

Fish Species That Could Help Develop Business Opportunities Between Japan And Turkey

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ABSTRACT

This study examines fishery trade flows between Japan and Turkey, in order to identify existing trade patterns and look for potential business opportunities. In 2011, the total fish trade from Japan to Turkey was at its highest value ever, approximately USD 49.6 million; this number represents impressive growth, given that the value in 2000 was just over USD 12 million. Turkey and Japan are each surrounded by water, and both possess rich inland water resources; both countries also have high catching and production capacities. By correctly using these resources and placing even more importance on marketing activities abroad, the exports of both countries can surely rise. According to the information captured during our interviews, pacific salmon, skipjack tuna, sardine, and yellowfin tuna sales may indirectly contribute to the creation of new jobs, by expanding Japan's trade with Turkey; participants also said that trout, sea bass, sea bream, and mussel sales could expand Turkey's trade with Japan.

Keywords: Turkey; Japan; Fish Species; Trade

INTRODUCTION

This study examines fisheries trade flows between Japan and Turkey, in order to identify existing trade patterns and pinpoint potential business and trade opportunities. This study largely focuses on the fisheries sector of a specific country, Turkey, within the broader context of Japan–Turkey fisheries trade. It also considers historical backgrounds and analyzes trade composition, trade reciprocity, and trade potential. We use a combination of approaches and the results of an original survey to investigate these potential opportunities.

The societies of Turkey and Japan are very warm and friendly towards each other. The two countries share the same ideals and values, and hold similar approaches to international issues. Relations based on mutual trust and cooperation between the two countries have created an atmosphere conducive to the further development and diversification of bilateral relations. Historically, however, this positive relationship has not resulted in trade expansion between these two countries.

Turkey has held intensive commercial and economic relations with Japan in recent years, but there has been no impetus, and therefore no effort, to promote the Japan–Turkey fisheries relationship. There are within each of these two countries some positive circumstances and numerous high-potential fish species, but we want to know whether or not these can contribute positively to promoting increased business between Japan and Turkey. To that end, we created and executed between April and November 2011, inclusive, a survey among 90 adults in Tokyo; these included the fishermen of the Istanbul and Trabzon fish markets, fisheries businessmen, university professors, and government workers.

JAPAN–TURKEY FISHERIES RELATIONSHIP

In 2009, the total fish trade from Japan to Turkey reached its highest value ever (approximately USD119 million), but that of 2000 had been just over USD12 million. This trade was predominated by tuna, and sea snails were exported from Turkey to Japan; some kinds of Japanese fish species used in Japanese restaurants were also exported

from Japan. As a result of the global economic crisis and Japan's tuna overstock problem, Turkey's trade with Japan in 2011 dropped to approximately USD49 million (Trade Statistics of Japan, 2012).

Table 1: Fisheries Exports from Turkey to Japan, 2000–2011

Year	Amount (Tons)	Value (Millions of USD)	Turkey's Fisheries Export (%)	Japan's Fisheries Import (%)
2000	1,764	12.6	23	0.07
2001	1,769	8.4	18	0.04
2002	3,653	10.4	10	0.05
2003	2,623	45.1	36	0.26
2004	4,129	79.3	44	0.48
2005	3,838	82.8	40	0.48
2006	3,634	84.1	36	0.46
2007	3,882	108.9	40	0.62
2008	2,859	98.4	26	0.66
2009	1,359	119.6	38	1.06
2010	1,369	35.4	11	0.32
2011	2,404	49.6	13	0.46

Source: Trade Statistics of Japan, various years.

Table 2: Fisheries Exports from Japan to Turkey, 2001, 2003, and 2008

Year	Amount (Tons)	Value (Thousands of USD)
2001	35	332
2003	98	491
2008	29	2,070

Source: Trade Statistics of Japan, various years.

