007–May 2008. In addition, recent food and consumer product safety incidents involving toothpaste, toys, pet food and dumplings (see ***Traceability in practice***) led to what appeared to be a further tightening of control on information. In fact, just prior to one of the trips to China conducted for this study, in March 2008, entry to fish-processing factories by foreigners was restricted, thereby curtailing the scope of the visit.

In contrast to the lack of information forthcoming from Chinese Government officials, many traders and processors, both Chinese and non-Chinese, generously provided information and examples from their own operations. Although interview information is richly detailed, practical and experientially-based, sourcing and using it is not without its challenges. Foremost among these is deciding which information should be taken at face value and which should be discounted, as some industry players are not as frank, open and truthful as others and even the most forthright may have sensitivities about particular topics. It is also the case that most traders and processors know only their own businesses well. Therefore traders providing apparently contradictory information (e.g. X is always the case versus X is never the case) may in fact both be responding accurately in terms of their own experience.

There was also considerably more information than expected available on the Internet concerning government policies to improve food safety. In addition, the ability to access Chinese Customs data online (for a fee) at a finer level of detail than is publicly available from any other country (i.e. shipment-by-shipment with information on the importing company provided) continues to be a surprising incongruity.

Published (including web-published) sources are cited throughout the following text. Interview information is unattributed and where possible was verified with published sources or through statistical analysis. In order to introduce the general scope of experience of interview participants, the range of interviews was as follows:

- seven interviews with UK-based fish traders and processors and/or border inspection personnel;
- four interviews with Dutch or German traders, industry representatives and/or shipping agents involved in the fish trade;
- two interviews with Hong Kong-based fish traders and processors;
- three interviews with China-based fish processors as well as information gathered at the “China Fisheries and Seafood Expo” held in Dalian in November 2007;
- a meeting with the Qingdao branch of CIQ; and
- informal discussions with participants at two Chatham House workshops (Growth and Control of International Environmental Crime, in December 2007, and the 4th Chatham House IUU Fishing Update and Stakeholder Consultation, held in March 2008).

DESCRIPTION OF CHINA'S FISH PROCESSING TRADE

History and development

The first step in understanding China's fish processing industry, now widely recognized as the world's largest, is to understand how and why the sector evolved as it did. Several trends, set in motion in the early 1980s, have acted in synergy to place China at the centre of many of today's global seafood supply chains.

China began opening its economy in 1978 and by 1985 the State production and trade structures had been dismantled, allowing for entrepreneurship in the areas of both aquaculture and capture fishing. From 1978 to 1988, shrimp farming in China expanded 200-fold, to the point where China was the top supplier to the USA in 1990. Owing to poor management, however, the shrimp farming industry suffered a severe decline caused by disease problems and by 1994 production had fallen by 70%. Similarly, the rapid expansion of China's fishing fleets led to stock depletions in coastal waters, the imposition of three-month fishing bans, and fleet reduction policies by the mid-1990s (Redmayne, 2004).

At about the same time, however, the collapse of the Soviet Union left the rich Russian Far East fisheries in a state of disarray. No longer able to fund their operations without State support, Russian fisheries shifted to export-orientated production in the form of joint ventures. These new operations transhipped fish at sea, resulting in the abandoning of the Russian Federation's own coastal processing facilities, with much of the raw material headed for the new fleets' main service centre in Busan, in the Republic of Korea (South Korea) (Vaisman, 2001; Clarke, 2007). Initially, some processing took place in South Korea but this was quickly replaced by lower cost processing in northern, coastal China (Redmayne, 2004).

In parallel with other economic development measures, China established several special programmes to encourage industrial processing capabilities, including fish processing. These programmes included the creation of special economic zones (SEZs) with bonded processing areas, as well as processing trade regulations allowing products imported for the express purpose of processing and re-export to be exempted from the high tariff rates. In terms of fish, this processing trade was attractive to export markets not only because of China's low labour costs but because of superior product yields. Unlike in Western countries' fish-processing plants where mechanization had led to greater efficiencies at some levels but more wasted fish, China's skilful hand processing produced better-looking products, with higher fillet yields and less mince (AIPCE, 2007). Even though the catch area and the end-market were often both far from China, therefore requiring products to be frozen twice (i.e. after catch and again after processing), China's hand processing could be performed without full defrosting, thereby allowing twice-frozen products to meet consumer quality standards easily.

Meanwhile, growing prosperity in Chinese society as a whole led to increased demand for seafood products. This was met in several ways. First, China's aquaculture industry re-invented itself by introducing new species such as eel and tilapia aimed both at domestic and foreign markets (Redmayne, 2004; FAO, 2008a). Second, despite the depletion of China's coastal fish stocks, fishing companies which had sprung up in the mid-1980s focusing on distant water operations continued to thrive. Third, with the growth of the re-processing industry and its regulation via input–output yields, there was potential for large processors surreptitiously to report lower, but still credible, yields for export and sell the excess material on the domestic market (Redmayne, 2004). Finally, high tariffs came to an end with China's preparation to join the World Trade Organization in late 2001. This preparation required gradual reduction of fishery product tariffs over the first few years of this century to about 10%, depending on product, further facilitating foreign seafood imports for domestic consumption (Globefish, 2008).

China's own fisheries yearbook statistics illustrate that both production quantity and production capability basically doubled from 1993 to 2001 through the development of new production facilities (**Table 1**). A linear extrapolation of growth, 1998–2001, results in the projections for 2006 shown in the far right column. Such a simple extrapolation may not be entirely accurate, especially given major advances in aquaculture, fishing and processing technology, and policies designed to promote the processing trade. Nevertheless, in 2006 the most recent available data reported by China to FAO (FISHSTAT, 2008) indicated that total production was 9 269 381t, only 0.5% different from the linear extrapolation value for 2006 of 9 319 400 t shown in **Table 1**. It is also noted that FAO states that there were 8745 fish processing plants in China (FAO, 2008b, based on data from 2004), only slightly fewer than the 9267 plants predicted by the extrapolation method. The similarity of these figures suggests that the extrapolations may be reasonably accurate indications of China's current capacity. (It should be noted, however, that comparisons between figures from the Chinese Ministry of Agriculture and FAO FISHSTAT in other years show discrepancies for reasons which remain unclear.)

While China's production figures have thus grown in response to both domestic consumption and processing of seafood for foreign markets, it is trends in exports that reveal China's true transition to a major re-processor. In 1989, China's exports of fishery products totalled only 300 000t, ranked 18th globally, but by 2006 this figure had increased 10-fold to nearly three million tonnes, with China leading all other countries (FISHSTAT, 2008). China reports that, among all of its food export industries, aquatic products and processed aquatic products rank first and second in export value, just ahead of vegetables, canned food, juices and drinks (China State Council, 2007).

China's dominance in seafood processing is further confirmed by recent statistics (2006) from the world's three largest seafood markets: the EU, the USA and Japan. In the EU, China's processing trade contributes 25% of the whitefish supply, 25% of the plaice supply and 6% of the salmon supply. These figures are even higher (38%, 46% and 22%, respectively) when only frozen fillets, the highest volume product, are considered (AIPCE, 2007). In the USA, a comparison of total quantity of edible seafood

Table 1

Statistics on aquatic product production quantity and capacity for 1993 and 1998–2001, and a simple linear extrapolation (based on 1998–2001) for 2006

	Units	1993	1998	1999	2000	2001	2006
AQUATIC PRODUCTION QUANTITIES							
Frozen fish products	t	2 022 000	2 882 000	3 258 000	3 425 000	3 812 000	5 266 300
Dried fish products	t	205 000	650 000	643 000	740 000	778 000	1 015 400
Fish meal	t	143 000	693 000	707 000	806 000	723 000	855 100
Other	t	489 000	1 214 000	1 635 000	1 546 000	1 595 000	2 182 600
Total production	**t**	**2 859 000**	**5 439 000**	**6 243 000**	**6 517 000**	**6 908 000**	**9 319 400**
AQUATIC PRODUCTION FACILITIES							
Number of processing facilities		4255	5933	6443	6922	7648	10 392
Processing Capacity	t/day	5 128 000	9 126 000	11 271 000	9 338 000	10 610 000	11 723 600
Number of frozen warehouses		3585	4258	4392	4617	5772	7858
Frozen storage	t/day	55 000	108 000	108 000	135 000	154 000	233 500
Refrigerated storage	t/day	937 000	256 000	1 217 000	1 278 000	1 396 000	1 599 400

Note: The only annual data points available to this study were 1993 and 1998–2001.

Source: Chinese Ministry of Agriculture, various years

supplies to edible seafood imports from China indicates that China's contribution represented 9% of the total in 2006 (NMFS, 2007). In Japan, 58% of the fish supply is provided by imports (MAFF, 2008 (data for 2006)) and China is Japan's dominant seafood provider, supplying 22% of Japan's seafood, more than twice as much as the second-ranked supplier, the USA (9%; MAFF, 2007 (data for 2006)).

Some believe that China's days of dominating the fish processing trade are numbered owing to the rise of other low-cost processing centres, such as Viet Nam. Others claim that China's logistical advantages will continue to work in its favour, even as labour costs rise. Although the effect of increasing labour costs as well as other factors influencing the labour supply in China remains unclear, labour issues should be considered alongside issues of fish supplies and prices, and product hygiene and safety, as one of the key determinants of the future of the industry.

The remainder of this section of the report is devoted to a description of the current state of China's fish processing industry based on the available statistical data. The scope of this discussion is limited to imported marine fish and more specifically to the categories of whitefish, salmon and tuna. Discussions of fish produced by aquaculture or China's own domestic capture fishery activities are limited to the extent to which they influence, if at all, the re-processing trade.

The next section begins with an analysis to identify the actual species used by China's fish re-processing industry and the destination markets for these products. Following this, a section on sources of raw material expands upon this information to identify fisheries and countries supplying this industry. The focus then shifts in the following section to a description of the industry itself, including

key locations and companies which dominate the sector. Thereafter, the types of business models used to import, process and export fish are introduced, followed by an explanation of how this flow of goods is regulated by Chinese authorities using yield ratios. This information forms a primer on the functional operation of China's fish processing industry which is a pre-requisite for the discussion of fish traceability in the second part of the report.

Types of fish processed in China as classified by Customs codes and their destination markets

Existing information

Chinese Government sources report that lobster, clam, eel, tilapia and yellow croaker comprise the largest quantities of exported fish (China Ministry of Agriculture, 2008). A summary of trends in exports published by the same source indicates that in 2007 the major receiving markets were Japan, the USA, the EU and South Korea, together accounting for 76% of China's exports. Quantities exported to Japan and the USA have fallen since then, while exports to South Korea have remained stable and EU exports have risen, but at a slower rate than in previous years. While Chinese officials feel these trends indicate stagnation in its traditional "big four" export markets, they see hopeful signs from the Russian market. Exports to the Russian Federation increased by 71% in 2007, totalling USD310 million, and elevating the Russian Federation to the seventh-largest export destination for aquatic products (China Ministry of Agriculture, 2008).

While providing a general picture of China's aquatic product exports, this information does not provide great insight into the re-processing industry. This is because about 60% of China's exports of aquatic products derives from domestic production (see **Figure 2** below). Given this, and the presence of large aquaculture operations in China for the five types of fish listed as its top exports, it is considered unlikely that they are major components of the re-processing trade. Identification of destination markets for re-processed fish is also difficult because China's Customs statistics do not distinguish exports from re-exports (exports based on imported materials). This section attempts to provide information on species and destination markets for re-processed fish, in particular by examining China's own trade statistics and those of its major receiving markets.

China's fish exports in fillet and canned forms

The most straightforward means of assessing the species composition of China's processing trade would be to examine export statistics for processed fish products and then separate those species which are produced domestically from those which are not. Unfortunately, all wild and farmed fish fillets exported from China, except tilapia, are reported in species-aggregated categories by product form: fresh or chilled; frozen; or dried/salted. Similarly, there is also a category for frozen fish meat which is presumably composed of surimi-type products from a wide variety of species (**Table 2**). The largest

amounts of product are exported in the form of frozen fillets (>750 000t, equivalent to >92% of processed fish exports in 2007) but since the species composition is unknown, the origin (i.e. domestic or imported) of this raw material is also unclear.

Table 2

China's exports of fish fillets (excluding tilapia) and fish meat by commodity code in tonnes, 2004–2007

Year	Fresh/chilled fillets (0304–1000)[1]	Frozen fillets (0304–2090)[2]	Dried, salted or in brine fillets (0305–3000)	Frozen fish meat (0304–9000)[3]	Total
2004	5374	528 028	8377	31 434	573 213
2005	4668	621 678	16 402	33 423	676 171
2006	6384	721 013	21 911	36 153	785 461
2007	7849	754 263	27 692	31 419	821 223

Notes: [1] Code changed to 0304–1900 in 2007. [2] In 2007, this code was split into 0304–2990 (NES (not elsewhere specified), totalling 748 967 t); and 0304–2200 (toothfish), 0304–2910 (tilapia), 0304–2921 (channel catfish), and 0304–2929 (other catfish), together totalling 5296t. [3] In 2007, this code was split into 0304–9900 (general) and 0304–9200 (toothfish specific).

Source: GCBI, 2005–2008.

Table 3

China's exports of canned salmon and tuna as reported by its major importing partners—the EU, the USA and Japan (2004–2007)

	2004	2005	2006	2007
EU (1604–1100 & 1604–2010; 1604–1411, 1604–1418 & 1604–2070)				
Quantity of salmon received from China in canned form	338 t (2%)	483 t (3%)	248 t (1%)	178 t (1%)
Quantity of tuna received from China in canned form	154 t (45%)	38 t (20%)	235 t (40%)	347 t (11%)
USA (all codes referring to "canned" or "ATC" (airtight containers))				
Quantity of salmon received from China in canned form	310 t (11%)	71 t (2%)	107 t (2%)	93 t (1%)
Quantity of tuna received from China in canned form	665 t (73%)	997 t (58%)	5525 t (95%)	5974 t (70%)
Japan (1604.11–010 and 1604.11–090; 1604.14–010, 1604.14–092 and 1604.14–099)				
Quantity of salmon received from China in canned form	4672 t (44%)	5519 t (44%)	6170 t (47%)	6957 t (77%)
Quantity of tuna received from China in canned form	653 t (3%)	870 t (4%)	1,200 t (4%)	788 t (3%)

Notes: Codes used in the analysis (see **Appendix 1**) are given in the header for each importing partner. Percentages in brackets show % of total that is canned

Sources: Eurostat (2008a); Japan Customs (2008); and NMFS (2008).

In addition to exports of fish fillets and meat, China also produces some fish products in "prepared" forms, such as in cans. These forms are potentially important for salmon and tuna, but not for whitefish (**Appendix 1**). Even so, as shown in **Table 3**, quantities of canned salmon and tuna produced by China for the markets of the EU, USA and Japan are very small compared to the quantities of fillets produced. It should be noted that canned salmon is reported by species only by the USA; canned tuna is reported by species (partially) only by Japan.

The USA receives the majority of its tuna from China in canned forms, whereas the EU receives between 10–45% and Japan less than 5%. These figures highlight the well-known, strong demand for canned tuna in the USA (Stromsta, 2007) as compared to that in Japan, where the preference for fresh and frozen tuna for sushi and sashimi is high and the percentage of tuna in canned form is low. While the EU's imports of canned tuna from China increased in 2007, total imports of tuna from China in fresh and frozen forms also increased (see **Figures 1a-c** versus **1d**).

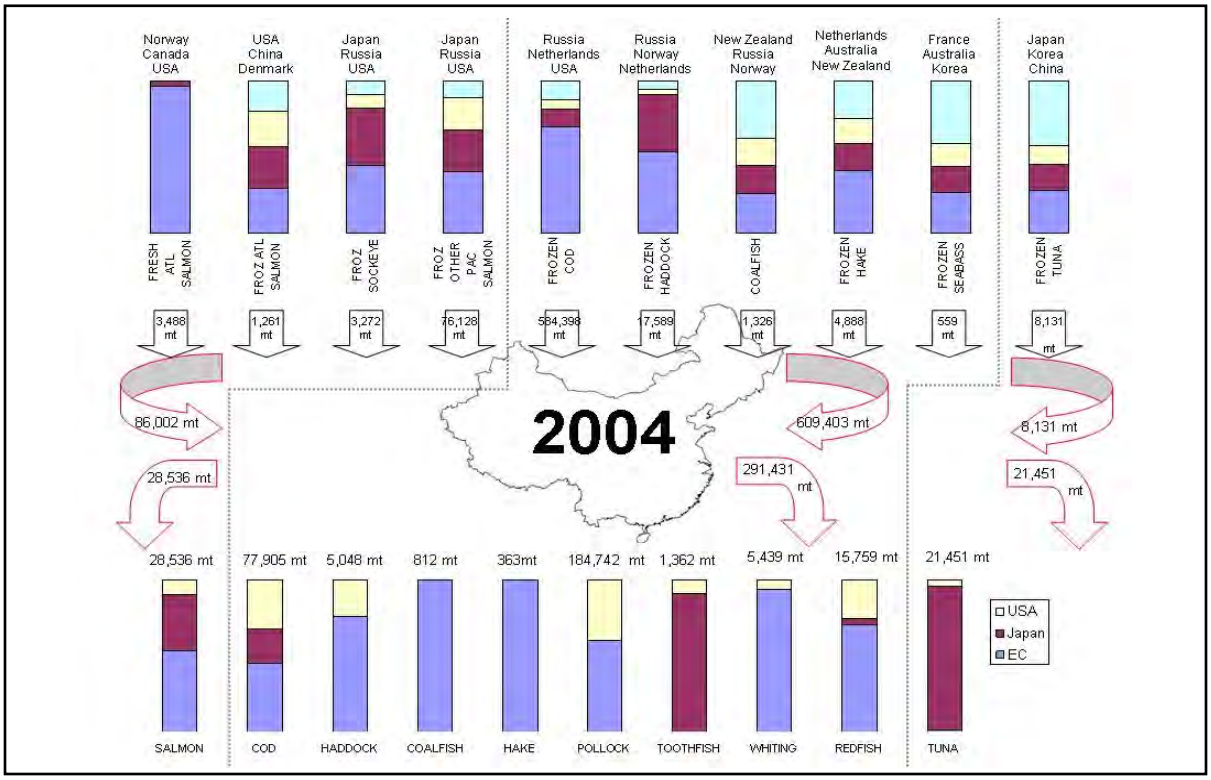
Canned salmon imports from China are minor components of the salmon markets in the USA and EU (<11%), but more substantial in Japan (40–80% of the total). This is likely to reflect Japan's prohibitive procedures for salmon processed in China which act to discourage trade in fresh and frozen products (Clarke, 2007), rather than a preference in Japan for canned salmon over other forms.

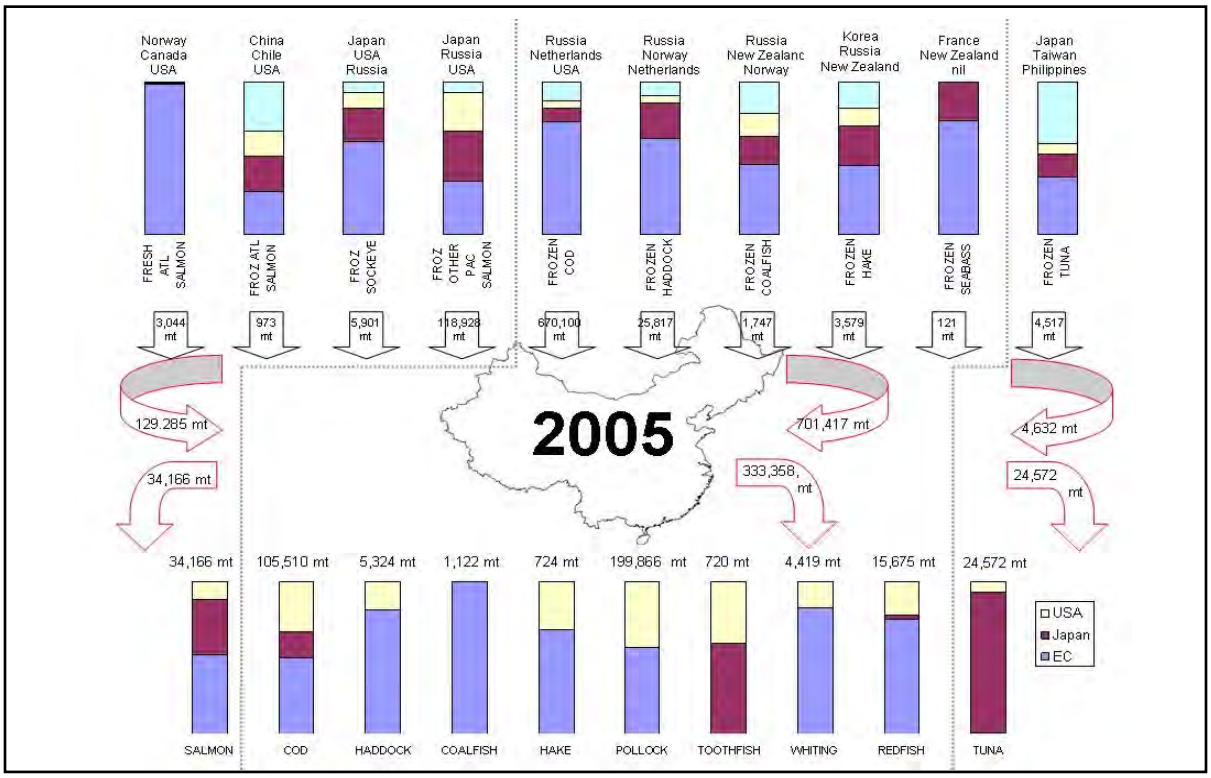
Development of import-export diagrams

From the preceding analysis it is clear that China's processed fish export statistics are largely uninformative with regard to species. It is therefore necessary to examine China's import statistics for potential raw materials with a focus on those species believed to be important in the re-processing trade. The species selected for analysis in this study are: salmon (Atlantic and Pacific); whitefish (cod, haddock, coalfish/saithe, hake, hoki, toothfish/seabass, Alaska pollock, whiting and redfish); and tuna. Unfortunately, however, China's commodity codes, while more species-specific for chilled and frozen fish than for fillets, are not specific for all of these categories (for example, there are no codes for pollock, hoki, whiting or redfish). Furthermore, during the years analysed, the amount of fish imported in the category "frozen fish not elsewhere specified (0303–7990)" grew from 203 000 t in 2004, to 611 000 t in 2007, at which point it was nearly equal to the total imports represented in **Figure 1** for 2007 (697 000t). While both fresh/chilled and frozen forms were analysed for salmon, whitefish and tuna, fresh/chilled fish imports comprised less than 1% of the total in each year. Similarly, imported amounts of unspecified fresh/chilled fish ranged from <1 to 15% of the imported amounts of unspecified frozen fish. As a result of all of these factors, analysis in this study of which species are imported by China for processing is largely based on frozen (whole) fish.

Figure 1a (upper figure) and 1b (lower figure)

China's imports of unprocessed fish (upper panels) and imports of processed fish from China by trading partners (lower panels) in 2004 and 2005, respectively

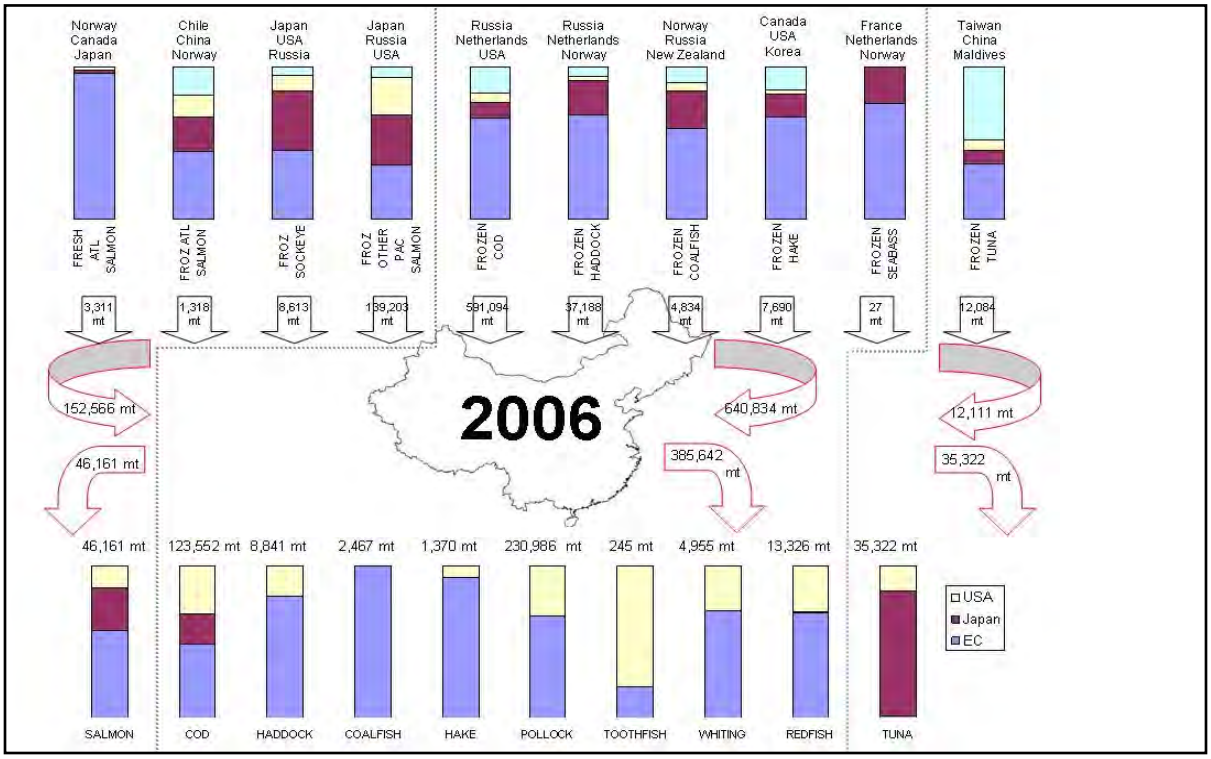


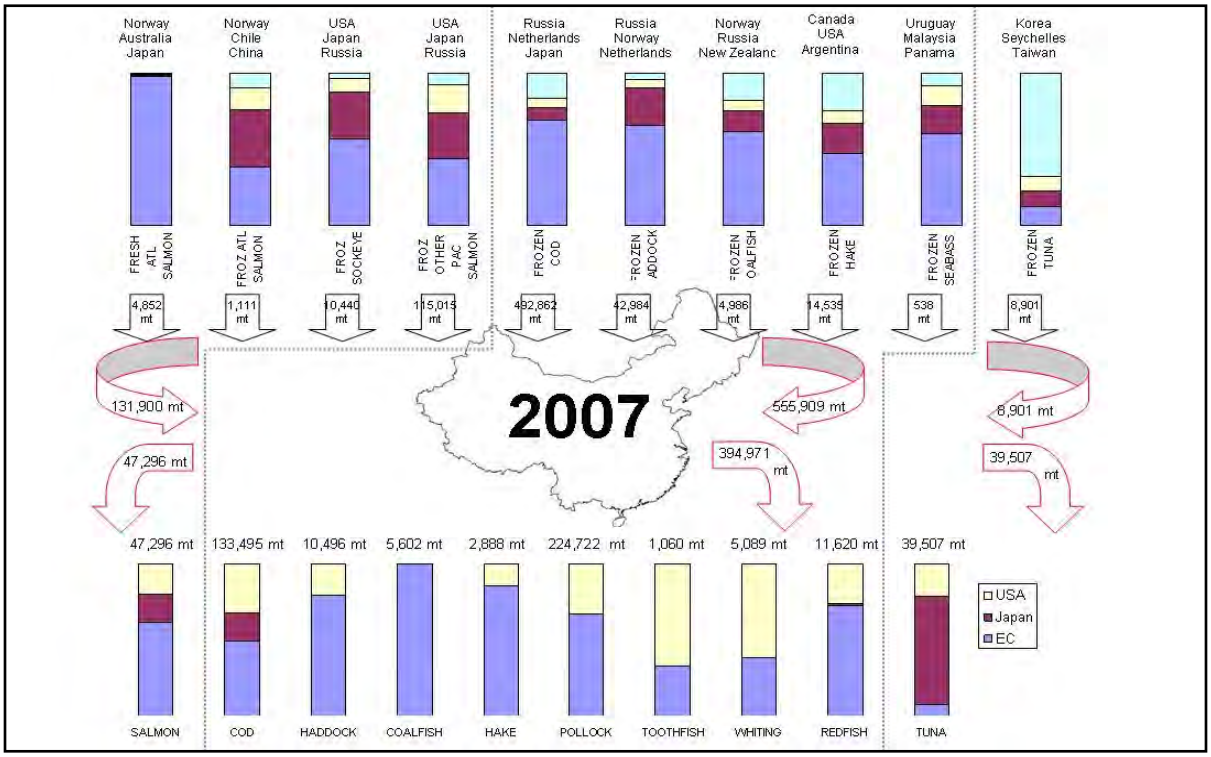


Note: mt here indicates t (tonnes)

Figure 1c (upper figure) and 1d (lower figure)

China's imports of unprocessed fish (upper panels) and imports of processed fish from China by trading partners (lower panels) in 2006 and 2007, respectively





Note: mt here indicates t (tonnes)

Owing to the lack of species specificity in China's import and export data, reported imports from China by China's major partners in the seafood trade were analysed in order better to understand the flow of products out of China. These partners were defined using data for the categories in **Table 2** and showed that, of the majority of (unspecified) processed fish products exported from China, 83% of the total was destined for either the EU (37%), the USA (25%) or Japan (21%; averages for 2004–2007). Therefore, on the receiving end of the supply chain, this study uses data on imports of processed fish as reported by the EU, USA and Japan.

Appendix 1 provides details on the matching of codes between the commodity coding systems in China, the EU, the USA and Japan. In compiling China's imports of raw materials, it was assumed all would be imported under either 0302– (fresh or chilled) or 0303– (frozen) code prefixes. Initially, it was assumed that all processed fish received from China by the EU, USA or Japan would be imported under either 0304– (fillets), 0305– (dried, salted or in brine) or 1604– (prepared or preserved) headings. However, inspection of EU, US and Japanese imports from China under prefixes 0302– and 0303– revealed that substantial quantities were imported under these headings. For salmon and whitefish, this is most likely to be explained by unintentional miscoding since it seems unlikely that China would export whole or primary processed (headed and gutted (H&G)) fish to these markets. In other words, even though the products were coded under headings 0302 or 0303 it is still reasonable to assume they had been processed. However, as will be shown in the section on business models used in the re-processing trade**,** this is not the case for tuna where landings of China's tuna fishing vessels in the EU, USA or Japan appear to be recorded as imports. Since EU, US and Japanese imports of tuna from China may thus contain both processed and unprocessed forms, these data should be used with caution. It should be further noted that for tuna, while fresh/chilled (0302) and frozen (0303) product categories are usually species-specific, most commodity codes used for imported processed tuna (fillets, loins or cans) by the trading partners are not. Therefore, for consistency, tuna of all species were combined into a single category for this analysis.

For each year from 2004 to 2007, China's imports of salmon, whitefish and tuna are shown as four-part bars (top three ranked suppliers and an "other" category) in the top panels of **Figures 1 a-d**. Each bar represents the first- (blue), second- (violet) and third- (yellow) ranked origin countries of the imports and the remainder from all other countries (light green). The names of the top-three ranked countries are listed above each bar in descending order. The total quantity imported in that category is shown below each bar. The bars in the lower panel represent the output of processed fish from China to the EU, USA and Japan, based on import statistics from these three trading entities. The total quantity reported by these three entities is shown above each bar. The curved arrows in the middle of the diagram show the consolidated input (of raw material into China) and output (of processed material from China as recorded by trading partners) for salmon, whitefish and tuna for all fresh/chilled and frozen forms. The arrows are sometimes higher than the sum of the bars shown above or below them because of the inclusion of fresh/chilled products which are not shown in the individual bars.

Findings from import-export diagrams

While there are expected to be substantial quantities of pollock, hoki, whiting, redfish and possibly toothfish re-processed in China, these fish do not appear in China's published import statistics and only some of these species appear as imports from China in statistics of the EU, the USA and/or Japan. This may be because these species are declared as other species, or the result of non-specific declarations (e.g. unspecified frozen fish). For example:

- Alaska pollock may be declared as "cod" since, like Pacific cod, it is caught in the Bering Sea, or possibly by mistake "coalfish" or "coley", as one of the common names for coalfish is pollock. (Another species, *Pollachius virens*, which is listed in Fishbase (2008) under the common name "saithe" is also sometimes referred to as "coalfish"/"coley" or "pollock".)

- Hoki (*Macruronus novaezelandiae*) may be reported as "hake" as it is in the same family (Merlucciidae). However, given that New Zealand is always among the top three source countries of China's imported "coalfish" , yet *Pollachius* spp. does not occur in New Zealand waters, it is likely that hoki may be recorded as "coalfish".

- Traders indicated that whiting was reported in the non-specific category "0303–7990, frozen fish, not elsewhere indicated" and the same may be true for redfish, for which there is also no obviously applicable category.

- China has implemented 10-digit commodity codes to separate toothfish, including 0303–620000 (frozen toothfish livers and eggs), 0304–120000 (fresh or chilled toothfish fillets), 0304–220000 (frozen toothfish fillets), and 0304–920000 (other toothfish meat). However, this study found no evidence that these 10-digit codes were used: Customs data are not published or otherwise available at the 10-digit level and it is not clear how frequently traders use the 10-digit codes. No imports or exports are recorded under the eight-digit version of these codes for 2006. Imports of whole or primary processed (only) toothfish into China may be declared as "seabass", but it is noted that annual toothfish outputs based on statistics from China's trading partners (**Figure 1a-1d**, lower panels) are larger than the annual reported input to China (**Figure 1a-1d**, upper panels) of "seabass" raw materials by 2–9 fold—a potential factor contributing to this discrepancy is described in a later section of this report.

While the above points may help to explain some of the anomalies in the species-specific trade statistics, many uncertainties remain and cannot be resolved on the basis of currently available information.

During the four years 2004–2007 the bulk of salmon, whitefish and tuna imported as raw materials comprised "cod" (71–83%, mean 77%). As discussed above, this figure is likely to include pollock. It

is interesting to note the close match between this figure and the largest output species (as reported by destination markets) of "pollock" (47–54%, mean 50%) and "cod" (23–28%, mean 26%). In terms of quantities, on average China produces 210 000 t of Alaska pollock and 110 000 t of cod products each year for the EU, US and Japanese markets (calculation based on trading partner statistics). If converted to whole weight equivalents, assuming a whole weight to primary processed (i.e. headed and gutted (H&G)) yield of 67% and a primary processed to fillet yield of 70%, these amounts would total 450 000 t for Alaska pollock and 236 000 t for cod. Given that the total Alaska pollock catch is reported at 2.7–2.9 million tonnes, 2004–2006, and the Atlantic and Pacific cod catch is reported at 1.2–1.3 million tonnes, 2004–2006 (FISHSTAT, 2008), these figures suggest that for both Alaska pollock and Atlantic/Pacific cod, China's re-processing output accounts for approximately 16–19% of the global reported catch.

Other fish are processed in considerably smaller quantities. Based on 2004–2007 averages, China annually produces a processed output of 39 000 t of salmon, 14 000 t of redfish and 7000 t of haddock. Processed products of whiting (5000 t), coalfish (3000 t), hake (1000 t) and toothfish (800 t) are produced in even smaller quantities.

It should be stressed that, in most cases, these species-specific figures for the amount of fish re-processed in China may be under-estimates. First, they assume no mis-declaration. Second, if some quantities of fish of these species are reported in non-specific categories, the actual output from China would be higher. Third, there may be additional quantities of these fishes which are re-processed but do not appear in the results because they are exported to destinations other than the EU, USA or Japan. It has been shown above that 83% of all Chinese-produced fish fillets are destined for the EU, US or Japanese markets and it is possible that for the subset of high-value fillets, including salmon, whitefish and tuna, the percentages of fish fillets bound for these main markets is even higher. On the other hand, salted forms of fish, particularly cod, may be mainly exported to other areas such as Canada, Brazil and the Caribbean and thus not be included in the analysis.

Another source of the discrepancies between input and output may arise because fish processed in China are exported to the EU, USA or Japan via another country. Trade sources indicate that this may be the case for fish processed in China for the US market, but first exported from China to Canada and then from Canada to the USA.

By market, Japan takes the highest percentage of China's tuna output and substantial amounts of cod and pollock. Japan also received the majority of China's toothfish output (coded as "mero"; **Appendix 1**), 2004–2005, but none in the period 2006–2007. The EU received the leading share of China's haddock, coalfish, hake, pollock, redfish, and, in all years except 2007, whiting. It also received approximately half of all China's salmon and cod output. The US market received substantial quantities of China's processed pollock and, in the period 2006–2007, toothfish (99% of which was recorded in US statistics as toothfish, 1% as seabass), which may include toothfish and other species. The USA also received substantial quantities of cod, haddock, hake, whiting and redfish from China in some years (**Figure 1**).

Other sources of species information

One potential existing source of more detailed species information was investigated for this study but the information proved unobtainable. CIQ requires species information to be provided before it will issue a Health Certificate for export of processed fish products (see **Appendix 2**, Item 28). For this reason, the Bureau was approached regarding the possibility of accessing these data for this study. CIQ declined to allow access, stating that they did not maintain "systematic" data on species and origins because they were mainly concerned with "safety and quality" of products. From this response it is understood that CIQ, while requiring species information, does not audit or maintain this information in any formal manner and thus is not prepared for these data to form the basis of any analysis of exported quantities.

There is the possibility that better data will be forthcoming from the China Customs Administration (CCA). One trader interviewed for this study stated that the CCA had recently informed him that the commodity coding system was being revised to match the species specificity of the EU system. The reportedly current integration of the responsibilities of CIQ and the CCA may also help to clarify species issues but the details of this integration, and thus the prospects for better information, are unclear (see chapter **Fish product traceability**).

Summary

Customs statistics were applied to investigate the species composition and quantities in China's re-processing trade for salmon, whitefish and tuna. Within these groups, pollock and cod comprise 71–83% (mean 77%) of China's raw material input and 74–78% (mean 76%) of its processed output, 2004–2007. This suggests that China's re-processing output, when converted to whole weight, is equivalent to 16–19% of the globally reported catch of Alaska pollock and Atlantic/Pacific cod.

Based on imports from China by the EU, USA and Japan, China's re-processing output averages 39 000 t of salmon, 14 000 t of redfish, 7000 t of haddock, 5000 t of whiting, 3000 t of coalfish, 1000 t of hake and 800 t of toothfish, annually. These figures may be under-estimates if additional quantities of these fish are exported by China to other markets. Japan took the highest percentage of China's tuna output, and also received the majority of China's toothfish output, 2004–2005. The USA took the largest share of China's toothfish output in the period 2006–2007. The EU received the leading share of China's haddock, coalfish, hake, pollock, redfish and, in all years except 2007, whiting. It also received approximately half of all China's salmon and cod output.

Despite matching China's production with species-specific imports from China recorded by the EU, USA and Japan, residual uncertainties about species identity, particularly in the case of the large (nearly 400 000 t in 2006) and growing category of unspecified frozen fish imports, remain. Overhaul of China's commodity coding system for fish products, as well as better integration of the databases and responsibilities of CIQ and the CCA, both believed to be under way, would allow for a much improved level of understanding of both China's and the world's fish trade.

Sources of raw material supplies

Existing information

There are two potential types of raw material supplies feeding China's wild-caught fish processing industry: imports, for which detailed data are available, and landings, for which data are very limited. Since China makes no distinction between exports and re-exports in its publicly released Customs figures, it is not possible to separate raw material used to produce exports into domestic-culture/landed fish (exports) and imported raw material (re-exports) quantities in this way.

Information on Chinese Government websites suggests that data on the source of the raw materials for China's "aquatic product" exports are indeed compiled (China Ministry of Agriculture, 2008) but seemingly not published. (The term "aquatic products" in Chinese (literally "water products") refers to both freshwater and marine, and both cultured and wild, products.) According to data for 2007, 40% of China's aquatic product exports derived from domestic aquaculture or mariculture, 21% from other domestic production, and 39% from imported materials (**Figure 2**, upper panel). It is reported that the relative share of exports produced from imported materials is continuing to increase.

Figure 2

Origin of aquatic products exported by China (upper figure) and the target uses of aquatic products imported by China (lower figure) for 2007, in tonnes

Source: China Ministry of Agriculture, 2008.

The same website source further categorizes China's fish imports into three classes by use. Raw materials for processing comprised 47% of total imports in 2007, whereas fish meal accounted for 28% and edible fish for domestic consumption totalled 25% (**Figure 2**, lower panel). If the amount of imported materials for processing (1 638 000 t from the lower panel) is contrasted with the export quantity produced from imported materials (1 196 064 t from the upper panel), the overall yield is 0.73, implying 27% by weight is lost during processing, which seems a credible figure given what is known about processing yields: see **Regulation of the re-processing trade by means of product yield**. A trend of increasing imports for domestic consumption is reportedly continuing, with quantities in 2007 growing by 22% (China Ministry of Agriculture, 2008).

These figures indicate that, excluding cultured fish, slightly over 630 000 t, or 35%, of China's raw material for the production of export-orientated products derives from its own domestic fisheries. For the purposes of this study it is necessary to consider whether any of this 630 000 t is composed of salmon, whitefishes or tuna. If not, i.e. if all salmon, whitefish and tuna supplies derive from imports, the countries from which these supplies are imported and the countries from which they originate, which may or may not be the same, may be identified from import statistics. These issues are addressed in the following sections.

Fish landings in China and the processing trade

For salmon, Chinese domestic landings are likely to be very small since China is not a member of the North Pacific Anadromous Fisheries Commission (NPAFC) and does not hold a quota for fishing North Pacific salmon. Although some Chinese vessels have been apprehended for illegal fishing in NPAFC waters (CBC, 2007), it is likely that the amounts of salmon, even if they were processed in China for export, would be negligible relative to the total amounts of salmon processed. Salmon caught by NPAFC members would be expected to arrive in China by means of cargo vessels and be recorded as imports (Clarke, 2007).

FAO capture production data for whitefish do not provide clear evidence of China's current involvement in any of the world's major fisheries for these species. The only whitefish capture production reported by China since 2004 is from a small fishery (19 000–25 000 t per year) for Pacific cod in the Yellow Sea (FISHSTAT, 2008). Traders report that these fish do not enter the re-processing trade on account of quality issues. Beginning in 1987, China reported catches of 11 000 to 338 000 t per year of Alaska pollock in the North Pacific, but there have been no reported catches of this species since 2002. It is not clear whether Chinese vessels are still involved in the Alaska pollock fishery: interview information suggests that the vessels may or may not technically be owned by Mainland Chinese companies and, even if so, they may be flagged to other countries, including the Russian Federation. Based on available information, it is believed that Bering Sea whitefish supplies arrive in China via refrigerated transport vessels and should be recorded as imports rather than landings.

China is involved in several Regional Fisheries Management Organizations (RFMOs) that oversee tuna fisheries. Since these organizations require public reporting of catches, and these reports are made available to FAO, the FISHSTAT capture production data for China's tuna catches are likely to be more accurate than for other species. For the period 2004–2006, China reported total catches of tunas and skipjack (albacore, Atlantic bluefin tuna, southern bluefin tuna, bigeye, skipjack, tuna-like species NEI and yellowfin) of about 110 000–170 000 t (FISHSTAT, 2008). A large portion of the catch was probably sold directly to foreign markets, but some may have been landed in China for re-processing. It is considered more likely for tunas than for the other species of interest to this study that landings by Chinese vessels or in China constitute a notable portion of the raw materials for China's processing industry.

China's reported source countries

Turning now to imported rather than landed raw materials, **Figures 1 a-d** show, for each year, the top three source countries for China's recorded imports of each type of fish. While these data are informative, a close examination highlights several potential problems associated with relying on Customs data to indicate fish origin. These potential problems fall into the following categories:

- In some cases, as with imports of fresh Atlantic salmon from Japan and the imports of frozen coalfish from New Zealand (see ***Findings from import–export diagrams***), the biological range of the declared type of fish does not match the declared country of origin. This indicates a problem with either commodity code selection, country of origin declaration, or both.

- For all of the years analysed, China itself appears as one of the top three countries of origin for either frozen Atlantic salmon or frozen tuna. One possible explanation for this is that fish offloaded into bonded warehouses and subsequently imported into Chinese Customs territory are not checked against the original paperwork indicating how the shipment reached the warehouse in the first instance. In such cases, China may be entered as the country of origin by default.

- There are many apparent cases in which a routing country is listed as the country of origin. Of particular note in this context is the frequent appearance of the Netherlands as a top-ranked country of origin for frozen cod. Although cod is neither caught by Dutch vessels nor caught in Dutch waters, as discussed below, the Netherlands may be likely to be recorded as the country of origin when the Health Certificate for the shipment is issued there.

- Finally, declared countries of origin which have no connection to the location of the fishing grounds or the fishing fleets may represent the flag State of transhipment vessels or irregular shipping patterns. Examples of this potential problem appear in the form of frozen seabass declared as originating in Malaysia or Panama.

Tallies of the total imports of raw materials under the salmon, whitefish and tuna codes listed in **Appendix 1** for 2007 reveal that 97% are imported from only 10 countries. The Russian Federation alone accounts for 57% of all China's salmon, whitefish and tuna imports, with 87% of the Russian Federation's share comprising "frozen cod" (possibly including pollock). The Russian Federation is followed by Japan, the Netherlands and the USA, each contributing 6–12% of total imports. South Korea, New Zealand, Canada, Germany and Chile each contribute ≤4% of the total. These patterns have remained consistent since 2004.

Chinese Government sources differ in their listing of major sources for aquatic imports (as a whole) probably owing to the inclusion of fish meal. The sources of the raw materials shown in the lower panel of **Figure 2** are given as the Russian Federation, Peru, the USA, Association of Southeast Asian Nations (ASEAN) members, Chile and Japan (China Ministry of Agriculture, 2008).

Finally, as described in the section ***Development of import–export diagrams***, there are large quantities of fish reported in the frozen "not elsewhere specified" category (0303–7990). Roughly 40% of the imports in this category in 2007 (ca. 242 000 t) were reported as originating in the Russian Federation. In 2006, the largest source of fresh/chilled "not elsewhere specified" (0302–6990) fish imports to China was Mongolia (47 t).

Quantities of imported raw materials

The final issue to be dealt with concerns an evaluation of the accuracy of the quantities reported in China's Customs statistics. As indicated above, it is apparent that the routing country is sometimes erroneously declared as the country of origin. This issue influences the accuracy of figures on imported quantities by country. An example is illustrated in **Table 4** for cod from two countries in the EU. In the case of the Netherlands, China reports importing vastly greater quantities of cod from the Netherlands than the Netherlands reports exporting to China. In contrast, the quantities of cod reported as exported by Denmark to China and reported as imported by China from Denmark align closely.

Table 4

Reported imports of cod by China from the Netherlands and Denmark as compared to reported exports of cod from the Netherlands and Denmark destined for China, 2004–2007

	2004		2005		2006		2007	
	Imports	**Exports**	**Imports**	**Exports**	**Imports**	**Exports**	**Imports**	**Exports**
Denmark	608	953	1036	825	616	1366	2812	2455
Netherlands	64 419	112	57 127	506	59 257	250	40 144	1250

Source: GCBI, 2005–2008; EUROSTAT, 2008a.

In the EU, traded goods may be classified in one of three ways for the purposes of statistical reporting: general, special or transit. Countries which apply the general trade system record goods entering their economic territory, whether or not those goods eventually enter free circulation within the country. In this way general trade statistics for country Y should record fish from country X stored in a bonded warehouse in country Y before onward shipment for processing in country Z. In contrast, under the special trade system only those goods which are released into free circulation in country Y are recorded in country Y's trade statistics. A third category is transit trade. These statistics cover goods which are simply shipped through a port without being stored and do not appear in either the general or special trade statistics[2].

Denmark and the Netherlands reportedly publish general trade statistics, but in order to comply with EU statistical conventions, when Denmark and the Netherlands report data on extra-EU trade to the EU, it is reported on a special trade basis (EUROSTAT, 2008b). This means that the only fish exports from the EU to China appearing in the EUROSTAT system are those that either originate in an EU country or are imported for free circulation into an EU country before being exported to China. In the case of Atlantic cod, most of which is caught by the Russian Federation and Norway (both non-EU countries), even though these fish may be shipped through the EU it would not be expected that they would be recorded in EUROSTAT export statistics except in limited instances where they are actually first imported for free circulation in an EU country. Similarly, since China's import statistics are recorded on a country-of-origin basis, one would not expect EU countries to be listed as the "country" of origin except in the rare cases in which import for free circulation into an EU country had occurred.

It is thus interesting to consider why the Netherlands is so often recorded as the country of origin of cod by China yet, according to Dutch statistics, the fish do not originate in the Netherlands. The answer probably lies in the special characteristics of the trading routes by which Atlantic cod move from the fishing grounds to processing factories in China. Some of the Russian-caught and much of the Norwegian-caught Atlantic cod is transhipped at sea and first landing takes place in EU ports which have good logistical links with China. In recent years, such ports have included Eemshaven (Netherlands), Bremerhaven (Germany), Grimsby (UK), and Velsen (Netherlands), but recent interviews conducted for this project suggest that Velsen (Netherlands) is now the main port of landing for transhipped Atlantic cod. In these ports of first landing, the cod undergo inspection and receive a Certificate of Origin and a Health Certificate through a process involving liaison between local authorities and authorities responsible for the fishing vessels and/or their operations (see section

[2] Given the importance of the Netherlands in the fish trade, that country's Customs statistical systems were explored in some detail. The statistical recording categories used by the Dutch Government are slightly different than the definitions given above by EUROSTAT. The Netherlands requires that cargo entering bonded areas (i.e. "transit trade") be recorded but these data are not publicly available. Therefore transit trade of fish to China is recorded but never published. Even if the goods leave the bonded areas, under the Dutch system if goods are imported into the Netherlands and almost immediately re-exported, without a Dutch citizen ever owning them, this trade is also not included in published Dutch national statistics. Dutch authorities refer to this as "general trade excluding transit" but it differs from the EUROSTAT definition of "general trade" (see main text above) because of the ownership test (and also because it excludes transit goods). For EUROSTAT purposes, the Netherlands prepares another set of statistics that includes all goods that cross the Customs border of the Netherlands, regardless of whether they are Dutch owned. This is referred to as "special trade including transit within the EU" (Dutch Customs Inspectorate, *in litt.* to S. Clarke, 25 and 28 April 2008).

Health Certificate). Therefore, although these certificates are issued on behalf of the Russian Federation or Norway, they are issued on Dutch letterhead and can easily be mistakenly interpreted as indicating the country of origin as the Netherlands.

Denmark is also said to be a hub for the onward shipment of Atlantic cod to China, but the situation there is different and may explain why China does not record large quantities of Atlantic cod as originating in Denmark. A portion of the Russian-caught Atlantic cod is landed in the Russian Federation, often in Murmansk, and shipped by road or rail to St. Petersburg and then by sea to Denmark. Under this route the cod's first port of landing is the Russian Federation and it is there that the Certificate of Origin and Health Certificate are issued. In this way the documents accompanying the shipment to China indicate clearly that the origin of the cod is the Russian Federation and thus there is less chance of confusion between the country of origin (the Russian Federation) and the routing country (Denmark).

An analysis of data from both the country of origin and the routing country for China's imports of cod and haddock was undertaken to identify which countries were major sources of these raw materials and which countries were merely shipment centres for supplies produced by other countries. Those countries from which China's reported import quantities were higher as routing countries than as origin countries were considered to be shipment centres. Seven countries consistently appeared to be routing countries during the period 2004–2007, including the Netherlands, South Korea, Japan, Belgium, Germany, the UK and Spain. Shipments declaring one of these countries as the country of origin for cod or haddock should be carefully evaluated.

Similarly, those countries from which China's reported import quantities were higher as origin countries than as routing countries could be considered to be actual sources. Six countries which consistently appeared to be source countries included the Russian Federation, Norway, Iceland, Ireland, Portugal and France. Even though country of origin and routing country data were taken at face value for this analysis, in fact, as shown in the previous analysis involving the Netherlands, in at least some cases shipment centres are erroneously declared as the country of origin. Therefore, it is possible that Ireland, Portugal and France are not actual countries of origin.

This analysis shows that it is not advisable to assume that China's reported import quantities by country are accurate, particularly when the product may be routed through a third country before reaching China. In order to explore the accuracy of reported import quantities in cases not complicated by routing patterns, exports of cod and pollock from the USA to China were contrasted with China's reported imports of "cod" (believed to include pollock) from the USA (**Table 5**). Such transactions are expected to be straightforward in that they should involve direct shipment from US vessels or ports to Chinese ports. It should be noted, however, that owing to differences in the way in which the US and Chinese statistics are compiled, the US quantities include cod and Alaska pollock in all forms (fresh, frozen, fillets and roe), whereas the Chinese imports should in theory be frozen whole fish only (i.e. code prefix 0303 only).

Table 5

Exports of cod and pollock reported by the USA as destined for China and imports of cod (believed to include pollock) reported by China from the USA (codes 0303–5200 and 0303–6000) (in tonnes)

Year	Fish	US exports to China	Imports to China from the USA	China-reported quantity: US-reported quantity
2004	Cod	17 412	37 124	1.83
	Alaska pollock	2874		
	Total	**20 287**		
2005	Cod	16 091	32 512	1.83
	Alaska pollock	1707		
	Total	**17 798**		
2006	Cod	22 861	34 497	1.38
	Alaska pollock	2067		
	Total	**24 928**		
2007	Cod	15 059	25 304	1.00
	Alaska pollock	10 237		
	Total	**25 296**		

Source: NMFS, 2008; GCBI, 2008.

For unknown reasons, China's reported import quantity is close to double the US-reported export quantity, 2004–2005, but nearly equal in 2007. While these figures do not document a close match between China and US figures, other than in 2007, they also do not suggest systematic under-reporting of imports by China.

Summary

The preceding assessment of the sources of fish for China's fish re-processing industry has indicated that imported materials currently provide 39% of the raw materials and that salmon and whitefish production relies heavily on these imported materials. Tuna products are certainly also produced from imported materials but because of China's involvement in many of the world's tuna fisheries, landings in China may play a proportionally greater role for tuna than for other products.

Information on the source countries of imported materials indicates that 97% of China's total salmon, whitefish and tuna supply derives from just 10 countries and 57% derives from the Russian Federation alone. Further raw material supplies are provided by the Russian Federation in non-species specific categories. Several instances of suspected mis-declaration were observed in which either the routing country, or China itself, was listed as the country of origin. The quantities of imported raw materials reported by China were shown to be grossly mismatched with the quantities of raw materials exported by trading partners to China in cases such as cod from the Netherlands. This is likely to be because the Netherlands does not report exports of goods which merely transit port areas on their way from north

Atlantic fishing grounds to China. It is easy for Chinese importers to conclude mistakenly the country of origin is the Netherlands when Dutch authorities issue Certificates of Origin and/or Health Certificates on behalf of the real countries of origin, such as the Russian Federation or Norway. South Korea, Japan, Belgium, Germany, the UK and Spain were also identified as countries which serve as routing countries but may be erroneously declared as the country of origin for cod or haddock imported to China.

Despite these various issues with the accuracy regarding country of origin and quantity information for imported raw materials, a direct comparison of straightforward trade in cod and pollock between China and the USA indicated no systematic under-reporting of imports by China and a very close match in the most recent annual figures (2007).