With regard to our aforementioned survey, 78% of the participants reported the relationship between Japanese and Turkish fisheries as being slightly positive, while 14% and 8% billed it as positive and not positive, respectively. The reasons for these assessments and recommendations for improving the fisheries relationship between the two countries are detailed in our previous report (Guzel, 2012). According to the information captured during our survey interviews, trade in pacific salmon, skipjack tuna, sardine, and yellowfin tuna may indirectly contribute to the creation of new jobs in Japan by expanding trade from Japan to Turkey. The survey participants also said that trout, sea bass, sea bream, and mussels could be exported from Turkey into Japan, if certain changes were to take place. This study looks to estimate the trade potential of these fish species.

FISH SPECIES IN TURKEY POTENTIALLY EXPORTED TO JAPAN

Trout

Aquaculture in Turkey is a relatively young industry; it started with rainbow trout culture (*O. mykiss*), and the first rainbow trout farm was established in the Marmara region in 1971 (Yildiz et al., 2009). This fish is preferred by consumers for its delicious taste and by Turkish farmers for its suitability to the water temperatures of Turkish rivers and reservoirs. In the case of rainbow trout farming, the approach of policy-makers was to stimulate production, but while concurrently neglecting the market and related marketing aspects. These circumstances have resulted in recent years in a production increase in farmed trout in Turkey (Turkstat, 2012), from 38,068 tons in 2001 to 107,936 tons in 2011 (Table 3).

Generally no processing or value-adding takes place in the trout-farming trade (mainly *O. mykiss*) in Turkey; trout tends to be marketed there as fresh fish. A few farms running their own processing units are involved in the production of smoked trout, but their production tends to be export-driven. Only 0.5% of trout farms produce fresh, frozen, or smoked fillets. Roughly 70% of trout farms apply no product processing (Turkstat, 2012). Opportunities for expansion based on the existing market may be limited, but those in Turkey who are in the know have indicated that trout-farming is viable and holds the tremendous potential to produce high-quality fish products for domestic and export markets alike.

Table 3: Trout Catch, Exported from Turkey and Imported into Japan, 2001–2011

Year	Catch Amount (Tons)	Amount of Exports from Turkey (Tons)	Export Value in Turkey (Millions of USD)	Amount of Imports into Japan (Tons)	Import Value in Japan (Millions of USD)
2001	38,068	1,015	3.75	82,989	231.41
2002	34,553	1,213	4.50	82,007	212.74
2003	40,868	1,073	5.66	66,206	230.58
2004	45,083	1,713	8.36	63,451	236.02
2005	49,282	3,077	14.58	50,728	216.72
2006	57,659	4,667	24.12	46,404	211.45
2007	61,174	5,395	29.94	46,850	193.15
2008	68,649	5,968	34.10	53,729	214.82
2009	80,886	8,196	41.49	48,922	237.92
2010	85,244	11,152	55.11	41,268	245.90
2011	107,936	14,677	82.21	39,568	276.85

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

Turkey's main aquaculture products are trout, sea bream, and sea bass. The trout segment comprises almost 50% of aquaculture production. Smoked rainbow trout fillets and frozen fillets of pike-perch comprise the main export items of salmonids and freshwater fish species (Turkstat, 2012). Today, Turkey holds the lead position in Europe's aquaculture sector, simply by being Europe's largest producer of trout. However, despite there being rapid growth in farmed fish production, the national seafood processing industry is still not fully formed, thus offering many opportunities for innovative product development and branding. For instance, new product variants, improved packaging, product differentiation, and the adaptation of quality management systems are some of the ways by which the Turkish industry could add value to its production. Statistics show that the rainbow trout exported from Turkey in 2011 was valued at USD82.21 million—a 31.6% increase compared to 2010. (Please see Table 3 for more details.)

The participants of our survey interview stated that consumers in Japan—the world's biggest seafood market—want both sustainably caught and clearly labeled fish products. Japanese consumers also like trout and frozen salmon trout—sales of which have increased sharply, after more than a decade of market development in Japan. The participants reported that producers in Japan were undertaking its first feeding trial in rainbow trout, as part of the industry's intention to find reasonably priced, high-quality feed ingredients and, ultimately, to fulfill great product demand. Meanwhile, Japanese scientists have successfully bred rainbow trout from salmon, using surrogate salmon brood stock; they hope to refine and develop, in the same way, a technique by which to breed endangered species such as tuna. While the market for rainbow trout in Japan will not be as large as those for other seafood items, it is clear that the basic results of these trials will have a great impact on the larger seafood market as a whole.