Characterization of importing and processing activities and companies in China

This section provides an overview of China's fish processing industry using official government descriptions as well as fishing sector labour statistics by province for 2004 to identify major processing areas. (The latter provide a relative comparison of the size of the fishing sector in various provinces: it is believed that fish factory workers are included in this figure, but this could not be confirmed.) Profiles of salmon- and whitefish-processing activities, primarily in Shandong and Liaoning Provinces, and tuna-processing activities, which occur on a vastly smaller scale, are then presented. Finally, the role of importing companies in the supply chain is introduced and discussed.

Overview of important re-export fish processing areas in China

According to Chinese Government sources, just six coastal provinces account for 92% of aquatic product exports (China Ministry of Agriculture, 2008). Leading the list are Shandong and Liaoning Provinces, located close to the fishing grounds of the Russian Far East and to the voluminous cold storage capacity of South Korea (**Figure 3**).

Geography thus helps to explain why the production of these two provinces, in particular, is said to be heavily reliant on imported raw materials (China Ministry of Agriculture, 2008). Guangdong Province is ranked third in overall aquatic production (China Ministry of Agriculture, 2008) on the basis of both its large aquaculture and capture fisheries industries (ranked third and first in China, respectively, based on labour statistics; **Table 6**). Zhejiang, Fujian and Hainan also have large capture fisheries industries (national ranks of fifth, fourth and seventh, respectively, based on labour statistics) which seemingly underpin their importance as aquatic product exporters as identified in official production information (China Ministry of Agriculture, 2008). These six provinces, i.e. Shandong and Liaoning, which are discussed in greater detail in the following section, along with Zhejiang, Fujian, Guangdong and Hainan, which are discussed briefly below, are also the top six ranked provinces for marine fish landings (FAO, 2008b, based on data for 2004). .

Figure 3

Map of China, showing its 27 provinces and four municipalities with provincial status (Beijing, Shanghai, Tianjin and Chongqing). The two dominant centres of the fish processing trade, Dalian in Liaoning Province and Qingdao in Shandong Province, are marked.

Although Guangdong Province reports the largest capture fisheries industry in China in terms of labour (**Table 6**) it reportedly derives most of its aquatic production for export from aquaculture activities, in particular shrimp (China Ministry of Agriculture, 2008). In terms of marine capture fisheries landings, Guangdong Province ranks fourth, recording 12% of national landings (FAO, 2008b, based on 2004 data). Since this study is focused on capture fisheries species, further characterization of the fish-processing industry in Guangdong was not pursued.

Zhejiang Province contains one of China's largest fishing ports, Zhoushan, located on an island off its easternmost tip near the city of Ningbo. This port hosts 7000 fishing vessels, 200 to 300 of which are far-seas vessels believed to be fishing off the coasts of the Russian Federation, Japan and South Korea. Zhejiang Province ranks first in fish landings, accounting for 22% of national figures (FAO, 2008b, based on 2004 data). Major species are said to include largehead hairtail *Trichiurus lepturus* (Ye and Rosenberg (1991) state that the hairtail fishery is the largest fishery in China), squid, drum *Pennahia argentat* and pomfret *Pampus* spp. In 2001, Zhoushan's production consisted of 70% frozen fish, 22%

peeled shrimp and 7% frozen farmed crab (Zhoushan Statistical Yearbook, 2001). Based on Zhoushan's low ranking as a re-export centre for fishing products, it is likely that most of these products are consumed within China. A casual survey of the Carrefour supermarket in Qingdao in March 2008 revealed many of the products there originated from Zhoushan. Another important fish processing area, Wenzhou, or more specifically the town of Yueqing and village of Puqi, is located on

Table 6

Labour statistics (in number of employees) for China's fish-related industries, by province and municipality (for those with provincial-level standing).

Area	Total fisheries labour force	Specialized fishery labour				Additional labour
		Specialized fishery total	Capture fisheries	Culture	Other	
China total	**13 018 332**	**7 109 179**	**1 825 453**	**4 489 971**	**793 755**	**5 909 153**
Qinghai	550	400	-	400	-	150
Tibet	613	609	575	34	-	4
Shanxi	7629	4555	280	3689	586	3074
Gansu	10 635	5658	813	3775	1070	4977
Xinjiang	13 935	8504	2310	5882	312	5431
Inner Mongolia	17 600	10 447	4053	5825	569	7153
Beijing	17 872	13 400	-	11 909	1491	4472
Ningxia	18 433	11 769	344	10 018	1407	6664
Tianjin	38 338	27 606	5162	21 037	1407	10 732
Sha'anxi	39 198	16 375	1480	14 517	378	22 823
Jilin	41 589	2699	476	2014	209	38 890
Shanghai	43 211	40 105	8343	27 758	4004	3106
Guizhou	117 268	34 219	7753	22 255	4211	83 049
Heilongjiang	150 279	102 017	21 648	72 768	7601	48 262
Hebei	163 585	103 388	46 900	46 467	10 021	60 197
Hainan	237 353	182 869	100 407	47 595	34 867	54 484
Yunnan	299 044	103 670	11 871	82 699	9100	195 374
Henan	383 755	153 615	29 125	99 979	24 511	230 140
Liaoning	493 222	383 265	140 673	215 050	27 542	109 957
Chongqing	507 172	218 349	11 839	176 528	29 982	288 823
Anhui	585 088	290 895	62 458	200 585	27 852	294 193
Guangxi	636 203	310 231	63 380	188 122	58 729	325 972
Jiangxi	712 713	255 983	48 951	179 223	27 809	456 730
Zhejiang	794 522	533 340	199 078	207 382	126 880	261 182
Fujian	871 298	532 773	209 333	255 476	67 964	338 525
Hunan	900 686	394 855	37 446	316 776	40 633	505 831
Hubei	988 551	699 049	70 524	601 050	27 475	289 502
Shandong	1 028 134	671 165	234 387	360 483	76 295	356 969
Sichuan	1 236 621	353 600	22 095	283 303	48 202	883 021
Jiangsu	1 261 832	803 614	219 556	525 613	58 445	458 218
Guangdong	1 401 403	840 155	264 193	501 759	74 203	561 248

Source: China Ministry of Agriculture, 2004.

the southern coast of Zhejiang Province. Puqi claims to be the largest shark-processing centre in China (Yueqing Tourism, 2005) (but it should also be noted that Guangdong Province appears to be a leading location for processing of shark fins in particular (Clarke, 2004)). There are several websites offering shark products from Puqi, including shark meat, cartilage and fins.

Fujian Province, and in particular its capital city Fuzhou, boasts that it is China's major far-seas fishery centre (FPOFA, 2005), even though it ranks only third nationally, having 15% of the national total of landings (FAO, 2008b, based on 2004 data). In 2004, 400 000 t of far-seas catch were landed in Fuzhou and this is said to be 60% of the total far-seas landings for China as a whole (FPOFA, 2005). Fujianese vessels are reported to be fishing throughout South-east Asia, with a special focus on Indonesian and Myanmar waters (FPOFA, 2005; Xiamen Government, 2007). The only available information on the types of fishing operation states that the Fujianese fleet has moved away from trawling and now deploys set and drift nets, tuna longlines and squid jigs. It is reported that the target species have also shifted from low-value, highly abundant species to high-value migratory species (FPOFA, 2005). Given this general information, it is difficult to assess the degree to which landings in Fujian may be channelled into the re-processing industry.

No information was found describing either the fishing fleet or processing activities based in Hainan Province, although statistics indicate that Hainan's fishing industry ranks sixth in landings nationally, having a 7% share of the total (FAO, 2008b, based on data from 2004).

Overview of salmon- and whitefish-processing and major processors

There is little information describing the fish-processing industry in China and it is thus difficult to determine which areas and companies are important other than through word of mouth. This analysis uses detailed, unpublished Customs statistics, in particular import and export data for salmon and whitefish, to identify some of the industry's key players. While this information represents the best available data to address this topic, it should be noted that some major processors' names do not appear. This is most likely to be because the import and export activities of these processors are camouflaged under the umbrella of an import–export company, as discussed in detail in ***The role of import–export companies***.

Analysis of detailed import statistics for salmon (fresh Atlantic, frozen sockeye, frozen other Pacific) and whitefish (cod (and pollock), haddock, coalfish and hake), 2006–2007, showed that of the total quantity of imports of these "processing trade" species, the vast majority were destined for Shandong or Liaoning Provinces (see **Figure 4**). Together, these two provinces received 98% of China's imported salmon and 92% of China's imported whitefish in 2006. In the following year, information on the receiving location information was missing from 5% of the salmon shipments and 1% of the whitefish shipments, but Shandong and Liaoning Provinces together accounted for 89% of the salmon imports and 92% of the whitefish imports.

Figure 4

Processing in a factory in Shandong Province

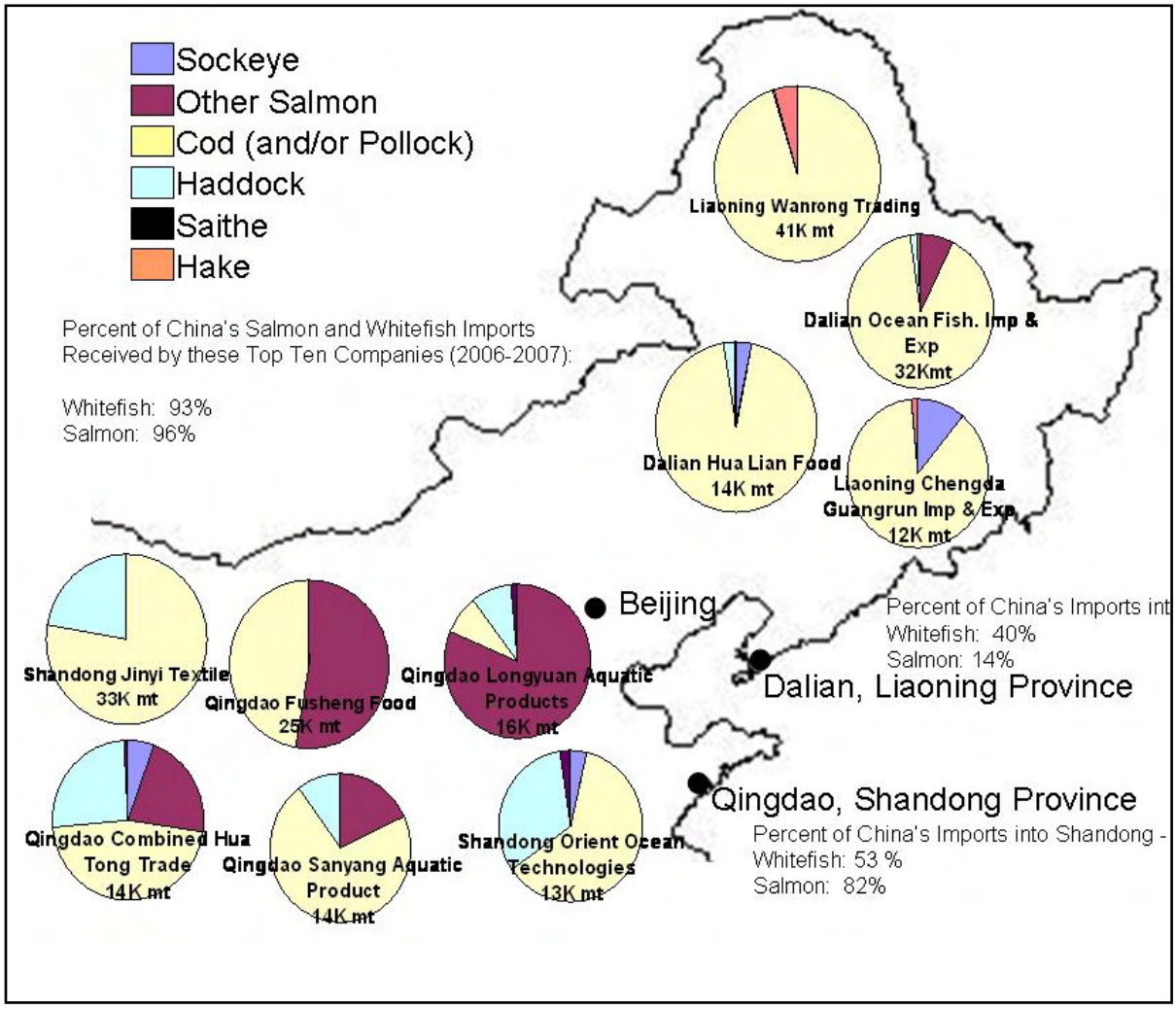
Credit: C. Morrison.

Imports of salmon and whitefish raw materials were compiled by importing company for 2006 and 2007 to determine the 10 largest receivers of these goods, their location and their species composition. During these two years, a total of 472 importers received salmon and whitefish raw materials. The top 10 importing companies, in aggregate accounting for 27% of salmon and 31% of whitefish imports for processing in China, were located in Dalian, Liaoning Province (four) and Qingdao, Shandong Province (six). The mix of species handled by each firm (**Figure 5**) reveals that companies in Dalian tend to focus primarily on cod (and/or pollock), whereas most factories in Shandong handle a greater variety of species, including haddock and, in particular, salmon.

This list of top 10 importers should only be considered a general reference source for some of the major salmon—and whitefish—processing operations and their location. This caveat is necessary because close examination of the ranked list of importing companies reveals, for example, that the importers ranked 10th and 11th are "Liaoning Chengda Guangrun Import and Export Company Limited" and

Figure 5

Quantities of salmon and whitefish imported by the top 10 receiving companies in China for 2006–2007. The average annual quantity is annotated beneath each company's name; each sub-graph shows the species composition for 2006–2007



Note: mt here indicates t (tonnes)

Source: (GCBI, 2008). Note that some companies are processors (e.g. Qingdao Sanyang Aquatic Product) whereas some companies are import–export firms potentially serving a number of factories or workshops (e.g. Shandong Jinyi Textile).

"Liaoning Chengda Company Limited". These entries show different facility numbers but the same postcodes and may or may not be the same entity. If they do represent the same entity, the 10th and 11th ranks should be combined and the corrected rank would be fifth. Similarly, the importers ranked 17th and 18th, "Qingdao Da Xi Yang Yong Jia" and "Qingdao Da Xi Yang Yong Xin", represent two different plants contracted to the processor Unibond. If these imports for 2006–2007 are considered to belong to one company, Unibond would rank as the sixth overall largest importer of salmon and whitefish in China. Since it is not possible to know all the names under which a processor may import its fish, and thus the imports of some lower ranking firms may actually combine into a high-ranking,

consolidated importing operation, a reliable ranking cannot be generated from the data available. While it is acknowledged that, in order to understand fully the China re-processing industry it would be necessary to look deeper than a simple list of company names receiving raw materials, as discussed further below, linking between processors and their potentially numerous sources of supply is only practical in a limited number of cases.

Details of whitefish processing in Shandong and Liaoning Provinces

Given the importance of Shandong and Liaoning as the two dominant fish processing centres in China, it is worth exploring their local characteristics in greater detail. Anecdotal information regarding the fish processing industries in Dalian and Qingdao was gleaned from interviews with industry players during the course of this study and is presented here. In overview, Dalian and Qingdao have relatively equal logistical advantages compared to other areas of China, owing to their proximity to the fishing grounds of the Russian Far East and the transhipment and storage centres in South Korea. However, Dalian is situated farther from key sources of labour in the Chinese hinterland and thus finds itself disadvantaged in comparison to Qingdao. As wages in China rose, even Qingdao was reportedly struggling to contract a sufficient number of workers after the February 2008 Lunar New Year holiday and presumably the situation was even worse in Dalian. Because of this inherent disadvantage, many traders consider that Dalian uses whatever means it can to compete with Qingdao. (It should be noted that none of the requests for interviews in Dalian for this project were granted.) In contrast, processors and officials in Qingdao were considered to be more proactive and to take a long-term view towards protecting the industry from potential reputational damage. A recent fact-finding trip to China by US Congressional officials confirmed that implementation of national requirements for food production hygiene by local CIQ offices was variable (US Congress, 2007).

Some interview sources believed that there were few inherent differences between processors and officials in Qingdao and Dalian, however, and that any observed differences in operating procedures in the two areas were driven by the markets they served. In particular, Dalian was said to be more focused on serving the US market, whereas Qingdao concentrated on the EU market. One key difference between US and EU seafood markets concerns the use of "polyphosphates" (also referred to as sodium tripolyphosphate or STPP), additives used to increase water absorption and retention in fish fillets. National standards for fish products and their additives are set with reference to Codex Alimentarius (Codex), a programme of food standards and guidelines operated by the FAO and the World Health Organization. In compliance with Codex and under the EU Food Additive Regulations, concentrations of polyphosphates in the form of P_2O_5 must not exceed 0.5% and any contribution of water to the overall product weight of >5% must be declared, except in the case of fillet blocks, where a 10% increase in weight is allowed. The USA is also a member of Codex and thus applies the same standards. However, several sources interviewed for this study suggested that operational practice in the US seafood industry relied more heavily on polyphosphates than did the EU industry. If this is indeed the case, and if it is true that Dalian is more orientated toward the US market than Qingdao, it would be expected that additive use in Dalian would be higher than in Qingdao.

Another technique sometimes used by processors to increase the weight of the resulting fish products is to apply a thick water-based glaze that can bulk up the weight of the product by as much as 15%. A combination of polyphosphates and glaze can result in an increase of weight of 25–40%. It should be noted that, while in some cases processors may employ polyphosphates or glaze, or both, without disclosing it to the product purchaser, in many cases the product purchaser will request these additives. It is interesting to note that these additives interfere with accurate calculation of product yields (see **Business models used in the re-processing trade**) and, if uncorrected, such interference could lead to overestimation the amount of raw material used to produce the finished product.

Although there is a legal basis for the use of additives in moderate amounts, concerns regarding their use still surface periodically. According to interviews, over the last year there have been two periods during which local CIQ officials have restricted exports of fish products from Dalian, effectively shutting down the industry for several weeks. The first of these periods occurred in September 2007. According to interview sources, the reason for this closure was CIQ's concern with high levels of polyphosphate additives, at concentrations possibly as high as 5%, and the damage this would do to the Dalian industry if such levels were detected by foreign inspection authorities. After this incident, traders began to hear talk of new non-phosphate additives that might pass undetected through CIQ's current additive testing protocol (Neubacher, 2005). One such product, for example, made from citric acid and rosemary, claimed to act as an anti-oxidant, thereby resulting in whiter fish of improved quality and with up to 12% increased yield in double-frozen fillets. When the Dalian fish processing industry was again shut down around the Lunar New Year holiday in February 2008, the closure was rumoured to be associated with excessive use of such non-phosphate additives.

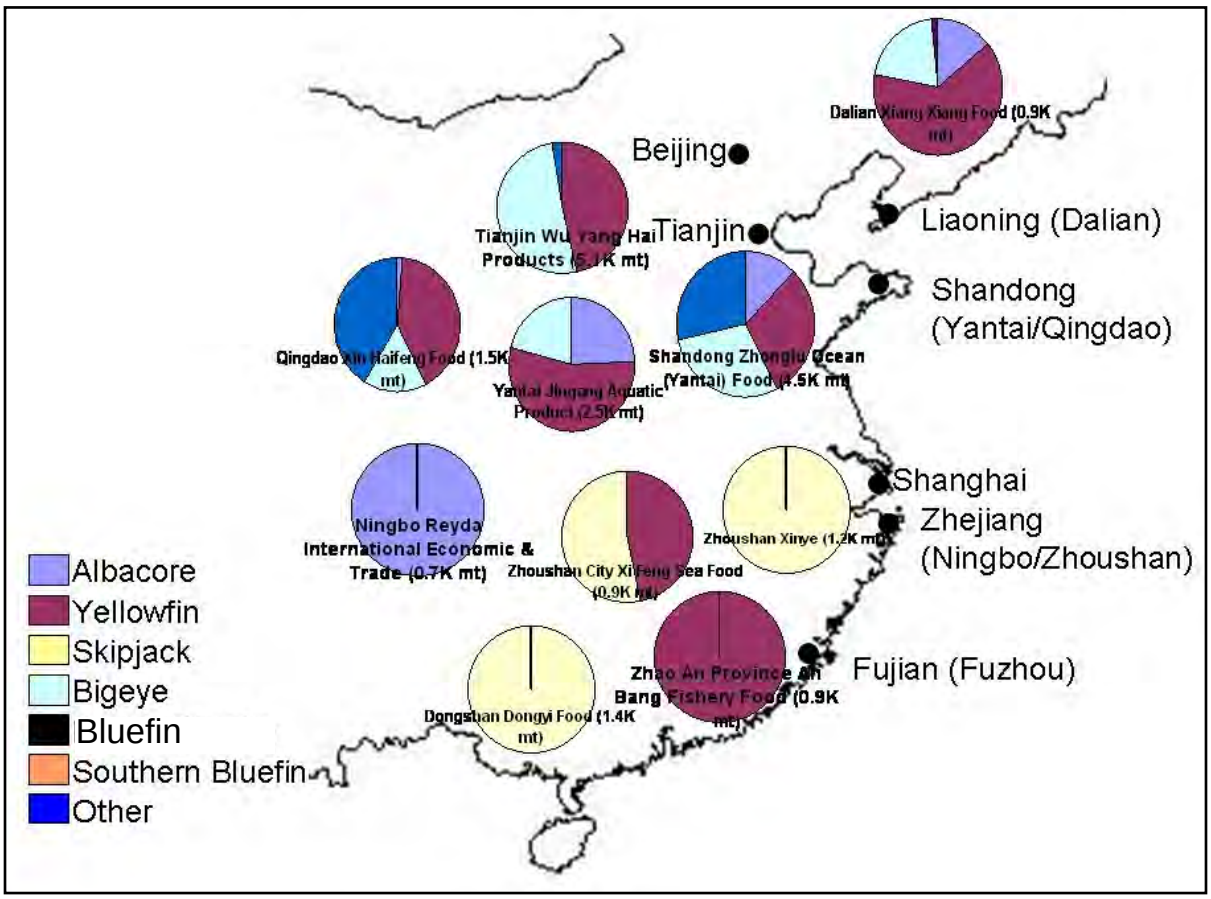
Processing of tuna

Imports of tuna were analysed in a similar manner but are discussed separately because they were received in considerably smaller quantities and showed a different pattern. As illustrated in **Figures 1 a-d**, the annual quantity of imported frozen tuna varied considerably from year to year, ranging from 4517 to 12 111t per year, 2004–2007. In addition to these frozen quantities, fresh tuna was also imported, 97% by volume of the fresh tuna imported by air being mainly to the Shanghai area. However, quantities of fresh tuna comprised only 0.5% of total tuna imports, 2006–2007.

Approximately three quarters of the total imports of tuna, 2006–2007, comprised a mix of frozen yellowfin (34%), frozen bigeye (22%) and frozen albacore (16%). Skipjack comprised 21% of tuna imports in 2006, but only 6% in 2007—global skipjack catches in 2007 were particularly poor (INFOFISH, 2007). As with salmon and whitefish, the leading processing location for tuna was Shandong Province, which received 38% of the frozen tuna imports, 2006–2007: Liaoning Province, however, did not appear to be a major processing location for tuna. Overall, Tianjin ranked as the second-largest processing location, followed by Zhejiang Province, notably the Ningbo and Zhoushan areas, and Fujian Province (**Figure 6**).

Figure 6

Quantities of frozen tuna imported by the top 10 receiving companies in China for 2006–2007. The total quantity for 2006–2007 is annotated beneath each firm's name; each sub-graph shows the species composition for the same two-year period



Note: mt here indicates t (tonnes)

Source: GCBI, 2008.

There were two large companies which received over 4000 t each over the two-year period. These were Wu Yang Hai in Tianjin and Zhonglu Ocean in Shandong. Four companies receiving medium-sized amounts of tuna (1200–2500 t each in two years) were located in Shandong, Fujian and Zhejiang. Four companies receiving small amounts of tuna in Dalian, Fujian and Zhejiang rounded out the top 10. Some of the medium and smaller-scale operators received only frozen yellowfin or skipjack. In contrast, only the larger operators in northern China reported receiving imports of the higher-value bigeye tuna and unidentified "other" tunas (**Figure 6**).

It appears that tuna-processing in China is still relatively specialized. Of the 60 companies importing frozen tuna, 2006–2007, only four are ranked within the top 50 companies importing salmon/whitefish and more than half of the companies importing frozen tuna (n=36) do not report importing any salmon or whitefish. Dalian Ocean Fishery Import and Export, which ranks as the third-largest salmon and

whitefish importer (**Figure 5**), ranks 23rd as an importer of frozen tuna, of which it handled 61t during the period 2006–2007. Rizhao (Shandong) Changhua Aquatic Foodstuff, ranked 15th for salmon and whitefish imports, appears on the list of frozen tuna importers, but received only eight kilogrammes of tuna in the period 2006–2007.

The role of import–export companies

Before concluding this discussion of processing operations in China, it is necessary to introduce an important distinction between importers/exporters and the processors involved in China's re-processing industry. In particular, it is not always the case that the party importing or exporting the raw materials to/from China is the party which processes those fish into products for re-export. In some situations, processing factories will entrust the responsibilities for importing and exporting to businesses specializing in this kind of international trading for a wide variety of materials. This may be the reason why some of the major importers/exporters of fish products into China have names like "Shandong Jinyi Textile Company" or "Shandong Machinery Import and Export Group". These two companies are known to service two of China's biggest and best-known fish processors, whose names do not appear anywhere on the list of salmon and whitefish importers.

The extent to which import–export companies are independent of the fish processors they service is not known in all cases. However, in at least some instances fish processors are one of several processing industries (e.g. including textiles and machine assembly) in a corporate group that are served by a single import–export arm. An example of this is the relationship between the large processor Yilufa in Shandong and the Oasis import/export group (Food Time, 2008). According to its website, the Oasis group handles products ranging from fish fillets, squid, shrimp and surimi to marbles and granite, industrial gloves and office furniture (Qingdao Oasis, 2008).

In other cases, a fish processor may establish its own dedicated import–export company with a different name to handle international transactions, while at the same time import and/or export some shipments under its own name. An example of this is Qingdao Zhengjin Group Import and Export Company, which ranked 13th as a salmon and whitefish importer in the period 2006–2007, and Qingdao Zhengjin Haiqing Aquatic Products Company, which ranked 69th on the same list. If these imports were combined, Zhengjin would rank within China's top 10 importers of salmon and whitefish.

In a third variation, a major processor such as Qingdao Longyuan Aquatic Products Limited, which reportedly operates the fourth-largest processing plant in China and ranks fifth on the list of salmon and whitefish importers, i.e. has an import record commensurate with its large size, may not regularly use the services of a separate import–export company.

There may be several reasons why a processor would find use of import–export company advantageous. As pointed out by Redmayne (2004), large import–export companies were first

established in parallel with China's development of overseas fishing operations to assist with, and profit from, the duty-free import privileges those operations enjoyed. Many of these companies were old-style, State-owned enterprises with access to large amounts of capital. While Redmayne (2004) claims that the threat of the Asian financial crisis in 1997–1998 caused China to curb imports resulting in the demise of many of these firms, there would still have been a great need for such companies to supply the raw materials for a multitude of Chinese processing and assembling industries expanding at around the same time. This historical background may explain why some of the import–export firms appear to handle a wide variety of goods, rather than focus exclusively on fish or even foodstuffs.

Independent import–export companies assist fish processors in the supply of raw material for a fee. Since this adds to the processors' costs there must be a clear business justification why processors would choose to use the services of an import–export company. China had over 7600 aquatic production facilities in 2001 and may have closer to 12 000 such facilities currently (see **Table 1**). Many of these will be very small workshops which do not have experience with the protocols of international trade. Therefore, small processors may find the use of import–export companies a necessary and/or efficient business strategy.

On the other hand, as the preceding discussion has shown, some of China's largest processors also make use of import–export companies. One reason for this may be that import–export companies can serve as a kind of supply clearinghouse, allowing large processors to adjust the flow of raw materials to a number of workshops. European businesses trading fish into and out of China revealed that, while they may sell fish directly to factories, they often deal with large import–export companies that parcel fish out to, and bundle finished products from, a number of processing plants. This may be a useful strategy to cope with variation in standard processing throughput times owing to variation in fish quality, availability of manpower resources (e.g. around holiday periods) and, most importantly, demand from potential customers. Materials can be imported but held in the large cold stores of the import–export company until the workshops are ready to receive them. This kind of situation may apply both when there is a one-to-one relationship between the import–export company and a single processor (perhaps with several workshops) or when there is a one-to-many relationship between a single importer and a number of different processing companies.