Japan imported 39,568 tons of trout in 2011 (Table 3). The most recent losses have occurred in the most highly valued market, Japan, which imports Chilean and Norwegian rainbow trout. The Japanese real price of Chilean rainbow trout exports is described as taking a linear function relative to the per-capita quantity of Chilean rainbow trout exported to Japan. Japanese real per-capita income lagged relative to per-capita Chilean rainbow trout exports to Japan, and an indicator variable can be used to address unusual conditions in this market (Fishery Agency of Japan, 2011). Turkish rainbow trout products are serving as alternatives for more and more European companies; many find it an excellent alternative to Norwegian rainbow trout. Therefore, within Japan, Turkish rainbow trout may serve as a good alternative to Norwegian trout, if its price is acceptable to Japanese companies.

Sea Bream

In the early 1990s, agriculture in general and sea bass and sea bream farming in particular emerged as attractive and profitable lines of business. Sea bass and sea bream farming predominantly takes place in floating cages along the Turkish coast, on the Aegean and Mediterranean Seas (Rad, 2012). There is a strong and growing home market, especially for sea bream. Turkey has an extensive and sheltered coastline that offers many suitable cage-farming sites. Sea bream production is less consolidated, and its prices are therefore more volatile than those of sea bass. Consequently, production increased from 7,48 tons in 2001 to 32,187 tons in 2011 (Turkstat, 2012). Quantitative trends vis-à-vis the production of sea bass and sea bream are provided in Table 3.

According to the information captured during our survey interviews, expansion in Turkey has been motivated by a perceived lower sea bream production cost, combined with the direct export subsidy afforded to Turkish production. The sea bream industry has now matured in Turkey: the use of wild fry has been banned, cages are now mostly plastic on offshore (but still sheltered) sites, there are no unlicensed operators, the packing sector meets European Union (EU) hygiene standards, and there is greater professionalism in the industry. Additionally, industry development within Turkey has been achieved without the benefit of grants enjoyed in other EU countries, and production costs are significantly lower in Turkey than in other countries. Leading companies have made clear intentions to significantly increase production-but caution must be exercised, because this is a move that, if not properly planned, could lead to instability, especially in the export markets.

The Turkish local market is able to consume Turkey's total sea bream production, but exporting and thus obtaining foreign currency is always preferable. Owing to the stable financial environment, strong domestic demand and prices, and low production costs, the general mood in the industry is positive. A good percentage of sea bream production is fresh and/or processed and exported throughout the world, whereas Turkey's rainbow trout is exported mainly to Europe as a hot-smoked, vacuum-packed product. The quantity of sea bream exported in 2012 was 9,531 tons, bearing a value of USD53.79 million (Turkstat, 2012). Turkey in particular has good site availability and growing conditions and low production costs, and it is likely that most future production in sea bream will come from this country. It is clear that the potential for high levels of sea bream exports to Japan is very high, and that Japanese companies are likely to show more interest in it.

Table 4: Sea Bream Catch, Exported from Turkey and Imported into Japan, 2001–2011

Year	Catch Amount (Tons)	Export Value in Turkey (Tons)	Export Value in Turkey (Millions of USD)	Import Value in Japan (Tons)	Import Value in Japan (Millions of USD)
2001	12,939	748	2.32	3,328	6.96
2002	11,681	1,260	3.73	4,258	8.04
2003	16,735	1,729	5.91	2,675	5.15
2004	20,435	1,805	8.59	2,278	4.76
2005	27,634	2,736	11.33	2,224	5.14
2006	28,463	3,321	13.71	1,411	3.75
2007	33,500	5,302	24.43	1,519	4.59
2008	31,670	7,741	29.79	1,176	3.57
2009	28,362	7,324	30.11	1,325	4.17
2010	28,157	7,422	34.52	901	2.89
2011	32,187	9,531	53.79	1,862	5.96

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

Sea bream has a special place in Japanese cooking. From our interview, sea bream (or *tai*, in Japanese) is one of the best-loved fish in the country; it is also an important symbol in Japanese culture. These foods are an integral part of the Japanese menu, and bound to the culture itself. There are many varieties of sea bream, such as red sea bream, black porgy, and yellow back sea bream (Pawiro, 2007). The red sea bream has a unique red color that is considered lucky, and in Japan, it is served whole on New Year's Day, at wedding ceremonies, and on other special occasions. It is in season in the spring, and it is called the "King of Fish" in Japan. A whole *tai* is quite expensive and is enough for an entire meal. Sea bream farming is a thriving business, producing about seven times the harvest from the seas. Many different species of sea bream are imported into Japan from overseas; in 2011, Japan imported 1,862 tons of sea bream worth over USD5.96 million. Sea bream fillets are very popular products, and they have been dominating the Japanese fish market. The export of sea bream fillets, both fresh and frozen, are quite significant, and the trend is for European consumers to increase their consumption of Turkish products. Therefore, business people in Turkey are continuing to research new business opportunities, and the Japanese market is showing very strong potential.

Mussel

Turkey has many kilometers of coastline, and shellfish farming is developing slowly within the country. First undertaken in Turkey in 1997 (Rad, 2012), mussel farming seems to be a promising sector for Turkey. The main issue with mussel aquaculture in Turkey is insufficient local consumer demand, which has forced producers to export their

products. Turkey's aquaculture is mainly based on intensive finfish culture; extensive and semi-intensive aquaculture is limited to the production of mussels (mainly striped Venus clams) and common carp. As shown in Table 5, mussel production started to generally increase in 2002, with production in 2012 reaching 30,202 tons (Turkstat, 2012).

Suppliers of Turkish mussels are coming under increasing pressure—a position not assisted by the growing commodification of mussels within the international market, with price being a key buying consideration. In this environment, Turkish suppliers suffering from a lack of scale and a relatively high production cost base are at a significant disadvantage. This position is further compounded in some markets by Irish suppliers competing with each other for selected customers and, in the process, managing to place additional downward pressure on the prices they receive. However, for Turkey's mollusk culture industry to expand, culture areas must expand, and natural stocks must be protected to ensure a reliable supply of seed.

Table 5: Mussel Catch, Exported from Turkey and Imported into Japan, 2001–2011

Year	Catch Amount (Tons)	Export Value in Turkey (Tons)	Export Value in Turkey (Millions of USD)	Import Value in Japan (Tons)	Import Value in Japan (Millions of USD)
2001	10,200	3,468	10.64	4,055	19.01
2002	15,035	4,133	12.54	11,059	31.54
2003	19,700	4,990	17.32	10,524	31.49
2004	22,633	3,183	14.03	5,212	7.64
2005	23,209	2,827	8.85	8,579	12.74
2006	29,610	3,158	11.14	8,657	10.69
2007	28,622	3,241	11.64	9,942	11.22
2008	28,494	5,226	21.06	11,810	15.91
2009	24,653	4,462	15.18	15,932	26.43
2010	26,995	4,514	16.25	7,379	15.00
2011	30,202	4,598	16.83	12,009	27.76

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

Striped Venus clams are the most important exported mussel product in Turkey. Except for striped Venus clams—which are either canned or frozen—almost all bivalve species produced in Turkey are exported live or fresh, mainly to Italy, Spain, France, and Greece (Aynur, 2009). Quality and food safety compliance, and certification thereof, are key determinants in the selection of Turkish mussels among many buyers on the European market. Likewise, not all processors are sufficiently focused on ensuring that the proportion of rejected mussels caused by improper product transport, handling, and storage and processing is minimized. Frozen rapa whelk meat is exported to Asia, including Japan and Taiwan; therefore, Turkish companies should examine potential business opportunities for the sale of striped Venus clams.

Japan is one of the largest markets for bivalves in Asia; in fact, the country is one of the largest importers of mussels, mainly from neighboring countries like China and South Korea (Pawiro, 2007). Mussel culture in Japan constitutes a significant economic activity, and there is a large and expanding market for mussels there. While there are a number of opportunities for developing mussel aquaculture activities in Japan, it must be borne in mind that quality is very important in the Japanese market; for this reason, mussels are inspected and any broken or substandard shells are removed prior to being packed for selling in Japan.