The role of import–export companies may also be connected to the use of bonded cold store facilities in China. One processor explained that fish purchased in Europe and transported to China may be either a) imported and shipped straight to a processor's factory or b) directed to a cold storage facility, where it is held under bond and then cleared for import as and when required. At that point it may be moved to the originally intended factory, or possibly to another factory. According to this trader, the advantage in using the bonded cold storage is additional flexibility in deciding where to, and perhaps even whether to, process the material. Although the situation remains unclear, it seems likely that management of imported and stored raw materials for distribution to a network of potential factories would be undertaken by import–export companies except in the case of large and highly diversified

processors. Furthermore, if by using an import–export company, the original consigner is able to sell off the material if they no longer wish to process it, use of an import–export company could convey a substantial business advantage.

In addition to parcelling by import–export companies, complex distribution of raw material may also occur when traders undertake something they call "swapping". This occurs when shipments contain species other than the trader's target species, e.g. because the original vessel's catch included by-catch. Traders explained that they would "swap" such fish with other companies through barter. If the swapped fish is by-catch only it is presumed the quantity would be low. However, as the practice exists, it would in theory be possible to use it for larger amounts. Swapping, then, also has implications for tracing the origin of fish through processing operations, as will be shown in the chapter **Fish product traceability**. As described in that chapter, there appear to be no regulatory provisions for swapping, and thus the relationship of this practice to traceability requirements is unclear.

Summary

China's re-export fish processing industries are based primarily in Shandong and Liaoning Provinces, with additional capabilities in other coastal areas, such as Guangdong, Zhejiang and Fujian. Together, Shandong and Liaoning account for over 90% of China's imports of both salmon and whitefish. The top 10 importers in these two provinces account for over 30% of the total imports.

Dalian, in Liaoning, appears to focus its processing on cod and pollock, whereas Qingdao, in Shandong, processes a wider variety of species, including salmon. Since the use of additives appears to be higher in products destined for US markets, if Dalian is more orientated toward the US market than Qingdao, it would explain why interviewees suggested that use of additives in Dalian was higher. Two recent industry-wide closures in Dalian since September 2007 are said to have been related to high concentrations of additives in fillets destined for export.

Shandong and Tianjin appear to be the main areas for tuna-processing in China, 34% of which is based on yellowfin. Tuna-processing operations appear to be separate, and perhaps specialized, in comparison to salmon and whitefish, as only four of the top 50 salmon and whitefish importers also import frozen tuna.

It is not necessarily the case that the party importing or re-exporting the raw materials into China is the party which processes the fish. Import–export companies, which are sometimes servicing a variety of industries such as textiles and machinery, often supply and distribute fish on behalf of large, and probably small, processors. Although this service comes at a price, it may offer essential flexibility in the dynamic channelling of raw material to a network of factories as market conditions change.

Business models used in the re-processing trade

Business models used in China's processing trade

Importing of goods at reduced or zero duty for the express purpose of processing and re-export is referred to as "inward processing trade" or more simply "processing trade" or "re-processing trade". According to the CCA, this system operates in two forms within China. It was estimated in 2005 that one third of all Chinese importers and exporters, including those involved in fish-related industries, were involved in the processing trade in some form (Jin, 2005). In "contractual processing trade", ownership of the materials used in processing remains with the foreign supplier of the goods. In "other processing trade", ownership of the materials is transferred to the processor, typically a China-based foreign-invested company.

Raw materials imported to China are classified into several sub-categories by the CCA database. While these subcategories relate to the basic delineation of goods as being either foreign-owned or Chinese-owned while in China, as introduced above, some additional detail is provided. The sub-categories relevant to the fish processing trade are (GCBI, pers. comm.):

- **Processing and assembling**. The processor will import, but not purchase, the materials from overseas, process the materials and then export the end product. Therefore, during processing the ownership of the material rests with a foreign party. Chinese processors are exempted from paying import duties on the understanding that all of the end product (i.e. the imported material minus the waste or processing loss) will be exported. The CCA may levy the import duty retrospectively if they have reason to believe that the processor did not use all the imported materials for producing goods for export.

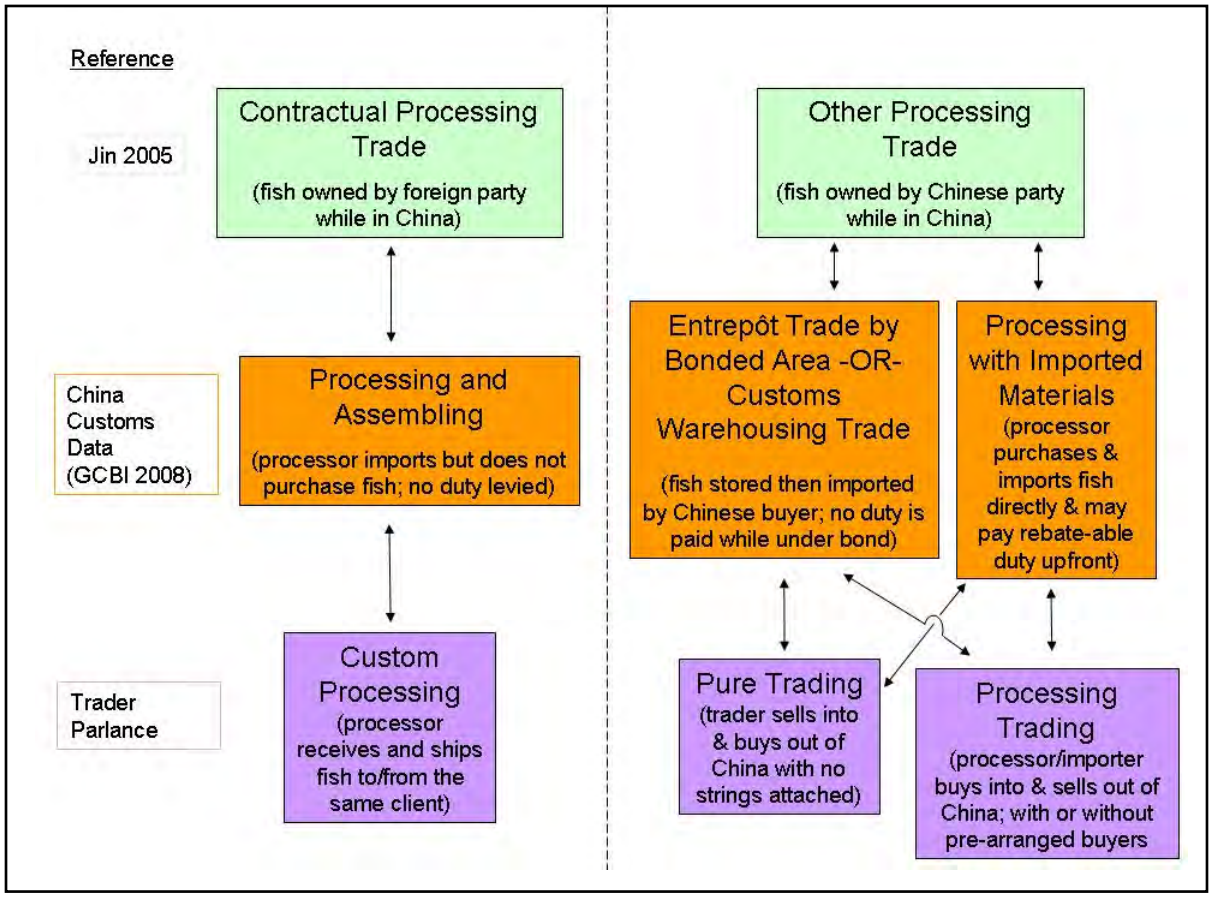
- **Entrepôt trade by bonded area or Customs warehousing trade**. The material is imported into or through a Customs warehouse within (entrepôt trade by bonded area) or outside (Customs warehousing trade) a specific bonded area in China. The importer is allowed up to one year of duty-free storage of the material in the warehouse. The importer usually sells the material while it is still in the warehouse thereby passing the responsibility for clearing the material out of the warehouse and for payment of duty on to the buyer of the material. However, if the purchaser has bonded status, duty need not be paid (Hong Kong Trade Development Council, 2008). While it is possible that the material could be sold from the bonded area or warehouse to a foreign party, it is assumed that most transactions under this subcategory involve sales to a domestic party. The clearing of material out of the warehouse is presumed to involve the issuance of the Inspection and Quarantine Certificate of Imported Goods as described in ***Importation and transfer of the material to the processing plant***.

- **Processing with imported materials**. The processor purchases the materials directly from overseas with foreign currency, processes the materials and exports the end-product. In this situation, the processor must usually pay the import duty, but will receive a rebate when the end-product is exported. An exception to paying duty for processing trade goods on import may be granted for enterprises confirmed by the CCA to have no record of smuggling or other violations (Hong Kong Trade Development Council, 2008).

This tripartite categorization adds another level of complexity to the simple system based on ownership described by Jin (2005) (**Figure 7**). In particular, it accounts for the role of importers as described in the preceding section. In the "entrepôt trade by bonded area" and the "Customs warehousing trade" a Chinese party other than the processor arranges for the material to be brought to China and stored. In both of these cases and also in "processing with imported materials", whoever imports the material into China's Customs territory (i.e. outside bonded areas or sanctioned warehouses) is liable for the import duty.

Figure 7

Terminology used to describe the various categories of imports by which fish raw materials enter China for processing



Note: Despite the impression of fixed models given by this diagram, it should be noted that some processors may be using more than one system at the same time**.**

Source: Jin, 2005; GCBI, 2008; and interviews (this study).

While the terminology introduced thus far seems reasonably straightforward, confusion may arise in relating these terms to operational practices in the global fish trade. This is because the categorization used by traders is not completely aligned with the China import terminology. Trader parlance takes account of not only which party owns the material in China but which party takes control of the material when it leaves China. As a result, a third set of terms is introduced as follows (**Figure 7**):

- **Custom processing**. The foreign supplier of the material maintains ownership of the material throughout the transport and processing and receives the finished products when they are exported. This is analogous to "processing and assembling" and "contractual processing trade" under CCA terminology.

- **Pure trading**. Under this model, foreign traders sell fish into China with no intention of buying it back. They may sell directly to processors or to importers. The material may be stored in a bonded or other warehouse or go directly to the processing plant. The Chinese parties buying the material may or may not have already determined to whom they will sell the finished product, but it is assumed that at least some of the Chinese buyers are speculating. The foreign traders may also buy processed fish exported from China, and they may in fact receive some of their originally traded material back, but this would be by chance rather than by design. Likewise, the Chinese party (importer or processor) would not be required nor even expect to re-sell the material to the original supplier and may operate on a completely open-market basis.

- **Processing trading**. This model is a hybrid of custom processing and pure trading. As with the pure trading model, under the processing trading model the Chinese processor takes ownership, in some form, of the material when it is imported to China and sells the finished product when it is exported. However, since many small and medium-sized fish factories would find it difficult to finance the upfront purchase of raw materials, "processing trading" often involves a loose relationship between the supplier or buyer, and the processor. For example, processors and potential overseas suppliers/buyers may open joint lines of credit so that ownership passes to the processor while the fish is in China but only the difference between the cost of the raw material and the cost of the finished products changes hands. This is conceptually similar to custom processing except that ownership of the material passes to a Chinese party. Another variation involves processors purchasing raw materials only when they have a guaranteed buyer waiting for processed products. In this case, processing trading resembles pure trading, except that it has a lower risk.

There are inherent advantages and disadvantages to each of these systems. With the rising cost of raw materials, small and medium-sized enterprises will wish, if possible, to avoid purchasing fish themselves as well as to avoid paying the import duty on it. This would tend to favour the custom processing model. However, at the other end of the spectrum, there must be sufficient profit to be made, despite the high risk, in buying material on speculation and then selling it to the highest bidder, or else the pure trading models would not exist. Under such cases, the utility of large conglomerates,

such as those identified in ***The role of import–export companies***, in providing capital and acting as import–export brokers becomes obvious.

Perhaps the key practical distinction between the trade systems on the left and right sides of **Figure 7** relates to whether import duties are levied or potentially levied. The import duty on fish in China is 26% and can represent a substantial sum for high-value and/or large shipments. If the ownership of the material is maintained by a foreign party, no duty is levied unless the CCA suspects some of the finished products are being sold domestically. On the right side of **Figure 7**, where the material is owned by a Chinese party, under standard circumstances duty must be paid on import and rebated when the finished product is exported. Processing factories may qualify for exemption if they can attain bonded status or maintain a clean trade record.

Chinese Customs statistics were examined on a shipment-by-shipment basis to attempt to determine for salmon, whitefish and frozen tuna which trade models were most commonly used (**Table 7**). According to the results, bonded areas and Customs warehousing methods are rarely used. Instead, for

Table 7

Percentage of shipments of salmon (fresh or chilled Atlantic salmon, frozen Atlantic salmon, frozen sockeye salmon, frozen other salmon), whitefish (frozen cod, haddock, coalfish, seabass and hake) and tunas (frozen albacore, yellowfin, skipjack, bigeye, bluefin, southern bluefin and other tuna) imported under the four most common trade models, 2006–2007.

	Salmon	Whitefish	Tuna
Processing with imported materials (i.e. processing trading or pure trading)			
2006	0.53 (0.62)	0.64 (0.75)	0.10 (0.20)
2007	0.48 (0.56)	0.63 (0.72)	0.14 (0.22)
Processing and assembling (i.e. custom processing)			
2006	0.37 (0.28)	0.30 (0.19)	0.86 (0.76)
2007	0.38 (0.30)	0.29 (0.20)	0.81 (0.73)
Customs warehousing			
2006	0.06 (na)	0.04 (na)	0.01 (na)
2007	0.09 (na)	0.05 (na)	0.04 (na)
Entrepôt trade by bonded area			
2006	0.04 (na)	0.02 (na)	0.04 (na)
2007	0.04 (na)	0.03 (na)	0.01 (na)

Notes: Figures in parentheses show percentage of trade by quantity (rather than number of shipments)—and "na" indicates "not available"—for "processing with imported materials" and "processing and assembling" only. Owing to rounding, columns by year may not tally to exactly 100%

Source: GCBI, 2008.

salmon and whitefish the predominant model is “processing with imported materials” implying that most of the salmon and whitefish is purchased by Chinese parties before processing either through processing trading or pure trading. In contrast, most of the frozen tuna is imported under the “processing and assembling” model, suggesting that the tuna is owned by foreign parties and is processed under custom processing operations.

Interviews with fish traders actively engaged with China indicated that the pure trading model was very common with thousands of companies trading fish with China as importers, exporters or both. One trading company interviewed considered that there were no more than 20 companies following a custom processing model. Since it was possible, however, that the market share controlled by a relatively small number of companies following a custom processing model (e.g. likely to include major companies such as Foodvest, Trident, Birds Eye Iglo, Icelandic, etc.) might be quite large, this was explored by computing the percentages based on quantities rather than number of shipments. The data in **Table 7** by quantity (in parentheses), however, conform to the patterns shown in the statistics by number of shipments, i.e. salmon and whitefish are predominantly processed under the “processing with imported materials” (processing or pure trading) model, whereas tuna is predominantly processed under the “processing and assembling” (custom processing) model.

Summary

Two broad categories of raw material import can be defined, based on whether the material is owned by a foreign or domestic party. If the material is foreign-owned, import duty need not be paid as long as the finished products are exported. If the material is owned by a Chinese party, 26% duty may be levied and then rebated, or traders/processors may qualify for an exemption from the duty if they maintain a clean trade record and the material remains under bond. Raw materials may not always be imported to China by the processor and thus material may change hands one or more times while in China. In some cases, large import–export companies channel materials to processors which behave as sub-contractors; in other cases, processors may buy materials from a Chinese importer.

Despite the apparent drawbacks of high capital cost of materials and potential tariff liability, it appears that as much as 60–70% of the salmon and whitefish raw materials used in China’s re-processing industry are Chinese-owned (the “processing with imported materials” model). In contrast, 70–85% of the tuna processed in China is foreign-owned and handled under the “custom processing” model.

Regulation of the re-processing trade by means of product yield

Yield regulation using Trade Processing Manuals (TPMs)

The CCA polices the quantities of goods used in the fish-processing trade by examining factories' reported yields for various products. (The other aspect of regulation of China's fish processing trade discussed in this report, i.e. sanitary requirements, is the responsibility of CIQ—see chapter on fish product traceability.) Expected yields are always approximate as they will vary considerably depending on, *inter alia*, the species; the product form (e.g. skinned or not, boned or not, method of pinbone removal (J-cut or forceps), and other factors); the quality and size of the raw material and the concentration of additives and amount of glazing. As an example, Knapp *et al*. (2007) give yields for chum salmon processed in Alaska as ranging from 51% for skinless/boneless fillets to 81% for skin-on fillets. Therefore, using yield information to identify potential discrepancies between input and output amounts clearly presents a challenge for the CCA.

During the course of this study it was not possible to meet with officials from the CCA, but traders provided information on how yield auditing is typically handled. Given that product yield must be allowed to vary, the larger the quantity of fish being processed, the more likely a slight variation in yield could lead to a large amount of product that can be hidden from Customs authorities and sold on the domestic market. In fact, according to Redmayne (2004):

> *"Everybody has their ways to avoid paying the full tariffs," says one Qingdao importer. Reprocessors, for example, will often report low processing yields, so they can sell off some of the seafood they import to the local market without paying any tariffs. "It's a game all of us are very good at playing," he says.*

It is therefore not surprising that the CCA has recently begun restricting the total amount of material that can be registered under a single TPM, a kind of ledger used to tally quantities imported and exported (**Box 1**).

Gross yields by type of fish

There are several reasons why it should not necessarily be expected that annual total import–export ratios for China by species, as available from Customs data, should conform exactly to yield expectations. These include the previously introduced issues of the lack of species-specificity in some import categories and the possibility that Chinese fish exports are first exported to third-party countries before arriving in the destination market (i.e. only EU, US and Japan markets considered in this analysis). In addition, not all material imported in a given calendar year is processed and exported in the same calendar year. Despite discrepancies arising from these factors, it would not be expected that yields derived from high-level, nationwide mass balance analysis would diverge radically from industry norms. This section conducts such an analysis and examines the results.

Box 1

Trade Processing Manual system for regulating re-processing trade input and output

As a preliminary step, all processors must report their annual processing capacity to the CCA, which keeps this information on file. Before any raw material is imported for processing, the processor must apply to the CCA to open a Trade Processing Manual (TPM). The main purpose of the TPM is to provide a basis for auditing product yields, to ensure that all of the processed materials are exported as required by Customs regulations. A TPM is valid for a period of one year, after which time the processor is liable to pay value-added and Customs taxes on the material documented in the TPM. In considering whether to allow registration of the TPM, the CCA will inspect a processor's previous TPMs and compare them against the registered annual processing capacity. This appears to serve as a gross check on whether overall processor throughputs conform to expectations.

In the past, there was no limit on the amount of material that could be registered under a single TPM. However, it appears that guidance was issued in 2008 by the CCA indicating that the import value in a single TPM should be limited to less than USD500 000 unless special authorization were obtained, and in no case should the quantity be greater than 100 000 t. Within these limits, it is common to list several or even many different types of product specification in a single manual, e.g. when many different products are made from the same raw materials. It is even possible to list several species in a single manual ,although this is reportedly discouraged by the CCA. TPMs are larger in scale than single import and export shipments; typically several import and export shipments are combined under one TPM. However, splitting of a single imported shipment into products for export under more than one TPM is not allowed.

Imported fish must be described in the TPM in terms of the catch area (presumably FAO area, e.g. North Pacific), species name, form and length, and exported products must be described in terms of whether skin and/or bones have been removed. Documentation that these are indeed the processing specifications must be provided in the form of the purchase orders for the incoming and outgoing material. If the specification changes, it is possible to inform the CCA of the modified specification before the goods are exported.

The CCA audits TPMs by applying standard yields for various species and products. If the species or product is new or otherwise not well understood, or if the permit and import–export amounts do not align, CCA officials may visit the factory to inspect the processing.

In the case that a party other than the processor itself owns the material, for example, in custom processing where the owner is a foreign party, or in the case of a large Chinese import–export company importing on behalf of the processor, the legal responsibility for compliance with Customs laws lies with the owner of the material. However, in practice, the processor takes the lead on interactions with CCA officials on yield issues.

The data in **Figures 1 a-d** representing China's declared imports of raw materials and declared imports of processed fish products of similar species to the EU, USA and Japan from China, are now examined in terms of yield. Results for the four types of salmon shown in **Figures 1 a-d** are presented in **Table 8**.

Table 8

Back-calculated H&G (headed and gutted) weight of salmon (fresh or chilled Atlantic salmon, frozen Atlantic salmon, frozen sockeye salmon, frozen other salmon), based on trading partner-declared imports from China and estimates of yield. All figures in tonnes.

	2004	2005	2006	2007	Notes
China's salmon output (as received by EU, USA and Japan)	28 536	34 166	46 161	47 296	(from **Figure 1**)
Back-calculated H&G weight of salmon	71 340	85 415	115 403	118 240	Assuming a yield of 40% (interview (information)[3]
China's salmon input (imports declared to CCA)	86 002	129 285	152 566	131 418	(from **Figure 1**)
Observed : expected	+14 662	+43 870	+37 164	+13 178	Row 3–Row 2
Observed yield	0.33	0.26	0.30	0.36	Row 1/Row 3

Note: Figures in parentheses show percentage of trade by quantity (rather than number of shipments) for "processing with imported materials" and "processing and assembling" only. Owing to rounding, columns by year may not tally to exactly 100%

Source: GCBI, 2008.

In order to back-calculate from the exported products received by the destination market to the original raw material weight received by China processors, a normative yield of 0.4 was applied. This factor is based on interview information suggesting that this is the yield government authorities in China expect to see for salmon products. Applying this yield to 2004–2007 Chinese exports (as recorded by trading partners) results in back-calculated headed and gutted (H&G) raw material weights which are always lower than the recorded amounts of raw materials imported to China (**Table 7**, row 4). In all years, observed raw material import quantities in China are 13 000 to 44 000 t higher than salmon output would suggest. This indicates that this amount of China's imported quantity of salmon (**Table 8**, row 4) is either lost in processing, consumed domestically or exported to a market other than the EU, USA or Japan. (Note that China's Customs data show that 17% of all exported fish fillets are not destined for the USA, EU or Japan. It is not known whether this statistic accurately reflects the distribution of salmon fillets exported from China but it would be expected that the percentage would be considerably lower than 17% for high demand species like salmon.) A gross calculation of yield (**Table 8**, row 5) suggests that figures in the range 26–36% are achieved in the Chinese fish processing industry. These figures appear too low both in comparison to yields for salmon in Alaska (51–81%; Knapp *et al.*, 2007)

[3] Some Chinese processors report achieving higher yields for salmon, e.g. in the order of 50–53%. If these yields were applied in this analysis the quantities in Row 4 would be even higher.

and to indications from interviews with traders that yields are actually in the order of 50–52% for salmon fillets processed in China. Note that if bulking additives and/or heavy glazing is used, the yields would be higher, rather than lower, in comparison to these alternative figures.

A similar analysis was conducted for whitefish (**Table 9**). The yield rate applied in this analysis was derived from interviews conducted for this study which suggested that CCA officials expected to see a yield of 65–73% for most species of whitefish processed in China. (One trader gave yield ratios of 70% for Atlantic cod, 73% for Pacific cod and 65% for haddock. AIPCE (2007) indicates fillet yields from H&G cod in China range from 68–70%.) Using the midpoint yield rate from the range 65–73%, the back-calculated amount of raw material, as is the case for salmon, is higher than the observed amount of imports, 2004–2006 (by 82 000 to 218 000 t), and lower in 2007 (by 16 000 t; **Table 9**, row 4). It is acknowledged that the different species combined here into the category "whitefish" have different processing characteristics including potentially different yields. However, given the problems with species-specific coding introduced in the section **Types of fish processed in China as classified by Customs code**, analysing the observed and expected yield for each species separately would not be a meaningful exercise. Nevertheless, there appears to be some systematic bias in the data for 2004–2005 versus 2006–2007 since the yield rate compared to expectations is very low in the first period but more closely conforms to expectations in the second period. Possible reasons for the differences could include changes in additive levels or changes in the way raw materials are supplied (e.g. if a major species like Alaska pollock started to be supplied through landings rather than imports this might appear as suddenly higher yields—it could not be determined from available information whether any Alaska pollock is landed is China (see ***Fish landings in China and the processing trade***).

Table 9

Back-calculated H&G (headed and gutted) weight of whitefish (frozen cod, Haddock, coalfish, seabass and Hake), based on imports from China declared by trading partners, and estimates of yield. All figures in tonnes.

	2004	2005	2006	2007	Notes
China's whitefish output (as received by USA, EU and Japan)	291 431	333 358	385 642	394 971	(from **Figure 1**)
Back-calculated H&G weight of whitefish	422 364	483 128	558 901	572 422	Assuming a yield of 69% (interview information)
China's whitefish input (imports declared to CCA)	609 403	701 417	640 834	555 909	(from **Figure 1**)
Observed : expected	+187 039	+218 289	+81 933	-16 513	Row 3–Row 2
Observed yield	0.48	0.48	0.60	0.71	Row 1/Row 3

Note: Figures in parentheses show percentage of trade by quantity (rather than number of shipments) for "processing with imported materials" and "processing and assembling" only. Owing to rounding, columns by year may not tally to exactly 100%

Source: GCBI, 2008.

In addition, one trader opined that Poland's joining the EU in 2006 could be responsible for the increase in the EU's reported whitefish imports from China from 2006 onwards (**Table 9**, row 1), while measures to control IUU fishing of cod initiated in 2005–2007 may have concomitantly acted to reduce China's cod supply (i.e. lower declared imports; **Table 9**, row 3).

Figure 8

Skilful hand-processing in China results in higher yields compared to processing elsewhere

The most striking feature of the comparison of raw material input to processed product output for tuna is that output quantities are consistently and substantially (3–5 times) higher than input quantities (**Figure 1**). There are two possible explanations for this discrepancy.

- First, it is very likely that the EU, USA and/or Japan are recording tuna landed by Chinese vessels as imports. These tuna are whole fish rather than the products of the Chinese fish-processing industry. Japan accounts for 71–94% of the imports of tuna from China, as shown in the lower

panels of **Figure 1**, and is known to record the flag State of the transport vessel as the country of origin. Therefore, even if the tuna is not caught by a Chinese vessel, when tuna is transported to Japan on a Chinese-flagged cargo vessel it would be recorded as a Chinese import in Japanese Customs statistics. Indeed, the majority of tuna imported from China by Japan (19 000 to 26 000 t per annum) is in the form of fresh or frozen whole tuna and thus has not necessarily passed through China. As a result, it might be expected that China's "exports" (as indicated by imports from China by receiving countries) of tuna are greater than China's own imports of tuna raw materials.

- Second, landing of tuna by Chinese fleets in China could contribute additional amounts of tuna raw materials not accounted for in the import statistics compiled for this analysis (i.e. **Figure 1**, upper panels). In this way, it is possible that China's tuna raw material supply is considerably greater than indicated by import data alone and results in larger than expected quantities of outputs. As will be discussed in **Conclusions and recommendations**, it is impossible to know what fish in what quantities are being landed where in China, based on available statistics. Information from interviews conducted for this study indicates that it is possible that such tuna landings may be occurring in Dalian and Zhoushan, the home ports of some of the Chinese tuna vessels, and channelled to the smaller tuna-processing factories there, as identified in the earlier section of this report characterizing importing and processing activities.