Mussels are one of the healthiest and most delicious gourmet food choices in Japanese food culture; the combination of Turkey's succulent, organically grown mussels with a delicious sauce is highly favored there. At present, Europe is by far Turkey's largest mussel market, followed by Japan, the United States, and Australia (Nzgeographic, 2012). The value of Turkey's 30,202 tons of mussel exports in 2011 totaled USD4,598 million, up from that of the 4,514 tons of mussels exported in 2010 (Turkstat, 2012). The upsurge in the animal products sector among Turkey's exports has been seen in increased exports of products such as sea snails, which Turkey exports to Japan every year in rapidly increasing volumes. In addition, striped Venus clams are being promoted in new markets by pertinent Turkish business people; those new markets include foreign-cuisine restaurants in Japan, given its delicious taste and its preponderance among the cuisines of EU countries.

Sea Bass

Aquaculture in Turkey started with rainbow trout culture in the early 1970s; little had happened in terms of sea farming there until 1985, when gilthead sea bream and sea bass were first cultured in the Aegean Sea. The relative growth in sea bass production has grown since 1994, as a reliable supply of hatchery-produced juveniles is making production planning possible. Sea bass production has increased continuously, from both the seas and Turkey's internal water sources. The cultured production of sea bass has increased considerably, from 15,546 tons in 2001 to 47,013 tons in 2011 (Turkstat, 2012) (Table 6).

From our interviews, we learned that the deployment of Turkish structural funds played a major role in the rapid development of Turkey's sea bass and sea bream sectors between 2001 and 2011; especially, those funds have been used to support new production capacity. Sea bass farming had emerged as an attractive and profitable business in which to invest, and farming started to develop in Turkey and in other Mediterranean countries. Sea bass on-growing is predominantly carried out in floating cages along the Turkish coast on the Aegean and Mediterranean Seas. Some Turkish sea bass fisheries are managed in a responsible manner, but there are some areas where the species has been and continues to be overfished. Nonetheless, industry operators were quoted as saying that this responsible management will encourage consumers to increase their consumption of sea bass and sea bream; as such, they plan to emphasize the message of "responsible stewardship" in their communication strategy in attracting consumers.

Table 6: Sea Bass Catch, Exported from Turkey and Imported into Japan, 2001–2011

Year	Catch Amount (Tons)	Export Value in Turkey (Tons)	Export Value in Turkey (Millions of USD)	Import Value in Japan (Tons)	Import Value in Japan (Millions of USD)
2001	15,546	4,785	17.79	1,100	6.30
2002	14,339	6,948	27.12	787	3.93
2003	20,982	6,594	31.49	371	1.94
2004	26,297	8,51	42.52	187	1.02
2005	37,290	10,708	51.09	172	0.58
2006	38,408	11,906	51.86	329	0.87
2007	41,900	14,953	74.01	127	0.36
2008	49,270	13,921	77.89	109	0.34
2009	46,554	14,728	65.02	16	0.04
2010	50,796	11,666	51.79	24	0.23
2011	47,013	10,215	58.24	4	0.05

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

The production of sea bass and sea bream in Turkey is increasing, on account of both internal and external demand pressures. At the moment, prices are still well below the European average, and remain at retail levels. Until a few years ago, internal demand was low; consequently, the interest of fishermen in these products was also limited. Given the consequential under-exploitation of stocks in open seas or lagoons, it can be predicted that production could readily expand in the near future. Nearly 50% of sea bass production in 2012 was exported to the EU; only a few years previous, that number was 80%, and there were only limited trout exports (Turkstat, 2012). Statistics show that Turkish aquaculture in 2010 exported product worth USD58.24 million; a 12% increase had been projected for 2011.

Sea bass is extremely popular in Japan, where it is traditionally served at celebrations and festive occasions. In our interview, we learned that the Japanese sea bass is the most prolific sea bass species living in Japan's coastal waters. Called *suzuki* in Japanese, this particular type of sea bass is similar to North American striped bass, European sea bass, and other well-known sea perches worldwide. Sea bass have shiny white flesh with an easily recognizable broad-flaked structure and a mild flavor that is highly favored among Japanese consumers.