It is noted that, under the first explanation, the Chinese tuna exports are unprocessed raw materials, whereas under the second explanation the Chinese tuna exports are processed products. (See section on development of import–export diagrams for an explanation of why whole tuna commodity codes were included in this analysis.) From this assessment, we conclude that tuna is not well suited to this type of analysis because of potential confusion between imported tuna which has been processed in China and landings of whole fish by Chinese vessels in foreign ports, which are recorded as imports from China. While it should, in theory, be possible to separate these two types of product by commodity code, in practice exports from China of tuna loins or other non-fillet portions may be recorded under the same codes as whole fish.

Summary

The CCA monitors whether processed fish is re-exported through TPMs and application of yield ratios to imported and exported amounts. For this study, yields for salmon and whitefish were calculated on a national level for 2004–2007. For salmon, observed yields ranged from 26–36% annually, which appears low compared to industry norms and would be even lower if polyphosphates and/or heavy glazing were used to bulk product weight. Imported salmon raw materials were observed to be 13 000 to 44 000 t higher than processed salmon output would suggest, indicating that this excess material is either lost in processing, consumed domestically or exported to a market other than the USA, EU or Japan. A similar analysis for whitefish showed two different patterns for 2004–2005 and 2006–2007. A yield of 48% was observed in the earlier period, but in the latter period the yield suddenly increased

to ~60–70%, near the yield claimed by traders in interviews. Tuna is not well suited to this type of analysis because exports from China of processed tuna loins or other non-fillet portions may be recorded under the same codes as whole fish offloaded in foreign ports by Chinese vessels. It is thus not clear how to quantify either the input or output of Chinese-caught or -processed tuna.

FISH PRODUCT TRACEABILITY IN CHINA

Introduction

Traceability systems were originally designed as auditing processes to allow a food product to be traced back to its production facilities in the event of a health and safety incident. In contrast to systems such as Hazard Analysis and Critical Control Points (HACCP), which are designed to prevent problems from occurring in the first place, or quality assurance testing protocols which are designed to detect problems in products before they reach consumers, traceability systems are designed to work retrospectively. It is important to note that the existence of a traceability system does not guarantee a product's provenance is traceable. Since traceability systems may not be fully implemented throughout supply chains, it is both the system itself and the rigour with which it is applied that ultimately determine product traceability.

In parallel with the development of increasingly sophisticated traceability systems, concerns with food products have over time broadened from straightforward food safety issues to encompass, *inter alia*, the distance a product has travelled from source to consumption ("food miles"), labour conditions at production facilities, and the ethical sourcing of raw materials. While not all of these issues can or should be dealt with under traceability systems, demands on existing systems and stretching of the definition of traceability to include a broader raft of issues is occurring. This led FAO to conclude:

> "*Not all 'traceability' systems are equivalent and/or interchangeable. Nor can they necessarily be consolidated. Different purposes and systems also trigger different expectations in producers and consumers that do not always correspond to the traceability system in use*" (Lupin, 2006).

One example of this situation relevant to the fish trade is the various environmental labels and guides which exist to point consumers towards products which meet their standards. Some labels and guides take a process-orientated approach by describing the sourcing, production and/or distribution processes of various products rather than making any claim about individual packages presented to the consumer. Examples of this approach for fish would include seafood wallet cards and the Earth Island Institute's "dolphin safe" logo. Both provide information about the quality or sustainability of the raw material source (i.e. species or fishery) and rely on other parties, often the consumer, to verify that the particular product in their hand actually derives from that source. Other approaches, including some labels, require that consumer-ready packaging display tracking numbers which link into traceability systems

documenting provenance from a certified source. The Marine Stewardship Council (MSC) eco-label for fish is an example of this type of system. There are also systems which approach the issue from the catch-side rather than the consumer-side of the supply chain and thus work in the opposite direction to traditional traceability systems. Catch-orientated schemes, which are usually referred to as catch documentation or certification systems, seek primarily to verify that the fish were caught in compliance with all applicable regulations but do not necessarily pass this information down the supply chain. The Northeast Atlantic Fisheries Commission's Scheme of Control and Enforcement (NEAFC, 2007) and the bluefin tuna catch documentation programme of the International Commission for the Conservation of Atlantic Tunas (ICCAT, 2007a) fall under this category.

This report uses the term "catch certification" to refer to systems documenting the legal provenance of the fish; the term "traceability" is used to refer to existing systems which track all or part of the chain of custody of fish products but do not necessarily address provenance issues. In the following sections, current traceability systems for China's re-processing trade are presented in three parts: (i) a description of the required documentation for fish imports into China; (ii) an explanation of how traceability of fish in the Chinese processing trade is maintained between import and re-export; and (iii) the documentation and procedures applicable when material is exported from China to its destination market. One labelling scheme (the MSC eco-label) and three quite different catch certification schemes (NEAFC, ICCAT and the new EU regulation to prevent, deter and eliminate IUU fishing) are then used as examples to assess how well China's existing traceability mechanisms meet the requirements of each scheme.

Documentation of imports of fish for processing into China

Introduction

In order for fish raw materials to be imported to China, the CCA requires an import application accompanied by two essential documents: the Certificate of Origin and the Health Certificate. Other paperwork relating to shipping such as contracts, bills of lading, invoices, letters of credit, etc. must also be presented, but as these do not relate to traceability issues, they are not discussed further here. The following discussion describes the purpose, issuance and contents of Certificates of Origin and Health Certificates as they pertain to fish imported for re-processing. These documents are then assessed with respect to their ability to serve as a basis for, or contribution to, traceability and catch certification systems.

Certificate of origin

A Certificate of Origin is a document which confirms the location of production of the imported goods. At first glance, for fish this may sound similar to documentation which could confirm the legality of the catch, but in fact the foremost purpose of the Certificate of Origin is to determine which tariff rates

will apply on import. Given the potential consequences of differences in tariff rates depending on the country of origin, it is not surprising that much energy is expended in fora such as the World Trade Organization debating rules of origin for traded goods. Despite this attention, however, based on analysis conducted for this study, the Certificates of Origin themselves appear to be poorly standardized and lack detailed information regarding product provenance.

Different countries may apply different rules of origin to the same product under the same circumstances. For example, while all countries agree that fish caught within a country's 12 nautical mile (nmi) national waters originate in that country, there is no such agreement for fish caught in a country's Exclusive Economic Zone (EEZ) beyond 12 nmi. Most developing countries favour a rule of origin that confers origin to the country in whose EEZ the fish was caught, while the EU supports a rule that determines origin of fish caught in the EEZ by the origin of the vessel (Estevadeordal and Suominen, 2003).

At the other end of the supply chain, China will issue a new Certificate of Origin for all exported, processed fish, regardless of where they were caught, under a 2004 rule of origin which confers the origin to China whenever the value added increases by ≥40% or the 4-digit tariff code heading changes, e.g. from 0303 for frozen fish to 0304 for frozen fillets (Lu, 2006). This has led to allegations against China of fish laundering. According to Roheim (2008),

> *"A growing and significant amount of fish is exported to China post-harvest, processed, then re-exported around the globe. This has significant implications for IUU fish, in particular, as if one is successful in getting illegal fish into China, the product is essentially laundered, as it re-emerges as legal 'product of China,' if it does not remain in the domestic market for consumption there."*..

However, China's rules of origin seem more the norm than an exception and in fact a very similar policy (≥40% value added) is said to be strongly supported by some parties in the EU in the debate surrounding reform of the rules of origin (AgriTrade, 2007).

As a practical matter, the exporter must gather the evidence for, and support the cost of, producing the Certificate of Origin in the production country. The issuing authority for the certificate may be a government body, a trade organization such as a chamber of commerce, or in some cases the exporter. Some importers worry that low rates of import inspection allow exporters to become complacent and put the importers at risk of claims for back duty, interest and/or penalties if the Certificates of Origin are incorrectly issued (Sumner, 2006). It is thus easy to understand why European importers oppose EU proposals to reform the EU rules of origin to allow Certificates of Origin to be issued by pre-registered exporters, rather than government or trade authorities, in the origin country. In arguing against allowing exporters to issue Certificates of Origin, these European importers have stated that

”Certificates of Origin, also known as ‘Form A‘, issued by foreign Customs authorities provide a minimum of protection against false indications” (**Appendix 3**).

An exception to the usual practice for Certificate of Origin issuance occurs when fish are transhipped at sea and landed in a country different from the flag State of the vessel. This is often the case in, for example, the Barents Sea cod fishery when Russian-caught fish are landed in EU ports for logistical reasons. In such circumstances, the port State, in this case an EU country, can issue the Certificate of Origin on behalf of the flag state of the vessel, in this case the Russian Federation. It is not clear what co-ordination, if any, takes place between the port State and the flag State before a Certificate of Origin is issued (see section on NEAFC Port State Controls for a discussion of required co-ordination between the port State and the flag State for special catch documentation forms required under the NEAFC Scheme of Control).

As has been referred to in the chapter describing China’s fish processing trade, fish imported to China for re-processing are often exempted from the usual 26% tariff, or the tariff can be rebated upon export. This may be the reason why CCA authorities have no particular requirements for the format or information content of the Certificates of Origin and simply require that one be attached when fish are imported. Similarly, interviews conducted for this study indicated that EU traders and Customs authorities often pay little attention to China’s Certificates of Origin for processed fish entering the EU when that fish actually originated in the EU. This is because EU traders can, on export, apply for Outward Processing Relief (OPR) which allows them to pay duty only on the value added by the processing, not on the value of the fish themselves, when the fish return to the EU. In such cases, the OPR application, called a T5, is referenced to the EU export application number and submitted when the fish returns to the EU. These two documents thus supplant the Chinese Certificate of Origin in determining tariff status. Therefore, in such cases on both outbound and inbound routes, the Certificate of Origin may have only a very minor role in documenting fish shipments.

A number of Certificates of Origin were gathered under this study for fish exports from the EU, Iceland, Norway, the Russian Federation and the USA. A review of these certificates found that they provided the information shown in **Table 10**.

Although all of the shipments represented by these forms were destined for China, only one (Norway) was translated into Chinese. Two were issued by government authorities (Norway, USA), whereas as another two were issued by industry organizations (the Russian Federation, UK) and the final certificate did not show the issuing authority in one case (Iceland). Most provided the names of both the importer and exporter, but Iceland did not identify the exporter and the USA did not identify the importer. Three of the five samples did not give vessel-specific transport information. Only Norway’s certificate identified the fishing vessel producing the fish. Only the US certificate cross-referenced to the US-issued Health Certificate for the same shipment.

Table 10

Types of information shown on Certificates of Origin obtained during this study.

Authority	Provenance	Material	Transport	Destination
UK (Chamber of Commerce)	Name and address of exporter, place of origin (country)	Species and form, number of cartons, gross and net weight	Container number	Name and address of consignee
Iceland (authority not specified)	Place of origin (country)	Species and form, container number, mark number, gross and net weight	na	Name and address of consignee
Norway (Customs Authority)	Name and address of exporter, place of origin (country)	Name of fishing vessel, species and form, number of cartons, gross and net weight	Name of transport vessel	Name and address of consignee
Russian Fed. (Chamber of Commerce)	Name and address of of exporter, place of origin (country)	Species and form, number of cartons, net weight, Invoice number and date	Name of transport vessel	Name and address of consignee
USA (Dept. of Commerce)	Name and address of exporter, place of origin (country)	Species and form, date mark, number of cartons, size of fish (na), number of fish (na)	Date of shipment type of vessel	City/country

Note: Cells marked with "na" indicate the information was not filled in on the certificate examined.

From this preliminary analysis it is clear that Certificates of Origin in their current form are not well-suited to serving as catch certification documents. Aside from the issues of differing rules of origin in different countries, as well as varying issuing organizations, Certificates of Origin do not provide sufficient information on the provenance of the fish to assess whether it was caught in compliance with applicable regulations. In order for Certificates of Origin to fulfil catch certification objectives, new and more detailed information, for example on catch location and vessel registration number, would have to be included. Formats, which are currently not well-standardized, would also need to be made more consistent as the certificates would likely undergo greater scrutiny than they do currently and format discrepancies could lead to rejection of shipments which are otherwise acceptable.

Health Certificate

The purpose of the Health Certificate when exporting fish materials for processing into China is to certify that the fisheries products derive from approved facilities; are provided under supervised sanitary conditions; are free of harmful substances; and, are fit for human consumption. Given the necessity of documenting particulars of the facility producing the fish on the Health Certificate, the objectives of catch certification would appear to align more closely with Health Certificates than with Certificates of Origin. However, since the scope of the Health Certificate is limited to sanitary issues, this form too would require substantial revision before it can be used for catch certification purposes.

In contrast to China's absence of specifications for incoming Certificates of Origin, the requirements for incoming Health Certificates are clearly stipulated. They must be issued by the designated authority of the exporting country and contain the name of the product (including the scientific name); the origin country; the harvest area; the processing method; the plant name and registration number; the issuing department; transportation details, including vessel name, voyage and container number; seal number (inside the container); consigner; consignee; quantity and production date (Canadian Food Inspection Agency, 2008).

As explained in **Description of China's fish-processing trade** concerning the landing of Barents Sea cod, the port State for fish landing is not always the same as the flag State of the vessel. In such cases, the main reason for landing the fish elsewhere is often that they can be efficiently and directly shipped out to China on a container vessel for further processing. Such fish will require a Health Certificate to accompany them and thus must undergo a health inspection in the port of first landing. For this reason, it is not uncommon to see imports of, for example, Russian cod into China, with a Certificate of Origin and a Health Certificate issued by the Netherlands. As an example, headed and gutted fish might be first landed in the port of Velsen in northern Holland, where it is inspected and containerized, and placed under bond. The containers would then be taken by road to Rotterdam, from where they would be shipped to China. It should be noted that these fish, even though they have been subject to a health inspection in the Netherlands, would not be considered to have entered the Customs territory of either the Netherlands or the EU (see ***China' reported source countries***). In this case, both the Certificate of Origin and the Health Certificate would specify the Russian Federation as the country of origin. The Health Certificate would contain some provenance information in order to identify the product, but the certificate itself would be issued based solely on the determination of the port State inspectorate—i.e. in this case, the Netherlands—that applicable sanitary conditions had been fulfiled. It is believed that the listing of countries such as the Netherlands or the UK as the country of origin for cod in China's import statistics is a result of the issuance of either Certificates of Origin or Health Certificates, or both, by these port States on behalf of the actual country of origin[4].

A number of Health Certificates were gathered under this study for fish exports from Denmark, Iceland, the Netherlands, Norway, the UK and the USA to China. A review of these certificates found that they provided the information shown in **Table 11**.

[4] On some occasions there may be more than one Health Certificate issued for a particular fish before it reaches China. This situation is most likely to arise when fish of different size classes are split in an intermediate port (e.g. the Netherlands or UK) for onward shipment to different markets. In such cases, separate Health Certificates which correspond exactly to the quantities in the partitioned shipments may be required by the importing authorities in the destination countries. For example, 200 t of cod from a Norwegian fishery landed in Norway could be issued a Health Certificate by Norwegian authorities then shipped to the UK where it is split by size for processing into fillets in China (150 t) and for the salt cod market in Spain (50 t). After splitting, UK authorities could issue a Health Certificate to accompany the 150 t shipment to China and China may record the country of origin as the UK. The 50-t shipment to Spain would not require a new Health Certificate as it could be imported into the EC for free circulation (i.e. from the UK to Spain) under the original Norwegian health certificate.

Table 11

Information relevant to fish provenance shown on Health Certificates obtained during this study

Issuing country	Issuing authority	Location of catch	Vessel/facility	Quantity
Denmark	Danish Veterinary and Food Administration	"North West and East Atlantic"	Name and address of processor	Scientific name, form not specified, net weight
Iceland	Directorate of Fisheries	FAO area	Name of fishing vessel, name and address of company, company registration number	Scientific name, form not specified, net weight
Netherlands	Ministry of Agriculture, Nature and Food Quality	Country name	Name of fishing vessel, EU facility approval number, name and address of consignor	Scientific name and form, net weight
Norway	Norwegian Food Safety Authority	"North Barents Sea" and FAO area	Name and home port of vessel, name and address of consignor	Scientific name and form, net weight
UK	North East Lincolnshire Council Environmental Services Dept.	FAO area	Name and address of consignor	Scientific name, and form not speci fied, net weight
USA	Department of Commerce	FAO area	Name, address and registration of producing company	Scientific name and form, net weight

In contrast to the Certificates of Origin, of which only one was translated into Chinese, all of the Health Certificates were written in both English and Chinese (and in some cases other languages). It was also noted that, in comparison to the Certificates of Origin, there was more standardization of information. Both points suggest that relatively more attention is paid by Chinese officials to Health Certificates than to Certificates of Origin when import documentation is examined.

Five of the six Health Certificates were issued by national authorities. The only exception was the UK Health Certificate which was issued by a local council. In interviews conducted for this study, Chinese officials and traders voiced concerns regarding the lack of standardized formats for Health Certificates being issued by different local authorities within the UK. According to these sources, this lack of standardization sometimes led to delays in receiving import approval in China, owing to difficulties in confirming the authenticity of the certificates.

While some of the information provided on the Health Certificates, such as location of the catch and name of the fishing vessel, is useful for catch certification purposes, this information would need to be recorded in a more specific manner. For example, although more specific ocean areas such as “North Barents Sea” are sometimes given, FAO areas which span many thousands of kilometres of coastline are the standard units. In half of the Health Certificates reviewed, the name of the fishing vessel was recorded, but the vessel registration number (which is, for example, useful for checking against authorization to fish registers) was not shown on any of these certificates, and only two showed the facility registration or approval numbers (which may provide a link to fishing vessel identity; e.g. see EU Third

Country Establishments List). Also, the form of the fish, although presumably headed and gutted, was not recorded in half of the examples. This could lead to uncertainties in back-calculating whole catch weights and comparing to quotas if used for catch certification purposes. In summary, before fish Health Certificates can be useful in checking and confirming compliance with catch regulations, both the format and the content would have to be made more specific with regard to provenance information.

Summary

The importation to China of raw fish material for processing requires two types of accompanying documentation which are particularly relevant to issues of catch certification. The Certificate of Origin serves to document the country of origin for the purposes of assigning tariffs. Although the concept of "origin" would seem to relate closely to the objectives of certifying the location and circumstances of fish catch, Certificates of Origin appear to be poorly standardized in information content and can be issued by a range of parties including, potentially, the exporter itself.

Though also not necessarily standardized within a single country (e.g. the UK), Health Certificates must be issued by national or local government authorities and follow well-understood formats complying with China's requirements. Health Certificates provide some information on product provenance but are primarily concerned with sanitary issues and therefore details useful for catch certification, such as the exact area of catch, vessel identification numbers and form of the fish (e.g. whole versus headed and gutted), are not always provided.

It is concluded that both documents would require substantial modification before they could serve a catch documentation purpose. Of the two documents, the Health Certificate, while being currently confined to sanitary issues, would have an advantage in that it is better standardized and issued by a smaller number of recognized authorities.

Traceability of imported fish during processing in China

The previous section described how the Certificate of Origin and the Health Certificate provide some information on the provenance of fish shipments arriving in China for processing. This section introduces the regulations and procedures in China that govern the traceability of this fish as it is imported, processed and re-exported to overseas markets. The import procedures in the overseas markets for processed fish from China are also briefly discussed, in order to introduce how these systems currently consider information relevant to product traceability.

Importation and transfer of the material to the processing plant

Two agencies bear primary responsibility for regulating the fish processing industry in China: the CCA and the Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). The role of CCA

in levying tariffs and regulating the output/re-export of fish-processing plants using yield ratios has been introduced in sections on business models used in the re-processing trade and on regulation of the re-processing trade by means of product yield. AQSIQ has been responsible for regulating food hygiene in the production and processing stages since 2005, when it was given this authority by China's Ministry of Health (Tam and Yang, 2005). AQSIQ's local entry–exit inspection offices are the CIQ offices, responsible for ensuring that all imported and exported fish meet sanitary requirements (Butterworth and Zhang, 2006).

Although there has been some co-ordination between CCA and CIQ for several years, the procedures for this co-ordination were strengthened in January 2008 with enactment of what was referred to by interview participants as "Rule 68". No documentation on this rule could be located but it was reported that it provided for an electronically linked export inspection system to be used by both CCA and CIQ. According to CIQ, however, the cross-checking procedures provided for in Rule 68 have been in place for several years, therefore the major advance is in the efficiency with which the system will work. Given observations during this and other studies (e.g. Clarke, 2004) electronic systems to facilitate regulatory compliance are being implemented at a rapid rate in China. Therefore, implementation of any additional electronic systems in response to international catch certification requirements should not pose technical problems for Chinese authorities.

Aside from the usual Customs procedures, the first step in importing fish raw materials into China for processing is to submit an application for import inspection along with the Health Certificate, Certificate of Origin and other paperwork to CIQ. If the documents are approved, CIQ will issue a *Clearance Certificate for Imported Materials* and the shipment can be transferred to a CIQ-registered storage facility. It is then subject to an "on-the-spot" inspection and quarantine check. This involves checking the conditions of transport and the transport vessel, the packaging, and checking if the contents of the product match the declaration. In interviews, CIQ indicated there was 100% coverage for "on-the-spot" inspections.

A laboratory examination of the material may also be conducted, consisting of microbial, physical, and chemical contamination checks. The identification of which products require laboratory examination is dependent on a number of factors, including national laws and regulations and AQSIQ regulations; bilateral agreements and protocols; alert notifications by AQSIQ; and whether the materials are of foreign origin and will be re-exported to a foreign country. The last-mentioned case, which is particularly relevant to the fish trade, would also involve an assessment of the species and of which countries were involved in the trade. CIQ indicated that rates of inspection for fish raw materials for processing varied from year to year, but for 2007 were in the order of 20%. Upon completion of any necessary testing, if the tests are passed, an *Inspection and Quarantine Certificate of Imported Goods* is issued and the material is cleared for transfer to the processing plant. If the tests are not passed, a *Notice of Inspection and Quarantine* is issued. This may be followed by treatment to render the material harmless, rejection or destruction.

Identification systems required during processing and in preparation for export

CIQ requires the importer to track fish raw materials through the processing operations via a system of raw material batch numbers, production lot numbers and application lot numbers. In cases where the importer is not the processor, it appears that the importer is still held legally responsible for complying with the tracking system, but the processor handles the day-to-day tracking responsibilities.

Every imported shipment of raw fish materials for processing consisting of the same species and commodity code and imported under a single import application to CIQ is considered a "batch". A unique number, called a raw material batch number, must be assigned by the importer or processor to each batch. CIQ requires that batch numbers be at least three digits but they may also be four digits in length. The format is typically that the first digit will represent the year, e.g. "7" for "2007" and the remaining digits will run sequentially from 1 to *n*, indicating that the batch is the *n*th shipment received for processing in that year. All raw material batches from imported materials must end in the suffix J. Therefore, for example, raw material batch number 7015J would be the processor's 15th batch of imported material in 2007.

Each time part of a raw material batch is used for processing it is given a production lot number. Production lot numbers are formed by adding a six-digit prefix, representing the date of production, to the raw material batch number. For example, material produced on 27 September 2007 from the batch number above would be 0709277015J. In theory, processing on the same day from the same raw material batch, but in a different workshop or on a different production line, would require a unique production lot number. It is not clear from information available to this study how such situations are handled.

When importers or processors are ready to export the material, they prepare an application using a new format implemented since January 2008, as shown in **Appendix 4**. Each application can list products produced from several raw material batch numbers (e.g. 7015J, 7016J, etc.), but only one species is allowed per application. The most important feature of this form, from a traceability perspective, is that it links the raw material batch numbers to the import application number. In this sense it provides a link to the earliest-issued Chinese documentation for the shipment. Documents received in support of the import application, e.g. the Health Certificate from the exporting country, the Certificate of Origin and any other relevant documents, are presumably kept on file by both CIQ and the importer or processor. However, there is no explicit need to provide or reference any documents produced or submitted in support of the China import application for the purposes of the export application. Upon receipt of the export application form, CIQ will inspect the processed fish and, if the goods are acceptable, an export Health Certificate will be issued (**Appendix 2**). As described above (***Certificate of Origin***) China will also issue a Certificate of Origin for any goods for which the value added through processing has increased by ≥40%, or for which the four-digit tariff code heading has changed.

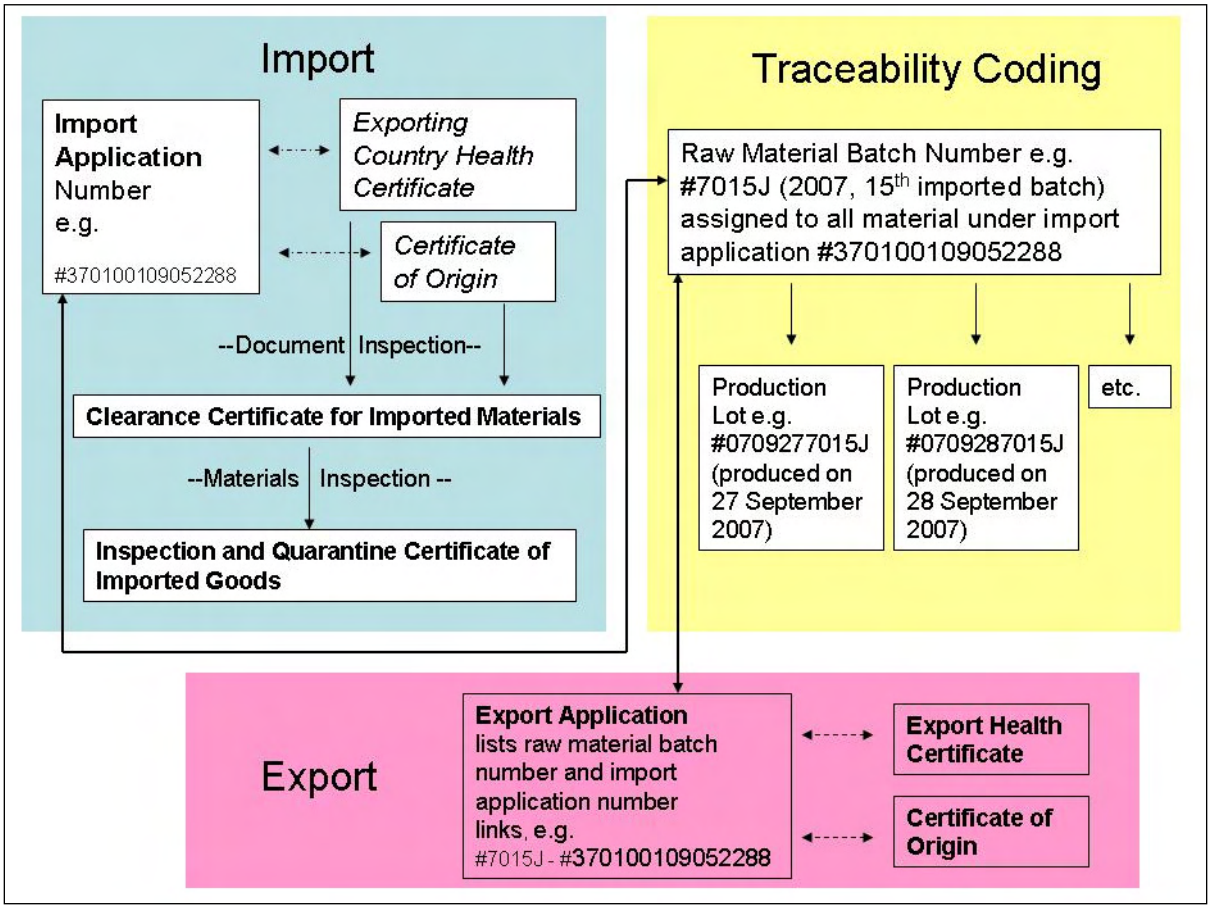
In addition to requiring the assignment of raw material batch numbers, production lot numbers and application lot numbers, CIQ places several other requirements on importers/processors for maintaining traceability. All export-orientated plants must prepare a plan documenting how traceability codes are applied within the factory. Material-purchasing logs must be maintained at the factory showing clearly the production lot code, the amount of raw material purchased, the species, and the origin of the purchased material. (It is not clear whether this requirement is equivalent to the TPM described in the section describing regulation using these manuals.) For imported raw material, the origin is considered to be documented if the import application number and Health Certificate number of the original exporting country are recorded and kept on file. Production lot numbers must be marked at the beginning and end of each production line and at appropriate intermediate points. Since materials from different raw material batches must be produced separately, cleaning and disinfection must occur prior to use of another lot. Materials or products from different raw material batches must always be stored separately and be marked with the raw material batch number and quantity.

Information from interviews indicated that CIQ monitors processing plants against these requirements on a frequent (daily or weekly) basis. This monitoring may take the form of CIQ staff on site inspections and/or checking of electronic reports sent by the processing plant. CIQ-Qingdao has already installed video surveillance at some processing plant production lines and officials stated that by the end of 2008 all factories in Shandong will have video monitoring. As a general rule, processing plants must bear the cost of CIQ monitoring. Although CCA has an importer rating scheme, under which, if an importer has a three-star (highest) rating, they are subject to a lesser degree of scrutiny, it is not possible for fish-processing plants to qualify for a lesser degree of scrutiny under CIQ (though other types of food-processing plants reportedly can qualify for “free-of-inspection” status).

A summary of CIQ’s traceability coding requirements for processing of fish from imported materials is provided in **Figure 9**. It should be noted that, based on information available to this study, it appears that the systems used for tracking fish-processing from imported materials by CIQ, as described here, and by CCA as described in the section on yield regulation using TPMs, operate separately. There have been steps taken earlier this year to integrate the responsibilities of CIQ and CCA under Rule 68, as described in the preceding section, but it is not known whether these steps will make a meaningful change in the way the two agencies co-ordinate their tracking of fish processing.

Figure 9

Systems for importing, tracking and exporting imported fish raw materials for processing in China



Notes: Documents issued by the Chinese Government are shown in bold; documents issued by foreign authorities are shown in italics. Explicit links are drawn with solid arrows; implicit links are drawn with dashed arrows.

Traceability in practice

According to the system outlined above, processed fish ready for export can be traced via the export application to the raw material batch number and the import application number. The import application should be kept on file with the Health Certificate issued by the country which exported the raw materials and the Certificate of Origin issued by, or on behalf of, the country which produced the raw materials. Bearing in mind that the concept of traceability requires that information be available when required, rather than physically present at all times (UK Food Standards Agency, 2003), this type of system appears to comply with currently accepted international best practice. Assuming this system functions effectively, the extent to which the processed fish ready for export can be traced further up the supply chain to the fishing operations which produced it will depend on the specificity of the Certificate of Origin and Health Certificate received by China when the raw material was imported. Therefore, traceability with regard to fish provenance is a function of both the information received by China and the traceability protocols applied while the fish is within China.

As explained in the chapter describing China's fish processing trade, the different models of trade in China's fish re-processing industry may also influence traceability in practice. For example, under the custom processing model, the processed products are exported to the owner who supplied the raw material in the first place. Such circumstances facilitate maintaining a full chain of custody for the fish from catch to consumer. However, as has been stated, custom processing is only a small part of China's fish processing trade. It is likely that the majority of fish is received under either the processing trading or pure trading models, both of which may involve the raw material changing hands several times before it reaches the processor. In such cases, there is in theory one party responsible for matching the exported material with its import documentation when the material is ready to leave China, but this may be the importer rather than the processor. For example, one trader approached for an interview at a particular factory under this study declined to participate, stating that he did "not manage the full supply chains" and only focused "on the processing and traceability within the factory itself". This response seems to indicate that this factory is operating under a pure trading or processing trading model as a processing sub-consultant to an importer. If the importer does not pass on strict traceability requirements to the processing factory there would seem to be a higher probability of mixing and mis-matching of material. In fact, as mentioned in the section on the role of import–export companies, it is possible that that these companies themselves are swapping fish between consignments/batches.

Based on these concerns, it would be useful to know whether there was routine auditing of China's food production traceability systems, but unfortunately no such information could be sourced. As there has been little interest to date in tracing fish products in China to determine whether they were illegally caught, all of the limited information that could be found regarding traceability was focused on determining the source of food contamination problems. Although the objectives of these kinds of traceback are different, mainly because they only extend to identifying the last known point before the raw material entered China as an import, they are briefly presented here to illustrate how the traceability system has been tested in recent incidents.

In February 2008, traces of the pesticide dichlorvos were found in mackerel processed in Shandong Province and exported to Japan. AQSIQ investigated the incident and was able to document the origin of all ingredients including the fact that the mackerel raw material was imported from Denmark. The source of the contamination was not identified (Mu, 2008). This incident followed on the heels of a highly publicized case in January 2008, in which two lots of dumplings manufactured in Hebei Province and sold and consumed in Japan were found to contain the pesticide methamidophos. In the extensive, bilateral investigation of this incident which spanned several weeks, AQSIQ traced the main raw materials of the contaminated dumpling batches to six areas within China, including the provinces of Shandong and Inner Mongolia (AQSIQ, 2008). In this case also, the source of the contamination could not be identified. Descriptions of both incidents, one pertaining to imported fish and one pertaining to domestic non-fish materials, appear to show that China's traceability system was adequate to determine the source of the raw materials in these cases.

These recent cases differ considerably from the results of a study conducted in 2002 which compared traceability systems in a fish-processing plant in Iceland to those in a fish processing plant in Dalian (Liu and Ólafsdottir, 2002). Although the Dalian factory received fish raw material from overseas sources and was processing for various export markets including the USA and Japan, the study identified serious traceability shortcomings. In particular, the Dalian factory was routinely mixing material from different batches on single production lines and was unable to distinguish the sources of the raw materials under their material management system. This example pre-dates the formation of AQSIQ as well as implementation of the current AQSIQ regulations for exported aquatic product traceability, quarantine and supervision in May 2004. Based on these very limited examples it would seem that traceability systems in China have made considerable advances in recent years.

Despite obvious progress in some areas, it is important to understand that not all fish-processing plants in China are raising their standards of traceability and food safety at the same rate. Independent analysis (Tam and Yang, 2005) as well as official Chinese Government materials (China State Council, 2007) state that small food workshops, especially those in rural areas, pose the biggest problems for quality assurance. Of China's 448 000 food processing plants, 26 000 large-scale plants occupy a 72% share of production; 69 000 are medium scale with a 19% share, and 353 000 are small scale with fewer than 10 employees and a share of 9% (China State Council, 2007). The situation is generally similar in fish processing: while in 2007 the top 50 companies accounted for nearly 60% of the total quantity of fish fillets exported to the EU, USA and Japan, the remaining 40% of the fillets were exported by another 473 companies (GCBI, 2008; calculations by the author). Aware of the situation, the Chinese Government is taking special steps to rectify conditions in small food processing plants. Under a government-led programme, by the end of June 2007 5631 workshops had been closed down, 8814 had been forced to suspend production and 5385 had improved their standards to the point where they met requirements. The government also encourages consistent performance in large facilities through the export enterprise credit system. Facilities with clean records and a good export reputation are granted "favourable policy treatment" whereas those receiving complaints from importing countries, or which are unco-operative with inspection and quarantine procedures, are placed on an Internet-published blacklist. To date, 55 companies have been black-listed (China State Council, 2007).

As the preceding discussion has indicated, China is working to strengthen food safety standards and increasing traceability is part of this effort. It is not known whether there are any routine and current traceability monitoring programmes operating in China, but in some recent high-profile incidents it has proved possible to trace raw materials to either their domestic origin or link them to their import documentation. Although China is committed to traceability systems enabling product recall when necessary, it is likely that more time will be required for these procedures to be implemented in small-scale and/or rural enterprises. It also appears that, since traceability issues are handled by AQSIQ and CIQ, i.e. agencies which are fundamentally focused on sanitary issues, extending traceability systems to include the legal provenance of the materials may not fit well within existing regulatory frameworks.

Import clearance by the trading partner after export from China

For fish processed in China and destined for overseas markets, the final step at which authorities check its documentation is when it enters the Customs territory of the receiving market. As with the other aspects of traceability described in this section, almost all of the procedures currently in effect aim to determine whether the products meet sanitary standards. While determining the origin of the products is a peripheral part of such checks, detailed checking of provenance is not normally performed. This section describes current procedures for Chinese-processed fish entering overseas markets with a view to understanding how provenance issues are or could be incorporated into existing systems. This discussion is based on information from the EU, China's largest export market for fish fillets.

EU regulations (*EC97/78*) require all imports of animal origin to be received in a designated port and undergo a health and veterinary check. In addition, fish can only be received from countries, such as China, which are considered to have a functioning sanitary authority. The processing plant producing the product for export to the EU must be listed on the EU Third Country Establishments List, a list of approved facilities. The 2008 list of approved fish-producing establishments for China lists 624 processing plants (PP) and freezer vessels (FV) (EC DG SANCO, 2008a). The process by which these facilities are placed on the EU list involves first being nominated by Chinese authorities. The EU informs Member States of the nominations and if after seven days no objections have been raised, the EU includes the facility on the list (EC DG SANCO, 2008b).

When the processed fish from China arrives at an EU port, the Health Certificate, the Certificate of Origin and other shipping documents, such as the invoice, packing list and bill of lading, are reviewed by port officials. These officials will typically check for all shipments that:

- the export Health Certificate is genuine;
- the export Health Certificate matches the import declaration;
- there are no discrepancies in the packing list (e.g. through checking the number of cartons and product form);
- the country of origin and the production establishment number is on the packaging; and
- the contents match the documents.

With specific regard to checking the origin of the product, officers generally only check whether the fish is wild or cultured and, to the best of their ability, that the type (species) of fish matches the label.

In addition to checking the documents, a portion of the incoming shipments will be selected for physical inspection. The methods of selecting shipments varies by country within the EU. In the UK, this selection is based on a risk assessment approach, i.e. high-risk shipments are prioritized for selection, whereas in the Netherlands shipments are selected at random without regard to risk. The UK aims for physical inspection of at least 20% of all shipments (and typically achieves 30–40%). These

inspections include an organoleptic test (usually by taste); as well as sampling for antibiotics (cultured fish only), heavy metals, and for microbiological levels if the product is cooked. In comparison, the rate of physical inspection was said to be as high as 50% of all shipments in the Netherlands. If all tests are passed, Common Veterinary Entry Documents (CVED) are signed off and once the shipment is cleared by Customs authorities it is released for free circulation into the EU.

If the material fails the physical inspection, a "rapid alert" is sent to the national food standards agency, which circulates the information within the EU via a system known as the Trade Control and Expert System (TRACES). In response to a rapid alert, the next 10 shipments of similar products should be inspected. In theory, these inspections should be co-ordinated across the EU but, according to interview respondents, in practice there is no EU mechanism to co-ordinate this and thus the 10 inspections are typically conducted within the country that issued the rapid alert. When a rapid alert is issued for shipments from China, it will report the CIQ export Health Certificate number, but owing to access restrictions in TRACES, as well as the fact that TRACES is not fully implemented in some countries, not all users have access to this information. Furthermore, the rapid alert will be made with reference to the consigner of the shipment, not necessarily the establishment producing the goods. Therefore, the rapid alert will not necessarily target any of the material from the same raw material batch number or even the same processing plant. In interviews conducted for this study, CIQ officials expressed concern that when a rapid alert was issued for a Chinese export they did not receive sufficiently detailed information to allow them to conduct a traceback of the product.

The disposition of shipments which trigger a rapid alert is set by DG SANCO directives and regulations, but in practice varies from country to country within the EU. This is because each EU Border Inspection Post (BIP) is authorized to develop and follow its own policies within the EU framework under the principle of subsidiarity. Therefore, shipments which fail inspection may be either shipped to an onward destination outside the EU, shipped back to the country of origin, destroyed, or possibly handled in yet other ways. Such differential policies between BIPs was considered by traders interviewed for this study to lead to, *ceteris paribus*, competitive advantages for those BIPs which adopt more lenient approaches to goods which fail inspection.

Summary

The importation of fish raw materials to China for processing is regulated by CCA and by AQSIQ, through its local CIQ offices. These authorities will check the Health Certificate and Certificate of Origin for all shipments. Physical inspection targets for fish shipments are reportedly in the order of 20%.

CIQ requires that each shipment of imported raw material be assigned a unique raw material batch number and each processed unit of each raw material batch be assigned a unique lot number. Mixing of material from different batches is not permitted. When material is exported, the export application

lists the original raw material batch and the import application numbers. In theory, both CIQ and the importer (which may or may not be the processor) should maintain files which link these identification numbers to the original Certificate of Origin and Health Certificate. However, there is no requirement to reference or attach these documents to the export application. Upon export, under China's rules of origin, all products which have increased in value by 40% while in China, or have changed four-digit tariff classification (e.g. from frozen fish (0303) to fillets (0304)), will be exported as products of China with a Chinese Certificate of Origin issued by CIQ.

Recent incidents in which contaminants have been found in Chinese-produced food products have demonstrated that China's traceability systems were adequate to determine the source of the raw materials in these cases. Considerable advances in traceability systems appear to have occurred over the past few years, although it is noted that implementation will certainly vary between large and small, and urban and rural enterprises.

Traceability with regard to fish provenance is a function of both the information received by China on import and the traceability protocols applied while the fish is within China. It is noted, however, that if traceability systems are extended to include the legal provenance of the materials, these new responsibilities may not fit well within the remits of AQSIQ and CIQ which are fundamentally focused on sanitary concerns.

The final step in checking the documentation of processed fish imports from China occurs when the materials are imported to the destination market, such as the EU. Import authorities will check the documentation as well as conduct a physical inspection on a proportion of China's fish exports. Under the current system, if fish shipments from China do not meet sanitary standards a rapid alert is issued. However, this alert system only references the consigner of the shipment, not necessarily the establishment producing the goods, thereby hampering Chinese authorities' ability to conduct a traceback.

Can China's traceability systems meet the demands of international catch documentation systems?

The preceding sections have described China's traceability systems in theory and, to the maximum extent possible, in practice. This section moves beyond the typical scope of traceability as currently bounded by sanitary issues and introduces four international systems which aim, either explicitly or implicitly, to verify the legality of catches. These systems include the MSC eco-label; the Northeast Atlantic Fisheries Commission (NEAFC) Port State Control regulations; ICCAT's Catch Documentation Programme; and the EU regulation to prevent, deter and eliminate IUU fishing. The extent to which China's traceability systems are currently compatible with and capable of supporting these four systems is then assessed.

Marine Stewardship Council eco-label

The MSC operates an eco-labelling scheme for wild-caught fisheries which meet sustainability criteria in the areas of stock status, ecosystem maintenance and fishery management systems. Fisheries which wish to obtain certification apply to be assessed by independent certification bodies who judge these fisheries against the MSC's principles and criteria. If the fishery receives a passing score in the assessment it achieves the right to claim it meets the MSC standard, but its products can only carry the MSC label (**Figure 10**) if the product distribution system also receives a chain-of-custody certification. This additional certification proves that the product is sourced from certified suppliers and that traceability is maintained to the point of purchase. Although the scope of MSC certification goes well beyond simple legality, documenting that the products derive from an MSC-certified fishery should in theory also document that the fish were legally caught.

Figure 10

Example of a seafood product carrying the Marine Stewardship Council eco-label (bottom right corner). This product is Alaska pollock processed (filleted) in China and finished (coated and cooked) in the UK.

Photograph used with permission of Young's Seafood Ltd

The key requirements for satisfying the MSC chain-of-custody standard are as follows (MSC, 2008a):

- Assure that raw materials derive from a fishery certified to the MSC standard, or from a chain of custody-certified supplier;
- Clearly identify all certified fish inputs at all processing stages;
- Separate (physically or temporally) certified and non-certified materials and do not allow mixing (non-certified fish flavourings totalling ≤2% of the total product are allowed);
- Ensure that labelling applies to only MSC-certified product and that it maintains product integrity and traceability during packaging, storage, handling and delivery;
- Be capable of tracing any product or batch via a sales invoice (e.g. issued by a processing plant) one step forwards (e.g. the product distributor) and one step backwards (e.g. the raw material supplier) along the supply chain.
* Maintain records, for at least three years, to a sufficient standard to trace output products backwards to their input materials.

The first three requirements (a–c) essentially relate to maintaining the traceability and integrity of raw material batches. In the context of processing imported fish in China—and as there are currently no certified Chinese fisheries, all MSC fish processed in China would by definition be imported—CIQ requires that raw material batches be coded to match import shipments. It is also a requirement that documentation accompanying imported fish (e.g. showing the supplier and some provenance information as contained on the Health Certificate issued by the exporting country) is required to be linked to the raw material batch information in both the CIQ and factory records. It is noted, however, that this theoretically standard documentation may be not sufficient to establish that the raw material is MSC-certified and thus the burden would be on the processor to maintain any additional documents. For example, for some MSC-certified fisheries, such as Alaska salmon, all of which are certified, it may be possible to document MSC provenance via a US Health Certificate specifying the production area and species name. However, for other MSC-certified fish it may be necessary to provide more detailed information (e.g. fishing gear, vessel or specific grounds) than is typically provided in a Health Certificate to establish MSC provenance. As for batch integrity, since CIQ prohibits mixing of raw material batches, maintaining batch integrity should be standard practice.

With regard to labelling (d), it not clear what requirements there are, if any, under Chinese regulations for recording the raw material batch number on the processed products' labels. Information received during a meeting with CIQ officials and verified through reference to AQSIQ regulations (Canadian Food Inspection Agency, 2008) implies that as far as CIQ is concerned, the export application, rather than any label on the package itself, is the link between the overseas receiver of the goods and the factory and the raw material. Therefore, while Chinese-processed products for the international market may often display the kind of information required by the MSC chain-of-custody standards for product labelling and traceability, this appears not to be a CIQ requirement *per se*.

The one step forwards, one step backwards requirement (e) is encompassed within the CIQ system. Specifically, material is required to be fully traceable while in China (i.e. import application linked to export application; requirement for batch separation), and traceable by reference to associated documents from the step before it enters China (i.e. the raw material exporting country's Health Certificate) and the step after it leaves China (the export Health Certificate issued by China; see **Figure 9**). Therefore, all Chinese parties in the supply chain for MSC material should be able to document the transfer of material into and out of their custody as required.

The final requirement regarding maintenance of traceability records for three years (f) is not an explicit requirement of the CIQ system. Nevertheless, the records required by CIQ, plus any special documentation necessary to establish provenance from an MSC-certified fishery, appear to be sufficient to satisfy MSC traceability requirements. Therefore compliance with the MSC standard would seem to be simply a matter of retaining the records for the required three-year timeframe.

The preceding discussion has, of necessity, described the correspondence between MSC and CIQ traceability requirements in a theoretical sense rather than exploring to what extent traceability is actually maintained in current processing operations in China for MSC fish. Although there are no publicly available data on compliance with MSC chain-of-custody standards in China, large quantities of MSC fish are processed in China and there have been recent reports of chain-of-custody problems in some cases. For example, five Chinese companies were reported to have lost their MSC chain-of-custody certification in 2007 (Intrafish, 2007) and of the 47 companies which are listed on the MSC website as having withdrawn or expired chain-of-custody certificates (as of July 2008), 13 (28%) appear to be based in China or Hong Kong (MSC, 2008b). Anecdotal information from interviews suggests that at least some of the certificate withdrawals in China have been as a result of prohibited mixing of raw material batches, which is counter to both MSC and CIQ requirements.

North Atlantic Fisheries Commission (NEAFC) Port State Controls

In May 2007, NEAFC implemented Port State Controls on foreign fishing vessels under its Scheme of Control. According to the measures, each contracting party to NEAFC is required to designate specific ports to receive landings of fish from the NEAFC area by foreign-flagged vessels. Unless otherwise specified, masters of foreign-flagged vessels who wish to land NEAFC fish must notify the port State three days prior to the estimated time of arrival. Upon receiving this notification the port State contacts the flag State of the vessel to request confirmation that the vessel's catch is within quota; the catch has been fully reported and accounted for; the vessel has obtained the fish through authorized fishing activities; and the vessel's presence in the declared fishing area has been confirmed through use of a vessel monitoring system (VMS). The fish can only be transferred from the fishing vessel and out of the port after flag State confirmation is received. Port States are obliged to conduct inspections of at least 15% of all landings and transhipments in their ports each year (NEAFC, 2007).

The critical difference between the NEAFC Port State Controls and the other catch certification schemes described in this report is that the NEAFC Port State Controls only operate up until the point of landing. There is no further checking or tracing of these fish by NEAFC after they are cleared for free circulation out of designated ports. While it is logical not to check further fish that have already been confirmed as legally caught, the scheme does not address fish that may illegally infiltrate the market through non-designated ports. Furthermore, since documentation of legal catches generated by the NEAFC scheme is confidential to the system used by NEAFC member States, traders, processors and consumers have no independent means of verifying that NEAFC fish in the market are legal, i.e. they can only assume that they are legal because the system works effectively to ensure only legal fish enter the market. During interviews conducted for this study, several traders stated that they would like to be able to access NEAFC documentation in order to confirm that fish they bought had been cleared by the Port State Control scheme.

China's processing industry and its traceability system has little effect on the NEAFC Port State Control scheme since, given the situation described above, China's system is not required to track or link with any information provided by NEAFC. However, in the absence of explicit documentation accompanying onward shipment of NEAFC-approved fish, it is possible that China may inadvertently accept NEAFC fish which have circumvented the Port State Controls. For example, if NEAFC fish are landed outside the designated ports but still manage to obtain a credible Certificate of Origin and Health Certificate, CIQ may clear the material for processing and the fish may subsequently be exported from China with a Chinese Certificate of Origin and Health Certificate. In this regard, some obviously suspicious shipment patterns, e.g. north Atlantic cod with West African or South American documentation, might be identified by knowledgeable Chinese import officials. Other incidents, such as the direct transport of transhipped cod and haddock from NEAFC fishing grounds off the Russian Federation to China in the Smolninskiy incident of October 2007 (Album and Esmark, 2008), might be more difficult for Chinese officials to detect unless they are familiar with the NEAFC scheme and know that NEAFC fish can only be landed in NEAFC-designated ports. In addition, since Russian-caught cod and haddock often enter China with documentation issued on behalf of the Russian Federation by foreign port authorities (see sections ***Certificate of Origin*** and ***Health Certificate***) or direct from transhipment operations off the eastern coast of the Russian Federation (see Clarke, 2007 describing salmon), pattern discrepancies in Russian fish shipments may be easy to overlook.

ICCAT statistical and catch documentation programmes

ICCAT adopted a recommendation in 1993 establishing a statistical document programme (SDP) for bluefin tuna. Similar programmes were implemented in 2002 for bigeye and swordfish. The key features of the SDPs include a requirement of all contracting parties to ICCAT to ensure that imports of the species in question be accompanied by a document containing information on the flag State, vessel, point of export, area of catch and description of fish. This document needs to be validated by a government official of the flag State of the vessel catching the fish: in the case that the fishing vessel

is chartered, the exporting State should validate the catch document. Re-exports of the species in question have to be accompanied by a re-export certificate attached to the original validated import document. The re-export certificate has to contain information on the re-export destination country, point of re-export, and description of imported and exported fish. Information on imports and re-exports compiled by the contracting parties has to be reported to ICCAT, who ask exporting countries to compare these data to their own records and report the results of the comparison to ICCAT (ICCAT, 2001).

In 2007, the SDP for bluefin tuna was broadened into a catch documentation programme (CDP). The CDP expands the scope of the SDP so that instead of applying only to imports and re-exports, validated documentation is required for all landings and deliveries (e.g. for farming activities), as well as imports, exports and re-exports. In addition, a previous exemption for fish which had been recorded in an ICCAT-accepted logbook or information retrieval system (ICCAT, 1994) was removed under the CDP. As a result, unless all bluefin tuna are tagged by the flag State of the harvesting vessel, all require validated documentation before landing or trade. The CDP information requirements for export and re-export certificates are greater than before with information on catch transfer (e.g. towing cages) or transhipment, farming, harvest from farms and additional trade information (e.g. company names) now required (**Appendices 5** and **6**). The timeframes for distributing the validated documents to the receiving party and to ICCAT have been shortened and are needed within five days of issuance of the validated document, instead of as part of annual reporting (ICCAT, 2007a).

Although it appears that much of the motivation for strengthening the SDP for bluefin tuna into a CDP may have been generated by concerns about tuna farming, there are some implications of the new scheme for China's processing activities. First, as of the time of implementation of the CDP in June 2008, China will have had to issue bluefin catch documents for any landings of bluefin tuna by its own vessels in Chinese ports. Any such fish, along with any imported bluefin tuna, need validated re-export documentation with the original import documentation attached before being shipped to foreign markets. The requirement for validated re-export documents for bluefin tuna, bigeye and swordfish is not new (i.e. it existed under the SDP for bluefin and still applies under the SDPs for bigeye and swordfish) but it is likely that tuna-processing in China has only begun recently and prior to that most Chinese-caught tuna was transhipped directly to foreign ports. Therefore, while China may have been asked to provide documentation for tuna or swordfish imports when Chinese-caught fish were landed in foreign ports, the recent initiation of tuna-processing in China is probably raising the requirement for re-export certificates for the first time. ICCAT SDP data provided by China for 2006 indicate that China exported bluefin tuna to Japan; bigeye to the EU and Japan; and swordfish to the EU, Japan and the USA. SDP re-export certificates were provided by China for bigeye and swordfish destined for Japan and South Korea (ICCAT, 2007b). For China, as for many countries reporting to ICCAT, the SDP data often do not tally with reported catches (ICCAT, 2007b) but owing to the aggregated nature of the publicly available data it is not possible to discover the source of the discrepancies.

The most interesting aspect of the ICCAT SDP and CDP programmes from the perspective of China is that they require the validated import document for the raw material to be attached to the documentation associated with the processed raw material exports. As has been discussed above, there is no general requirement in China for this kind of document linking and it is unclear whether China would consider CIQ, as the authority for food import and export quality certification, or CCA, as the authority for goods enumeration and taxation, responsible for issues of provenance certification. Although this kind of provenance documentation is not required by government, some Chinese processing operations need to and obviously do maintain the same for certain shipments for commercial reasons, as in the case of MSC-certified fish or otherwise at the request of the material owner in the case of custom processing, for example. This suggests that the documentation itself is not problematic, but assigning governmental responsibility for validating such provenance documentation, as required by ICCAT, may prove more complicated.

It is also interesting to note that the ICCAT CDP is not explicit with regard to traceability. Specifically, it does not require that the ICCAT species of interest be processed separately from, and without mixing with, other fish—ICCAT (2007a), Item 12(c) states "the products to be re-exported are wholly or partly the same products on the validated Bluefin Catch Documents" i.e. the import certificates. This suggests that ICCAT does not intend to use mass balance methods to check that raw material input matches processed material output. In fact, it is not clear what procedures will be used to determine and investigate any quantity discrepancies identified under the ICCAT SDPs and CDP.

EU regulation to prevent, deter and eliminate IUU fishing

In September 2008, the European Parliament finalized a Council regulation to combat IUU fishing. The original proposal, tabled in October 2007 (EC Commission, 2007), called for a variety of measures including port State controls; catch certification; lists of IUU vessels and non-co-operating countries; an alert system for identifying potential IUU activities; and sanctions and penalties for non-compliance. The port State control measures and catch certification measures, respectively, appear to draw heavily from the NEAFC and ICCAT schemes discussed above. In adopting the resolution in June 2008, Parliament made several amendments to the original proposal including a mandatory 72-hour notice period before port calls for all vessels; a requirement for a 50% inspection rate of third-country (non-EU) vessels; and removal of the requirement for certificates when re-exporting from an EU member State (later this inspection rate was reduced to 5% and the requirement for re-export certificates was re-instated (Council of the European Union, 2008)). The debate also called for compatibility of measures under this proposal (which will apply only to third-country vessels and catches) and the measures applicable to EU vessels and catches (which were set to be the subject of a new proposal for a Council Regulation in October 2008) (Aubert, 2008). The new measures will take effect on 1 January 2010.

Under the finalized text of the regulation, transhipment within EU waters will be prohibited and EU vessels will not be allowed to receive transhipped fish from non-EU vessels outside EU waters. Landing or importing of fishery products by non-EU vessels will only be allowed in designated ports, with 72 hours' prior notice and when accompanied by a catch certificate validated by the authorities of the flag State of the vessel that has caught the fish. EU Member States will be required to verify the information on the catch certificates and conduct inspections of landings, transhipments and on-board processing operations by non-EU fishing vessels.

There are two further provisions regarding processing of fisheries products that are of particular importance for China. First is the requirement that fishery products processed in a non-EU country before importation to the EU must be accompanied by a catch certificate validated by the authorities of the flag State of the vessel that has caught the fish (**Appendix 7**). This provision appears to require that China proactively obtain catch certificates for all fish which are destined for the EU market but are not imported as raw materials through the EU (i.e. those imports which do not arrive in China with the certificates already attached).

Another requirement is that authorities in the processing country, i.e. China, must provide either a traceability statement or a re-export certificate under an RFMO catch documentation scheme like that described for ICCAT above. If the traceability statement is provided, it must include "an exact description of the unprocessed and processed products and their respective quantities" and "indicate that the processed products have been processed in that third country from catches accompanied by catch certificate(s) validated by the flag state." In addition, the traceability statement must be accompanied by the original catch certificate if the entire amount under the catch certificate is represented in the shipment, or a copy of the original catch certificate if the shipment represents only a portion of the material. It is noted that this text is considerably looser than the text of previous drafts which required certifying that "the processed products have been exclusively processed from the unprocessed products referred to on the catch certificate(s)". By removing the concept of "exclusively…from…products referred to on the catch certificate(s)", the final text appears to allow mixing of certified and uncertified material. While China's traceability system should ensure that raw material batches are not mixed during processing, this will not provide the necessary assurance if, on import, the raw material batch (i.e. import consignment unit) represents a mixture of certified and uncertified material.

Compliance with the new EU measures may thus raise issues for China in several respects:

- China will need to ensure that all fish raw materials entering China for processing for the EU market have valid catch certificates. This could be particularly problematic in the case of salmon, cod and pollock caught off the eastern coast of the Russian Federation because of control problems in these fisheries (e.g. Clarke, 2007). It may also be difficult for tuna fisheries in the Pacific which do not currently operate under RFMO catch documentation schemes. This may place a considerable

burden on small island developing States to issue the catch certificates (ACP, 2008). A further issue is that the export market for fish may not be specified on import to China and may only be determined later under prevailing market conditions. This would mean that by default any fish with the potential of being exported to the EU would need a catch certificate.

- China will need to devise a system for linking the incoming catch certificate associated with the raw material with the outgoing processed material. As described above, China's system currently has only indirect links between the incoming and outgoing Certificates of Origin and Health Certificates. Furthermore, it is not clear which authority in China will take responsibility for provenance issues such as catch certificates but it would be expected that this authority has already been designed in response to the ICCAT SDP and CDS.

- The apparently common practice among China's importers of splitting consignments for processing at different workshops, possibly under different owners, would appear to complicate traceability. Nevertheless, China currently requires traceability to the original raw material batch number which is uniquely linked to the import application number. Therefore, if the import application number can be formally linked to the catch certificate, China's existing system should support the new EU regulation. In practice, though, if a wide variety of products for a large number of clients are processed from a single batch of raw materials, the proliferation of documentation may lead to problems in day-to-day management.

- It is not clear how China, or indeed any other processing country, will handle situations in which they receive only part of the landed catch under a single catch certificate. This will occur because, once landed, catches are often split by size and only those fish best suited for filleting are sent to China (see footnote on page 52). In such cases, the export Health Certificate, for example, issued by an EU country, will record only a portion of the quantity shown on the catch certificate, for example, issued by the Russian Federation, and this may complicate traceability by opening the door to double-counting or leakage of product from the traceability chain (e.g. the processing country could claim certified status for the entire amount on the catch certificate even though it only received a portion of those fish and supplemented this amount with non-certified fish). Such potential for discrepancies between raw material certified amounts and the resulting processed materials that claim to derive from certified raw materials should be the subject of further consideration, for example by a Member State working group convened to oversee questions of interpretation and application for this regulation.

Summary

The ability of China's current traceability systems to comply with four international schemes for ensuring the legality of fisheries products was assessed. The MSC eco-label's chain-of-custody standard requires maintaining the integrity of raw material batches and one step forwards/one step

backwards traceability similar to that required by CIQ. MSC labelling and information-archiving requirements are stricter than those imposed by CIQ but should present no problems for processors already compliant with CIQ regulations. Some MSC chain-of-custody certificates held by Chinese processors have been withdrawn in recent months for reasons which appear to suggest there may be problems with day-to-day implementation of basic, CIQ-mandated traceability requirements. In this sense, continued strengthening of CIQ oversight should deliver improved traceability in general, as well as better compliance with MSC chain-of-custody standards.

The NEAFC Port State Controls require that all NEAFC fish be landed in designated ports but only after confirmation from a foreign fishing vessel's flag State to the port State that the catch is legal. While this scheme aims to prevent all IUU fish from entering trade, it does not address IUU fish which may enter the market through other routes and it does not provide any documentation to accompany legally landed fish through the supply chain. Given this lack of documentation, if the standard paperwork for importation appears credible, Chinese officials may inadvertently clear IUU fish from the NEAFC area for processing, allowing subsequent entry to markets as a product of China.

ICCAT has recently broadened its documentation scheme for bluefin tuna into a CDP covering all landings and trade. As a contracting party to ICCAT, China will be required to issue a catch document for all bluefin tuna it lands domestically or in a foreign port; track the catch documents associated with any tuna raw materials it processes through to re-export; and issue a re-export certificate when the tuna leaves China. It is unclear whether China would consider CIQ, as the authority for food import/export quality certification, or CCA, as the authority for goods enumeration and taxation, responsible for validating these documents. Although CIQ's requirements for documenting the origin of fish raw material currently do not go far enough to satisfy the ICCAT CDP, CIQ prohibits mixing of raw material batches which appears not to be prohibited by ICCAT.

The proposed EU regulation to combat IUU fishing appears to draw heavily on the NEAFC and ICCAT schemes. Two key provisions with regard to China's fish processing trade are that: 1) all processed fish imported to the EU must be accompanied by a catch certificate issued by the flag State of the fishing vessel; and 2) the relationship between the processed product and the catch certificate must be documented either through processing documentation or via an RFMO re-export certificate. Major issues for China in complying with the new regulation are likely to involve: 1) the need to obtain and manage catch certificates for all fish raw materials potentially destined for EU markets; and 2) designating an authority and developing a mechanism to link catch documents with import and re-export applications. Another issue for China and other processing countries is the splitting, after landing or during processing, of catches under one catch document for shipment to different markets or different processors. The use by different processors of partial amounts under the same catch certificate will require further guidance.

CONCLUSIONS AND RECOMMENDATIONS

Rather than setting out to test any particular hypothesis, this study was designed to determine to what extent existing and available data can describe China's global role in the fish processing industry. As illustrated in the previous sections, though there were important data gaps, the amount of information compiled was surprisingly voluminous. This section revisits and interprets the key findings from the preceding discussions and provides recommendations for improving regulatory or management schemes, or for filling remaining data gaps.

Findings concerning trade statistics

Customs statistics are commonly used to assess quantities and species in trade, not because they are expected to be precise and accurate, but because often they represent the best available data source. The first of the analyses in this report used Chinese Customs statistics, as well as those from the EU, USA and Japan, to determine what information could be gleaned regarding China's fish re-processing industry and its species composition, source countries, processing centres and companies, structure of the trade and the effectiveness of regulation using fish yield factors. The most interesting findings from these analyses were:

- Among China's three key re-processing trade fish categories (salmon, whitefish and tuna), cod and Alaska pollock comprise three quarters, by weight, of both imported raw materials and exported finished products.

- Many instances of mis-coding by species of imported raw materials were observed, in some cases exacerbated by the lack of definition in the existing coding system.

- Almost all (97%) of China's imported raw materials of salmon, whitefish and tuna in 2007, totalling 697 000t, were supplied by just 10 countries and the Russian Federation alone supplied 57%.

- Very large quantities of fish raw materials were also received in an unspecified "frozen fish" category to which the Russian Federation contributed one third (by quantity).

- Some countries appeared in the analysis as the countries of origin (e.g. the Netherlands) but they are more likely to be the country of consignment which is issuing export paperwork on behalf of the real country of origin.

- The major processing centres and companies differ between salmon/whitefish (Shandong and Liaoning Provinces) and tuna (Shandong Province and Tianjin municipality).

- Some of the largest processors did not appear in the Customs data evidently because they import and export their fish using import–export companies.

- Import–export companies have the ability to parcel large shipments to a variety of processing factories, sell raw materials out of bonded warehouses and/or swap materials between processors, thereby complicating tracking of which fish goes where.

- Those importing fish for re-processing must register a TPM with CCA. These TPMs may combine several consignments and species and are used by the CCA to ensure that all finished products are exported (rather than sold domestically).

- Calculation of gross yields for salmon and whitefish indicated that overall yields were lower than expected based on industry norms suggesting that excess material is either somehow lost in processing, sold domestically or otherwise not accounted for in the analysis.

One of the drawbacks of these analyses was that in China, as in most countries, Customs statistical systems are designed primarily to manage tariff structures and there is little or no systematic monitoring to assess whether commodity codes are being applied correctly. In China, while there is reportedly some oversight on the use of appropriate commodity codes by Customs officials when fish are imported, like their counterparts in most countries these officials are not likely to have the expertise to determine when fish species are mis-identified. Therefore, in China as elsewhere, the reliability of the quantities of fish reported in particular species-specific categories must be largely taken on faith. One option for obtaining better data lies with CIQ, which requires species information as part of its export Health Certificate. It was not clear in this study whether CIQ's concerns about the accuracy of these data were well founded or a tactic to divert enquiries.

A further issue in the case of China, is that the commodity coding system has not matured in parallel with the evolution of China's fish re-processing industry. One trader interviewed for this study stated that CCA had recently informed him that the commodity coding system was being revised to match the species specificity of the EU system. While problems with mis-coding may still continue, such revision would provide an improved framework for importers and exporters who are able and willing to provide species-correct declarations to do so.

Even given obvious confusion between country of origin and country of consignment in the Customs statistics database, it was clear that Russian supplies of raw materials dominated all others. Therefore, it is likely that any changes in regulations in the Russian Federation's fisheries may have a major effect on China's fish re-processing industry supply. For example, recent press reports indicate that the Russian Federation will soon require all fish to be landed in Russian ports rather than being transhipped at sea. This may alter patterns observed thus far in country of origin data as well as in the proportion of imports versus landings to China (noting that the latter could not be assessed by this study).

The use of additives, water glazing, phosphates or non-phosphates, appears to be an emerging issue for the China processing industry. This is perhaps particularly true for processors in Liaoning, which is

said to have a competitive disadvantage as compared to Shandong as well as an orientation towards a US market that encourages additives. Although most countries allow additives and glazing under some conditions, there have been sufficient concerns on the part of CIQ officials regarding high concentrations of additives to motivate recent export stoppages. Furthermore, growing consumer and retailer awareness of these issues may lead to changes in processing practices as well as substantial changes in yield ratios.

Two findings reflect the complex nature of some of the chains of custody for re-processed fish in China. First, the discovery primarily through interviews, of the major role that broad-spectrum import–export companies play in the fish re-processing trade means that fish may change hands multiple times between import and re-export. This is further complicated by the ability to sell off material to other processors and swap fish among factories. Second, the analysis of Customs data shows that custom processing (i.e. where a single, foreign party owns the material from import through to export thus having a stake in receiving the same material back in the appropriate quantity) is relatively rare in comparison to processing trading and pure trading models. At minimum, the more complicated chains of custody that arise from processing trading and pure trading increase the regulatory complexity in tracing fish.

The responsibility for tracing the quantities of fish into and out of China lies with CCA. As has been illustrated, regardless of whether yield is under- or over-reported, the use of yield as a regulatory tool for auditing quantities is a blunt instrument. Although the maximum size of the auditable unit (the TPM) has recently been reduced to 100 000 t, this is still a large amount considering that minor variations in yield could lead to discrepancies of several thousand tonnes in input and output quantities. Several shipments, potentially from several different sources, can be combined in a single TPM after which they are audited as a single unit. Although catch area must be recorded in the TPM, other information from the import documentation does not appear to be linked. For all of these reasons, the management of imported fish raw materials for processing by CCA, while perhaps adequate for enforcing tariff regulations, does not appear to be well-suited for tracking discrete batches of fish.

Findings concerning traceability

Traceability systems have historically focused on food safety issues but as greater demands are placed on existing systems these systems are having to expand to account for other issues such as, in the case of fish, the legal provenance of the catch. This second analytical section of the report described China's existing traceability system, which is managed by regional offices of CIQ. After describing the system in theory, and to the maximum extent possible in practice, the system was contrasted with four international schemes which aim, either explicitly or implicitly, to verify the legality of catches. The most interesting findings from these analyses were:

- Certificates of Origin, required for import of fish to China and seemingly suited to document provenance, suffer from poor standardization and lack of fishing-specific detail, and are not always issued by government authorities.

- Health Certificates, which are also required for import and appear to be better standardised, also fail to document provenance because most lack necessary detail on catch areas, vessels and product form (to back-calculate catch quantity).

- Either certificate will require substantial modification before serving the purpose of documenting legal catch provenance.

- China's traceability system as managed by CIQ requires that consignments of imported material (batches) be kept separate through processing. In other aspects as well the system appears to comply with currently accepted international best practice

- There is no known audit programme conducted by CIQ to test whether the traceability system is effective, but in several recent food contamination incidents tracebacks were successfully carried out.

- At present, China's traceability system has no formal requirements to link with documents issued by parties outside China and it relies on importers and processors to maintain information on fish provenance.

- Because China's traceability system already requires maintaining the integrity of raw material batches, as well as one step forwards/one step back traceability, there should be no fundamental problem for Chinese processors in complying with the MSC's eco-label chain-of-custody requirements.

- The NEAFC Port State Controls do not provide any document to accompany legal fish through the supply chain and this feature of the scheme may make it more difficult for Chinese inspectors to identify suspicious shipments.

- Recent implementation of the ICCAT Bluefin Tuna Catch Documentation Programme may provide insight into how China can modify its traceability system to require attachment of external documents, as well as into which governmental authority is assigned responsibility for validating bluefin tuna import–export paperwork.

- The forthcoming EU regulation to prevent IUU fish entering EU markets appears to require that China proactively obtain catch certificates for all fish raw materials that may enter the EU. Further consideration of a means of dealing with the complications inherent in receiving only partial shipments of certified catches may be necessary.

The overall conclusion of this analysis is that there are no major fundamental problems inherent in China's current traceability system. The system has successfully supported several recent tracebacks

in response to contamination issues. A routine, random audit programme, if not already implemented, would lend further confidence to the system. In contrast to a situation described at a facility processing fish for the international market in 2002, where undocumented batches were being mixed on a single production line, current standards appear much higher. This has come about with the creation of AQSIQ/CIQ in 2005, as well as because processors have had to respond to higher international traceability standards in order to retain their major foreign clients. While implementation of traceability systems undoubtedly varies between factories, particularly by size and location, government programmes are working to improve standards at non-compliant facilities.

China's processing trade has recently come under criticism for allowing or even facilitating laundering of illegal fish. One particular criticism appears to have been aimed at China's rules of origin for fish, that claim country-of-origin status for products that change four-digit tariff code heading or increase in value by ≥40%. In fact, these rules of origin are not unique to China and are even being discussed in the EU. Furthermore, there do not appear to be any major gaps in China's import inspection system that do not exist in many other countries. In particular, aside from the NEAFC Port State Controls, the toothfish catch documentation scheme (Agnew, 2000) and the until-now rather rudimentary tuna statistical document programmes, very few species in very few situations are in any way screened for illegality. It is presumed, therefore, that whatever blame does fall to China for this situation is being magnified by the large volumes of global fish catches that are flowing into and out of China for re-processing. It was interesting to note in interviews with Chinese officials and traders that the documentation and inspection procedures of other countries, in particular the UK, with regard to the lack of standardization of export Health Certificates and the insufficient provision of information when rapid alerts are issued, were of concern.

Recent regulatory developments in the major seafood consumer markets suggest that it will become necessary in the near future for China to document more than just the input–output traceability of fish received within its borders for processing. China is already at the centre of the global seafood supply chain and this position requires that it expand its traceability systems to link to documents attached (physically or otherwise) to incoming raw materials and to pass those documents on when the processed products leave China. While it is China's responsibility to ensure such a pass-through mechanism is effective, responsibility also lies with external parties to provide documentation that is clear, understandable, workable and fraud-resistant. The fact that most of the Certificates of Origin examined for this study were not translated into Chinese is one example of where further work is needed. Standardization of certificate formats for ease of verification, as mentioned above, is another. The ICCAT Bluefin Tuna Catch Document Programme and EU catch certificates will need to consider issues of paperwork proliferation and applicability when a large landed catch is issued a single catch certificate but is subsequently split into numerous smaller consignments (within or outside China). Given that in the order of 60% of the raw material for China's re-processing industry originates in the Russian Federation, and that there are IUU fishing issues on both Russian coasts, the potential for fraudulent paperwork to undermine catch certification schemes should not be underestimated.

Perhaps the most fundamentally practical step China could take to prepare for increasing scrutiny of fish provenance is to continue its integration of responsibility between Customs and export food hygiene authorities. While the new Rule 68 promises further co-ordination, now in electronic form, between CCA and CIQ offices, it is not known how much of an advancement this represents. The key objective should be to combine the quantity monitoring currently undertaken by the CCA for the purposes of policing tariff payments, with the batch-by-batch (consignment-by-consignment) tracking of CIQ, whose main responsibility is to prevent contamination incidents. To some extent, breaking down bureaucratic bailiwicks is a challenge in any government structure and the degree to which it may be more or less difficult in China is hard to assess. Absent further co-ordination, it might be surmised that the CCA would take the lead responsibility for any additional fish import and export paperwork that is not directly related to processing activities within China. Based on the analysis presented here, this would be unfortunate. The CCA's regulatory reliance on the "blunt instruments" of the TPM, which allows up to 100 000 t of fish to be registered as a single unit, and yield ratios, which vary according to a wide range of factors and appear generally under-reported, can easily lead to discrepancies of several thousand tonnes. Although batch-specific tracking appears to be necessary, at present this is only undertaken by the food hygiene authority (CIQ), and only applies within the borders of China. In order to curb the flow of IUU fish into China meaningfully it will be necessary to combine the strengths of both the CCA and CIQ, as well as enhance co-operation between these agencies and their counterparts in key trading nations.

Recommendations

Recommendations resulting from this study are as follows:

- The CCA should reform its import and export commodity codes to conform to the specificity implemented by its main trading partners (i.e. the EU, USA and Japan) and in accordance with the importance of China's fish imports and exports to the global fish trade.

- The CCA and CIQ should continue to improve their co-ordination of responsibilities with the goal of combining quantity monitoring for tariff control and batch-by-batch (consignment-by-consignment) tracking for export food hygiene into a single integrated and effective traceability system.

- The CCA or CIQ (or both) should develop formal mechanisms and requirements for any catch certification or similar documentation accompanying incoming shipments of fish for re-processing to be carried through to re-export in anticipation of requirements by ICCAT and the EU.

- Authorities implementing catch certification/documentation procedures (e.g. ICCAT and EU) should, given China's importance in the global fish trade, develop special co-ordination mechanisms to provide information and materials which will assist China in complying with new

requirements and potentially feedback useful intelligence for fisheries enforcement. Such mechanisms could include consultative forums, information sheets for inspection personnel, and watch lists for specific products and sources.

- Academic and research organizations should continue to accumulate knowledge and understanding of China's role in the global fish trade and processing industries, thereby highlighting and prioritizing issues requiring international co-operation and management.

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Appendix I

Commodity codes for fish imports (headings 0302 (fresh or chilled), 0303 (frozen) only) used by China when importing raw materials, and codes used by the EU, Japan and the USA for imports from China by (headings 0302, 0303, 0304, 0305 and 1604), 2004–2007. Only codes for which data were found are shown. The English names used in the China codes are those published by China in their Customs Statistics Yearbooks. EU codes were obtained from the Eurostat database (Eurostat, 2008a). Japanese codes were obtained online from Japan Customs (2008) and translated by the author. US codes were obtained as non-numeric descriptions along with the data from NMFS (2008). An actual list of US Customs codes can be obtained from USITC (2008).

SALMON	**Input**	**Codes used by China**		
	Fresh or Frozen Atlantic Salmon	0302-1210 fresh or chilled Atlantic salmon 0302-1220 fresh or chilled Pacific or Danube salmon 0303-2210 frozen Atlantic salmon 0303-2220 frozen Danube salmon 0303-1100 frozen sockeye 0303-1900 frozen other Pacific salmon		
	Output	**Codes used by EC (2004-2007)**	**Codes used by Japan**	**Codes used by US**
	Salmon	12 codes: 0303-1100 frozen sockeye 0303-1900 frozen other Pacific salmon 0303-2200 frozen Atlantic salmon 0304-1013 fresh sockeye 0304-1913 fresh Pacific salmon 0304-2013 frozen sockeye 0304-2913 frozen Pacific salmon 0304-2915 frozen steelhead 0304-2917 frozen salmon trout 0305-4100 smoked Pacific salmon 1604-1100 salmon whole or in pieces	10 codes: 0303.11-000 sockeye 0303.19-010 coho 0303.19-090 other Pacific salmon 0305.20-030 salmon roe, 0305.30-010 salted salmon fillet (2004-2006) –AND- 0305.30-020 salted salmon fillet (2007), 0305.41-000, salted Pacific salmon, 0305.69-010 salted salmon, 1604.11-010 canned salmon,	19 codes: salmon sockeye frozen, salmon sockeye canned in oil, salmon sockeye canned not in oil, salmon atlantic fillet fresh farmed, salmon atlantic fillet frozen, salmon atlantic danube frozen, salmon chum canned not in oil, salmon chum fresh, salmon chum frozen, salmon nspf canned in oil, salmon nspf canned not in oil,

		1604-2010 prepared salmon not whole or in pieces	1604.11-090 canned other salmon, 1604.30-010 salmon roe	salmon nspf fillet fresh, salmon nspf prepared/preserved, salmon nspf salted, salmon pacific nspf frozen, salmon pink canned in oil, salmon pink canned not in oil, salmon pink frozen, salmon smoked
WHITEFISH	**Input**	**Codes used by China**		
	Fresh or Frozen Whitefish	0302-5000 fresh or chilled cod 0302-6200 fresh or chilled haddock 0302-6300 fresh or chilled coalfish 0303-6000 (2004-2006) –AND- 0303-5200 (2007) frozen cod 0303-7200 frozen haddock 0303-7300 frozen coalfish 0303-7700 frozen seabass 0303-7800 frozen hake		
	Output	**Codes used by EC**	**Codes used by Japan**	**Codes used by US**
	Cod	25 codes: 0302-5010 frozen cod 0303-5210 frozen cod 0303-5290 frozen cod 0303-6011 frozen cod 0303-6090 frozen cod 0304-1031 fresh cod fillet 0304-1931 fresh cod fillet 0304-2021 frozen cod fillet 0304-2029 frozen cod fillet 0304-2921 frozen cod fillet 0304-2929 frozen cod fillet 0304-9035 frozen cod meat 0304-9038 frozen cod meat 0304-9039 frozen cod meat 0304-9931 frozen cod meat	6 codes: 0303.60-000 frozen cod 0303.80-020 frozen cod livers or roe 0305.20-020 salted cod roe 0305.51-000 salted cod 1604.20-013 prepared in cans 1604.20-014 prepared, not in cans	20 codes: cod atlantic fillet blocks frozen > 4.5kg, cod atlantic fillet frozen, cod atlantic frozen, cod nspf dried, cod nspf fillet blocks frozen > 4.5kg, cod nspf fillet dried/salted/brine > 6.8kg, cod nspf fillet fresh, cod nspf fillet frozen, cod nspf fillet salted moisture > 50%, cod nspf fillet salted moisture not > 43%, cod nspf fresh, cod nspf frozen, cod nspf meat frozen > 6.8kg, cod nspf minced frozen > 6.8kg, cod nspf salted moisture content > 50%,

		0304-9933 frozen cod meat 0304-9939 frozen cod meat 0305-3011 salted cod fillets 0305-3019 salted cold fillets 0305-5110 dried cod, not fillets 0305-5190 dried cod, not fillets 0305-5919 dried and salted, not fillets 0305-6200 salted or in brine, not fillets 0305-6910 salted or in brine, not fillets 1604-1992 cod, prepared or preserved, whole or in pieces		cod nspf salted moisture content bet 43-45%, cod nspf salted moisture content not > 43% codcuskhaddockhakepollock smoked, whitefish frozen, whitefish meat frozen > 6.8kg
	Haddock	5 codes: 0303-7200 frozen haddock 0304-2033 frozen haddock fillet 0304-2933 frozen haddock fillet 0304-9045 frozen haddock meat 0304-9945 frozen haddock meat	None	5 codes: cuskhaddock fillet salted, haddock fillet blocks frozen > 4.5kg haddock fillet frozen haddock frozen haddock meat frozen > 6.8kg
	Coalfish	8 codes: 0303-7300 frozen coalfish 0304-1033 Pollachius virens, fresh fillets 0304-1933 Pollachius virens, fresh fillets 0304-2031 Pollachius virens, frozen fillets 0304-2931 Pollachius virens, frozen fillets 0304-9041 Pollachius virens, frozen meat 0304-9941 Pollachius virens, frozen meat 1604-1993 Pollachius virens, prepared or preserved	none	1 code: Pollock Atlantic frozen
	Hake	10 codes 0303-7819 frozen hake 0304-2055 frozen cape hake fillet 0304-2056 frozen Argentine hake fillet 0304-2058 frozen deepwater hake fillet 0304-2059 frozen other hake fillet 0304-2956 frozen Argentine hake fillet	None	3 codes: hake (Urophycis spp.) fillet frozen, hakewhiting frozen, hake salted whole/dressed

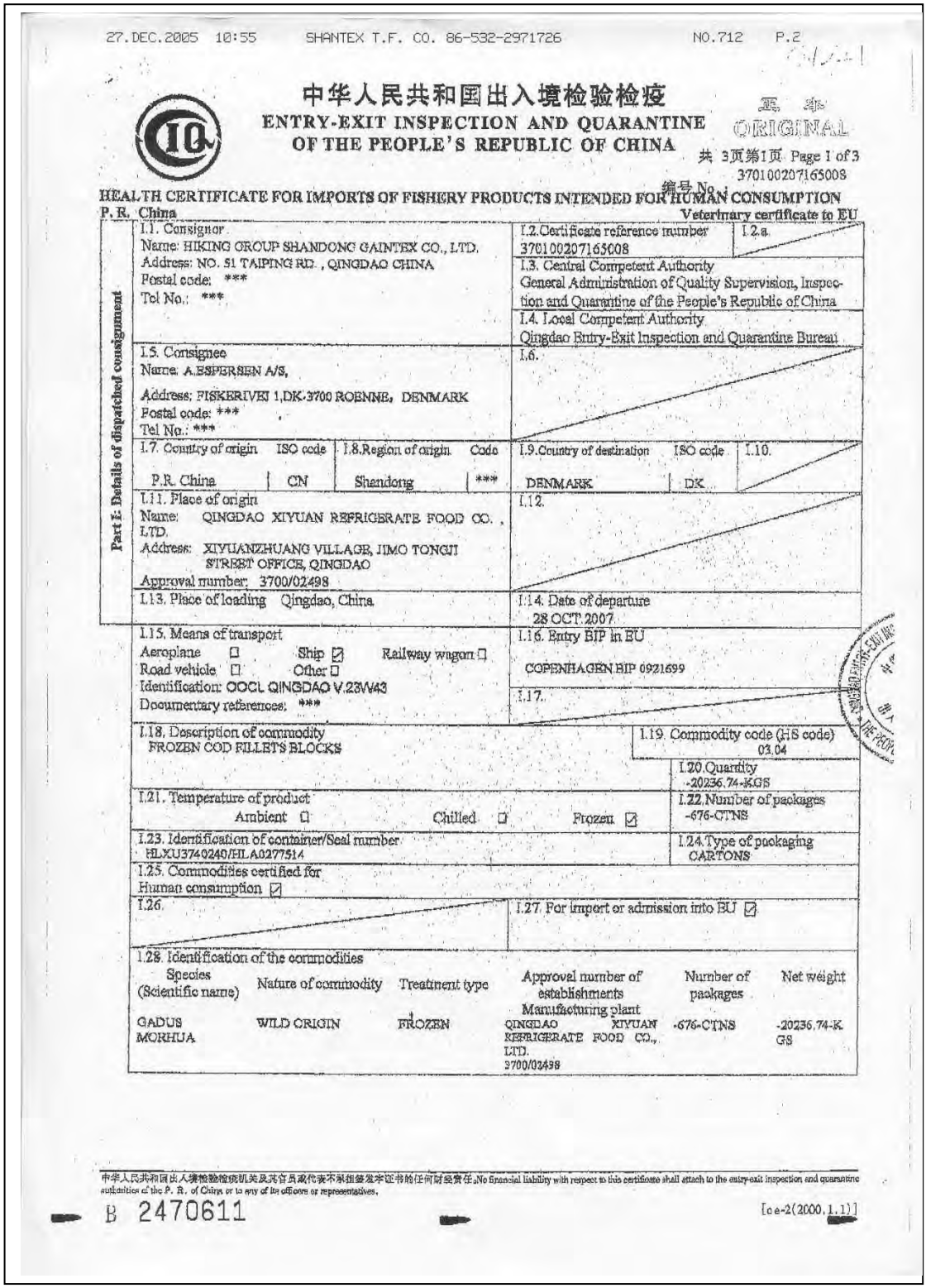
		0304-2958 frozen deepwater hake fillet 0304-9048 frozen other hake meat 0304-9951 frozen hake meat 1604-1994 prepared hake, whole or in pieces		
	Alaska pollock	6 codes: 0303-7955 frozen Alaska pollock 0304-2085 frozen Alaska pollock fillets 0304-2985 frozen Alaska pollock fillets 0304-9061 frozen Alaska pollock meat 0304-9975 frozen Alaska pollock meat 1604-1995 prepared pollock, whole or in pieces	1 code: 0304.90-013 pollock surimi (2004-2006) –AND- 0304.99-111 pollock surimi (2007)	11 codes: Cusk pollock fillet fresh, pollock alaska fillet blocks frozen > 4.5kg, pollock alaska fillet frozen, pollock alaska frozen, pollock alaska roe frozen, pollock alaska roe frozen, pollock nspf fillet blocks frozen > 4.5kg, pollock nspf fillet frozen, pollock nspf fillet salted, pollock nspf fresh, pollock nspf meat frozen > 6.8kg, pollock nspf salted whole/dressed
	Toothfish	3 codes: 0303-7988 frozen toothfish 0304-2088 frozen toothfish fillets 0304-2200 frozen toothfish fillets	2 codes: 0303.79-102 frozen mero 0304.20-100 mero fillets	5 codes: Seabass frozen, toothfish antarctic fillet frozen, toothfish antarctic frozen, toothfish patagonian fillet frozen, toothfish patagonian frozen
	Whiting	4 codes: 0302-6985 fresh blue whiting 0303-7945 frozen whiting 0303-7983 frozen blue whiting 0303-7985 frozen southern blue whiting 0304-2041 frozen whiting fillets 0304-2941 frozen whiting fillets 0304-9059 frozen blue whiting meat 0304-9971 frozen blue whiting meat	None	1 code: Whiting fillet blocks frozen >4.5 kg
	Redfish	9 codes: 0303-7935 frozen redfish	1 code: 0303.79-096 rockfish (menuke)	6 codes: ocean perch atlantic fillet frozen,

		0303-7937 frozen redfish 0304-1035 fresh redfish fillets 0304-1935 fresh redfish fillets 0304-2035 frozen redfish fillets 0304-2037 frozen redfish fillets 0304-2935 frozen redfish fillets 0304-2939 frozen redfish fillets 0304-9031 frozen redfish meat		ocean perch meat frozen > 6.8kg, ocean perch nspf fillet blocks frozen > 4.5kg, ocean perch nspf fillet frozen, ocean perch nspf frozen, ocean perch atlantic fillet blocks frozen >4.5 kg
TUNA	**Input**	**Codes used by China**		
	Fresh or Frozen Tuna	0302-3100 fresh or chilled albacore 0302-3200 fresh or chilled yellowfin 0302-3300 fresh or chilled skipjack 0302-3400 fresh or chilled bigeye 0302-3500 fresh or chilled bluefin 0302-3600 fresh or chilled southern bluefin 0302-3900 fresh or chilled tuna, other 0303-4100 frozen albacore 0303-4200 frozen yellowfin 0303-4300 frozen skipjack 0303-4400 frozen bigeye 0303-4500 frozen bluefin 0303-4600 frozen southern bluefin 0303-4900 frozen tunas, other		
	Output	**Codes used by EC**	**Codes used by Japan**	**Codes used by US**
	Tuna	18 codes: 0302-3290 fresh yellowfin 0302-3390 fresh skipjack 0303-4111 frozen albacore 0303-4190 frozen albacore 0303-4290 frozen yellowfin 0303-4390 frozen skipjack 0303-4411 frozen bigeye 0303-4490 frozen bigeye	13 codes: 0302.32-000 fresh yellowfin 0302.34-000 fresh bigeye 0303.41-000 frozen albacore 0303.42-000 frozen yellowfin 0303.43-000 frozen skipjack 0303.44-000 frozen bigeye 0303.45-000 frozen Pacific bluefin 0303.46-000 frozen southern bluefin	19 codes: Bonito canned not in oil, Bonito/yellowtail/pollock canned in oil, Bonito/yellowtail/pollock canned not in oil, Tuna albacore fresh, Tuna albacore frozen, tuna albacore in atc (foil or flexible) not in oil over quota, tuna albacore in atc (other) not in oil over

		0303-4590 frozen bluefin 0303-4931 frozen other tuna 0303-4939 frozen other tuna 0303-4980 frozen other tuna 0304-2045 frozen tuna fillets 0304-2945 frozen tuna fillets 1604-1411 tuna whole or in pieces in vegetable oil 1604-1416 tuna loins 1604-1418 tuna, not loins or in vegetable oil 1604-2070 tuna prepared or preserved, not whole or in pieces	0304.20-091 Tuna fillet, not bluefin (2004-2006) –AND- 0304.29-910 Tuna fillet, not bluefin (2007) 1604.14-010 Skipjack, canned 1604.14-091 Skipjack dried flakes 1604.14-092 Canned tuna 1604.14-099 Other prepared tuna	quota, tuna nspf fillet frozen, tuna nspf frozen, tuna nspf in atc (foil or flexible) in oil, tuna nspf in atc (foil or flexible) not in oil over quota, tuna nspf in atc (other) in oil, tuna nspf in atc (other) not in oil in quota, tuna nspf in atc (other) not in oil over quota, tuna nspf not in atc not in oil not > 6.8kg, tuna yellowfin fresh, tuna yellowfin frozen eviscerated head-on, tuna yellowfin frozen other preparations, tuna yellowfin frozen whole

Appendix 2

Sample CIQ Health Certificate for export of fish products to the EU



27.DEC.2005 10:55 SHANTEX T.F. CO. 86-532-2971726 NO.712 P.2

中华人民共和国出入境检验检疫

ENTRY-EXIT INSPECTION AND QUARANTINE OF THE PEOPLE'S REPUBLIC OF CHINA

正 本 ORIGINAL

共 3页第1页 Page 1 of 3

编号 No.: 3701002071650O8

HEALTH CERTIFICATE FOR IMPORTS OF FISHERY PRODUCTS INTENDED FOR HUMAN CONSUMPTION

P. R. China — Veterinary certificate to EU

Part I: Details of dispatched consignment

I.1. Consignor
Name: HIKING GROUP SHANDONG GAINTEX CO., LTD.
Address: NO. 51 TAIPING RD., QINGDAO CHINA
Postal code: ***
Tel No.: ***

I.2.Certificate reference number: 370100207165008 — I.2.a.

I.3. Central Competent Authority
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China

I.4. Local Competent Authority
Qingdao Entry-Exit Inspection and Quarantine Bureau

I.5. Consignee
Name: A.ESPERSEN A/S,
Address: FISKERIVEJ 1,DK-3700 ROENNE, DENMARK
Postal code: ***
Tel No.: ***

I.6.

I.7. Country of origin: P.R. China — ISO code: CN

I.8.Region of origin: Shandong — Code: ***

I.9.Country of destination: DENMARK — ISO code: DK

I.10.

I.11. Place of origin
Name: QINGDAO XIYUAN REFRIGERATE FOOD CO., LTD.
Address: XIYUANZHUANG VILLAGE, JIMO TONGJI STREET OFFICE, QINGDAO
Approval number: 3700/02498

I.12.

I.13. Place of loading: Qingdao, China

I.14. Date of departure: 28 OCT 2007

I.15. Means of transport
Aeroplane ☐ Ship ☑ Railway wagon ☐
Road vehicle ☐ Other ☐
Identification: OOCL QINGDAO V.23W43
Documentary references: ***

I.16. Entry BIP in EU: COPENHAGEN BIP 0921699

I.17.

I.18. Description of commodity: FROZEN COD FILLETS BLOCKS

I.19. Commodity code (HS code): 03.04

I.20.Quantity: -20236.74-KGS

I.21. Temperature of product: Ambient ☐ Chilled ☐ Frozen ☑

I.22.Number of packages: -676-CTNS

I.23. Identification of container/Seal number: HLXU3740240/HLA0277514

I.24.Type of packaging: CARTONS

I.25. Commodities certified for Human consumption ☑

I.26.

I.27. For import or admission into EU ☑

I.28. Identification of the commodities

Species (Scientific name)	Nature of commodity	Treatment type	Approval number of establishments Manufacturing plant	Number of packages	Net weight
GADUS MORHUA	WILD ORIGIN	FROZEN	QINGDAO XIYUAN REFRIGERATE FOOD CO., LTD. 3700/02498	-676-CTNS	-20236.74-KGS

中华人民共和国出入境检验检疫机关及其官员或代表不承担签发本证书的任何财经责任。No financial liability with respect to this certificate shall attach to the entry-exit inspection and quarantine authorities of the P. R. of China or to any of its officers or representatives.

B 2470611

[ce-2(2000.1.1)]

Appendix 3

Letter stating opposition of EU trade and industry operators to proposed EU reform of the rules of origin governing issuance of Certificates of Origin

12th November 2007

Joint Statement

EU Preferential Rules of Origin: Proposed Reform works only in Theory, not in Practice

European Trade and Industry Reject Origin Certification by Pre-Registered Exporters and Value Added Criterion

Representing a wide range of trade and industry operators throughout the EU, we **strongly reject** the European Commission proposal for a reform of preferential rules of origin.

The proposed reform would introduce **two major changes:**

- **Origin Certification by pre-registered exporters in the origin country**, thereby shifting responsibility for the establishment of the origin status from third countries' authorities to private operators.
  - Such a system would remove any legal certainty as to the origin of products imported into the EU. Today, certificates of origin ("Form A") issued by the foreign customs authorities provide a minimum of protection against false indications.
  - Importers, especially SMEs, would have to trust blindly the information provided by the registered exporter. Authorities in the origin country would be completely discharged of their basic and essential responsibility as reliable guarantors of origin certification.
- **A single "added-value" criterion** for the determination of origin
  - This criterion is unable to cope with price fluctuation. It would therefore make preferential imports completely unpredictable. The import of products with frequently changing raw material prices would, in particular, become a lottery.
  - In most cases, detailed information on the cost structure of a product is not available to European importers, who would, once again, have to fully rely on and blindly trust the information provided by their suppliers in the country of origin.

The proposed reform removes the predictability and legal certainty that traders need to base their calculation on preferential tariffs. It creates an incentive to importers to use MFN tariffs rather than the GSP, thus depriving the latter of its development function.

We would lend our full support to an ambitious reform that would aim at simplifying the existing system of preferential rules of origin and facilitating its use by European operators by providing sufficient commercial guarantees and legal safeguards, thereby ultimately helping promote the use of preferential trade schemes.

By no means will the proposed certification by pre-registered exporters and the "value-added" criterion ever help achieve any of these objectives.

On the contrary, unmanageable commercial risks will only turn European operators away from using preferential schemes to import from developing countries, seriously undermining, as a result, both the integration of these countries in the world economy and the EU competitiveness.

www.aedt.org aipce@agep.eu www.celcaa.eu www.coceral.com www.eucolait-dairytrade.org www.eurocommerce.be www.fena-furniture.com www.ferm-eu.org www.frucom.org www.fta-eu.org www.seafoodalliance.org www.uecbv.eu

12th November 2007

Why will the proposed system not work in practice?

It is important to know the specificity of international trade: the way this trade operates has been painstakingly elaborated in the course of many centuries, and has been formalised in several international treaties (on payment terms, on Incoterms, etc...).

The essence of international trade is that the transaction concerns the documents representing the goods, rather than the goods themselves.

The importer takes the irrevocable decision to pay, against presentation of:

- the bill of lading, allowing him to take reception of the goods upon their arrival at destination
- the other documents, that are supposed to give the importer the highest possible form of guarantee that the goods will comply with the requirements of his import market.

Obviously, these guarantees cannot be given by the exporter himself, who would be in that case at the same time judge and party. That is why, for example:

- the quality and the quantity can only be guaranteed by the report issued by an independent surveyor
- the sanitary condition can only be guaranteed by a certificate issued by the competent authorities
- the origin can only be ascertained by a certificate issued by an independent party.

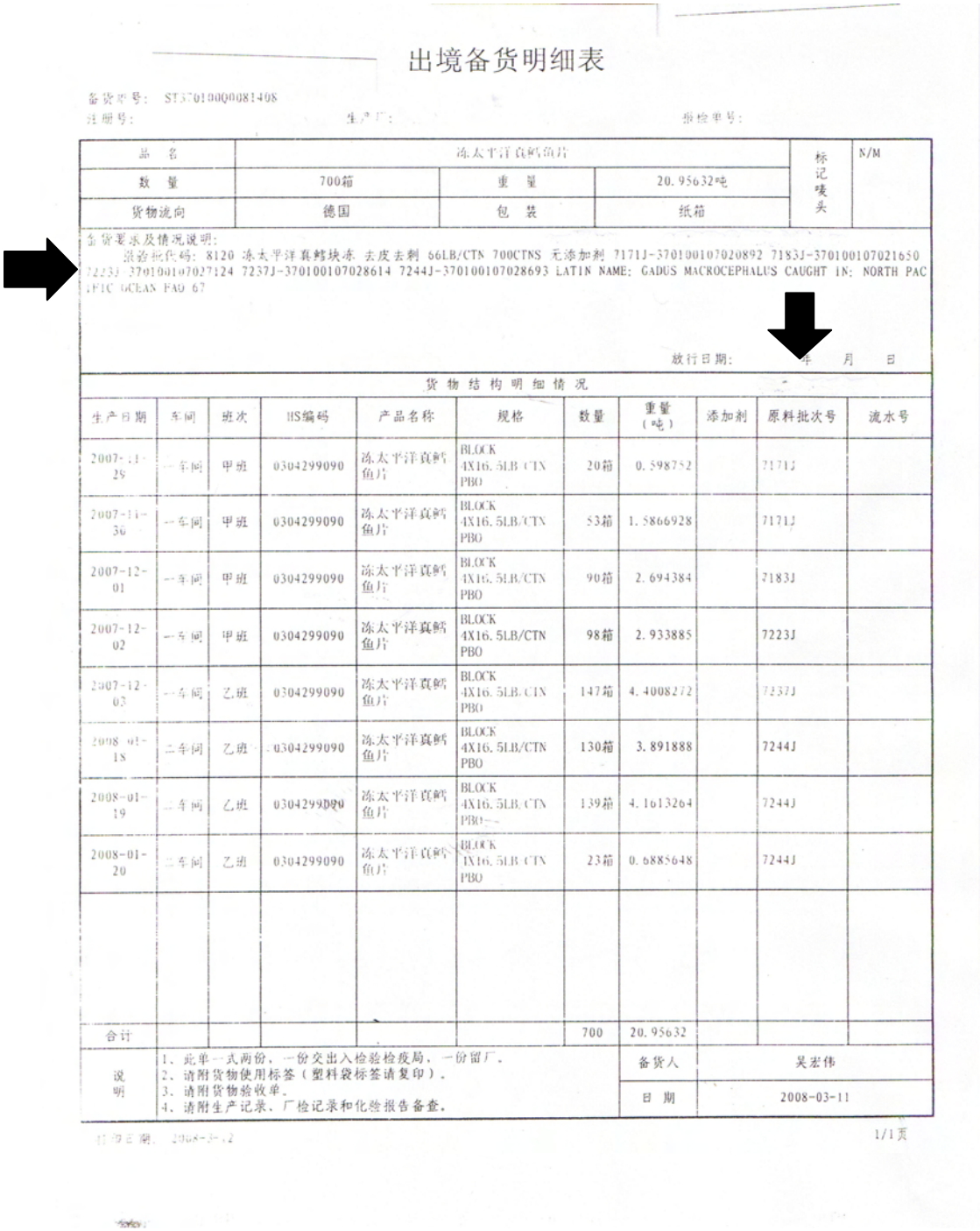
* * *

AEDT	European Association of Fashion Retailers
AIPCE-CEP	Association des Industries de Poisson de la CE Comité Import/ Export Poissons
CELCAA	European Liaison Committee for the Agricultural and Agri-Food Trade
COCERAL	The voice representing the European cereals, rice, feedstuffs, oilseeds, olive oil, oils and fats and agrosupply trade
EUCOLAIT	European Association of Dairy Trade
EUROCOMMERCE	The umbrella organisation of retail, wholesale and international trade in 29 European countries
FENA	European Federation of Furniture Retailers
FERM	Federation of European Rice Millers
FRUCOM	European Federation of the Trade in Dried Fruit, Edible Nuts, Processed Fruit & Vegetables, Processed Fishery Products, Spices, Honey and Similar Foodstuffs
FTA	Foreign Trade Association - the association for European commerce that specialises in foreign trade issues
SIPA	Seafood Importers & Processors Alliance
UECBV	European Livestock and Meat Trading Association

www.aedt.org aipce@agep.eu www.celcaa.eu www.coceral.com www.eucolait-dairytrade.org www.eurocommerce.be www.fena-furniture.com www.ferm-eu.org www.frucom.org www.fta-eu.org www.seafoodalliance.org www.uecbv.eu

Appendix 4

Sample export application form for processed fish from China. Note that in the header, the raw material batch numbers are matched with their corresponding import application numbers and the species name of the fish and its capture area (based on FAO area) is shown (horizontal arrow). In the lower portion of the form, the columns from left to right show the production date, workshop, production run, commodity code, product name, specification/product form, number of cartons, weight (t), additives, raw material batch number (vertical arrow), and serial number.



出境备货明细表

备货单号: ST3701000081408

注册号: 生产厂: 报检单号:

品 名	冻太平洋真鳕鱼片			标记唛头	N/M
数 量	700箱	重 量	20.95632吨		
货物流向	德国	包 装	纸箱		

备货要求及情况说明:
混合批代码: 8120 冻太平洋真鳕块冻 去皮去刺 66LB/CTN 700CTNS 无添加剂 7171J-370100107020892 7183J-370100107021650 7223J-370100107027124 7237J-370100107028614 7244J-370100107028693 LATIN NAME: GADUS MACROCEPHALUS CAUGHT IN: NORTH PACIFIC OCEAN FAO 67

放行日期: 年 月 日

货物结构明细情况

生产日期	车间	班次	HS编码	产品名称	规格	数量	重量(吨)	添加剂	原料批次号	流水号
2007-11-29	一车间	甲班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	20箱	0.598752		7171J	
2007-11-30	一车间	甲班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	53箱	1.5866928		7171J	
2007-12-01	一车间	甲班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	90箱	2.694384		7183J	
2007-12-02	一车间	甲班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	98箱	2.933885		7223J	
2007-12-03	一车间	乙班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	147箱	4.4008272		7237J	
2008-01-18	二车间	乙班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	130箱	3.891888		7244J	
2008-01-19	二车间	乙班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	139箱	4.1613264		7244J	
2008-01-20	二车间	乙班	0304299090	冻太平洋真鳕鱼片	BLOCK 4X16.5LB/CTN PBO	23箱	0.6885648		7244J	
合计						700	20.95632			

说明	1、此单一式两份，一份交出入检验检疫局，一份留厂。 2、请附货物使用标签（塑料袋标签请复印）。 3、请附货物验收单。 4、请附生产记录、厂检记录和化验报告备查。	备货人	吴宏伟
		日 期	2008-03-11

打印日期: 2008-3-12 1/1页

Appendix 5

The Bluefin Tuna Catch Document used by the International Commission for the Conservation of Atlantic Tunas (ICCAT, 2007a).

ICCAT BLUEFIN TUNA CATCH DOCUMENT #					
CATCH INFORMATION					
VESSEL/TRAP		NAME	FLAG	ICCAT RECORD NO	
CATCH DESCRIPTION		DATE (ddmmyy)	AREA	GEAR	
		NO. FISH	TOTAL WT (KG)	AVG WT (KG)	
		TAG NOS. (if applicable)			
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
TRANSFER INFORMATION					
TOWING VESSEL DESCRIPTION		NAME	FLAG	ICCAT RECORD NO.	
TOWING CAGE DESCRIPTION		NUMBER			
TRANSSHIPMENT INFORMATION					
CARRIER VESSEL DESCRIPTION		NAME	FLAG	ICCAT RECORD NO.	
		DATE	PORT (NAME AND COUNTRY)/ POSITION (LAT/LONG)		
PRODUCT DESCRIPTION		F/FR (circle one)	RD/GG/DR/FL/OT (circle one)	NET WT (kg)	
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
FARMING INFORMATION					
FARMING FACILITY DESCRIPTION		NAME	FLAG	ICCAT FFB NO.	
		LOCATION			
		NATIONAL SAMPLING PROGRAM? YES or NO (circle one)			
CAGE DESCRIPTION		DATE (ddmmyy)	CAGE NO		
FISH DESCRIPTION		NO. OF FISH	TOTAL WT (kg)	AVG WT (kg)	
		SIZE COMPOSITION	<8 kg	8-30 kg	>30 kg
OBSERVER INFORMATION		NAME	TITLE	SIGNATURE	
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
HARVEST FROM FARM INFORMATION					
HARVEST DESCRIPTION		DATE (ddmmyy)	NO. FISH	TOTAL ROUND WT (kg)	
		AVG WT (kg)			
		TAG NOS. (if applicable)			
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
TRADE INFORMATION					
PRODUCT DESCRIPTION		F/FR (circle one)	RD/GG/DR/FL/OT (circle one)	NET WT (kg)	
EXPORTER/ SELLER		PT OF EXPORT/DEPARTURE	COMPANY	ADDRESS	
		SIGNATURE	DATE		
TRANSPORTATION DESCRIPTION		(RELEVANT INFORMATION TO BE ATTACHED)			
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
IMPORTER/ BUYER		PT OF IMPORT/DESTINATION	COMPANY	ADDRESS	
		SIGNATURE		DATE	

ICCAT BLUEFIN TUNA CATCH DOCUMENT #					
CATCH INFORMATION					
VESSEL/TRAP		NAME	FLAG	ICCAT RECORD NO	
CATCH DESCRIPTION		DATE (ddmmyy)	AREA	GEAR	
		NO. FISH	TOTAL WT (KG)	AVG WT (KG)	
		TAG NOS. (if applicable)			
GOVT VALIDATION		NAME OF AUTHORITY AND SIGNATORY		TITLE	
		SIGNATURE		DATE	SEAL
TRANSFER INFORMATION					
TOWING VESSEL DESCRIPTION		NAME	FLAG	ICCAT RECORD NO.	

Appendix 6

The Bluefin Tuna Re-export Certificate used by the International Commission for the Conservation of Atlantic Tunas (ICCAT, 2007a).

DOCUMENT NUMBER	ICCAT BLUEFIN TUNA RE-EXPORT CERTIFICATE

RE-EXPORT SECTION:
1. RE-EXPORTING COUNTRY/ENTITY/FISHING ENTITY

2. POINT OF RE-EXPORT

3. DESCRIPTION OF IMPORTED BLUEFIN TUNA

Product Type *F/FR RD/GG/DR/FL/OT*	Net Weight (Kg)	Flag CPC	Date of import	BCD No.

4. DESCRIPTION OF BLUEFIN TUNA FOR RE-EXPORT

Product Type *F/FR RD/GG/DR/FL/OT*	Net Weight *(kg)*	Corresponding BCD number

F=Fresh, FR=Frozen, RD=Round, GG=Gilled & Gutted, DR=Dressed, FL=Fillet,
OT=Others (Describe the type of product:)

5. RE-EXPORTER STATEMENT:
I certify that the above information is complete, true and correct to the best of my knowledge and belief.

Name **Address** **Signature** **Date**

6. GOVERNMENT VALIDATION:
I validate that the above information is complete, true and correct to the best of my knowledge and belief.
Total weight of the shipment: kg

Name & Title **Signature** **Date** **Government Seal**

IMPORT SECTION
7. IMPORTER STATEMENT:
I certify that the above information is complete, true and correct to the best of my knowledge and belief.

Importer Certification
Name **Address** **Signature** **Date**

Final Point of Import: City **State/Province** **CPC** .

BFTSD Re-Export Certificate: 2007

Appendix 7

Proposed format for European Community Catch Certificate (European Union, 2008)

EUROPEAN COMMUNITY CATCH CERTIFICATE					
Document number		Validating authority			
1. Name	Address		Tel. Fax		
2. Fishing vessel name	Flag – Home port and registration number		Call sign	IMO/Lloyd's number (if issued)	
Fishing licence No – Valid to	Inmarsat No, Fax No, Telephone No, E-mail address (if issued)				
3. Description of product	Type of processing authorised on board	4. References of applicable conservation and management measures			
Species	Product code	Catch area(s) and dates	Estimated live weight (kg)	Estimated weight to be landed (kg)	Verified weight landed (kg) where appropriate
5. Name of master of fishing vessel – Signature – Seal:					
6. Declaration of transhipment at sea Name of master of fishing vessel	Signature and date	Transhipment date/ area/position	Estimated weight (kg)		
Master of receiving vessel	Signature	Vessel name	Call sign	IMO/Lloyds number (if issued)	
7. Transhipment authorisation within a port area					
Name	Authority	Signature	Address	Tel.	Port of landing	Date of landing	Seal (stamp)
8. Name and address of exporter	Signature	Date	Seal		
9. Flag State authority validation:					
Name/title	Signature	Date	Seal (stamp)		

Appendix 7 (cont).

Proposed format for European Community Catch Certificate (European Union, 2008)

<table>
<tr><td colspan="6">10. Transport details (see Appendix)</td></tr>
<tr><td colspan="6">11. Importer declaration</td></tr>
<tr><td>Name and address of importer</td><td>Signature</td><td colspan="2">Date</td><td>Seal</td><td>Product CN code</td></tr>
<tr><td>Documents under Articles 14(1), (2) of Regulation (EC) No …/2008</td><td>References</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">12. Import control — authority</td><td>Place</td><td>Importation authorised (*)</td><td>Importation suspended (*)</td><td>Verification requested – date</td></tr>
<tr><td colspan="2">Customs declaration (if issued)</td><td colspan="2">Number</td><td>Date</td><td>Place</td></tr>
<tr><td colspan="6">(*) Tick as appropriate.</td></tr>
</table>

TRAFFIC, the wildlife trade monitoring network, works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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TRAFFIC
the wildlife trade monitoring network
is a joint programme of

WWF IUCN

FEBRUARY 2009