Sea bass consumed in Japan tends to be imported, mainly due to its low cost compared to domestic product (Pawiro, 2007). Sea bass farming is a thriving business, producing about seven times the harvest from the seas (Table 6). Some different species of sea bream are still imported from overseas as well. In the course of our interviews, it was frequently cited that in recent years, the import of fish fillets (including sea bass, sea bream, and trout) has increased in both value and volume. These fillets are in demand by restaurants and supermarkets, which constitute their biggest

domestic customers. Turkish sea bass fillets are being exported to more than 40 countries, because they are both delicious and relatively inexpensive. Doubtless, these positive traits could give rise to positive sales opportunities.

FISH SPECIES IN JAPAN POTENTIALLY EXPORTED TO TURKEY

Skipjack Tuna

Japanese distant-water pole and line skipjack tuna fisheries began in the 1950s. As with most fish, skipjack tuna offers many health benefits to consumers, including high levels of omega-3 fatty acids, DHA, and healthy protein (WHFoods, 2012). Japanese consumers' awareness of the importance of sustainable fisheries will be leveraged in the course of promoting well-known skipjack tuna products. High-quality sashimi skipjack tuna has a deep-red colored flesh that becomes lighter when cooked. It has a stronger taste than other tunas and a short shelf life.

Skipjack tuna fisheries can be classified as part of Japan's distant-water and offshore pole-and-line fleets, and domestic pole-and-line fleets. The skipjack tuna catch ranged between 276,680 and 335,525 tons during 2001–2010; the catch was highest in 2003 (Trade Statistics of Japan, 2012). In our interviews, we found that, aside from being purchased by millions of people each year in canned or frozen form, skipjack tuna is a very popular option in Japanese cuisine. The Japanese call the skipjack *katsuo*, and in that country, it is typically smoked and dried, and then added to other dishes or used in making fish stock.

In our interviews, we found that Japan is the country that accounts for the greatest volume of fresh skipjack tuna consumed worldwide. Japan has been taking advantage of frozen skipjack tuna products for a number of years, followed by the United States and the EU. The highest grade of skipjack tuna is destined for the Japanese market or the very highest quality markets of other tuna-consuming nations. Japan is one of the world's largest exporters of frozen skipjack, the largest producer of prepared and preserved tuna, and the main exporter of prepared and preserved tuna products. The volume of skipjack tuna exported by Japan in 2011 was 44,886 tons; compare this figure to the 26,190 tons exported in 2001 (Trade Statistics of Japan, 2012). However, Japan has seen a decline in skipjack populations within its waters, which it attributes to excessive fishing in the equatorial area.

Skipjack tuna is also common in the shallow waters of the Mediterranean, Aegean, Marmara, and Black Seas; as such, it is an important commercial fish in Turkey, on account of its delicious taste (The Case of Turkey, 2011). During our interviews, we found that the skipjack tuna industry in Turkey bears the following characteristics. First, fishing grounds and landing areas are dispersed. Second, the government takes initiative in managing the industry. A full understanding of the complexity of factors leading to dwindling Turkish skipjack tuna populations demands the analysis of both social and economic factors.

The majority of skipjack tuna consumption is of ambient products, but there has also been considerable growth in fresh tuna in the retail and food service sectors.

The majority of imported frozen skipjack tuna hails from the EU and the Indian Ocean. Following the establishment of two large-scale canneries in Turkey, the import of frozen tuna has been steadily increasing in that country. Skipjack tuna is consumed in Turkey in the form of canned tuna, and consumption thereof has increased rapidly. The volume of skipjack tuna imported into Turkey in 2011 was 7,994 tons, worth a total of USD14.77 million (Table 7).

Table 7: Skipjack Tuna Catch, Exported from Japan and Imported into Turkey, 2001–2011

Year	Catch Amount (Tons)	Export Value in Japan (Tons)	Export Value in Japan (Millions of USD)	Import Value in Turkey (Tons)	Import Value in Turkey (Millions of USD)
2001	276,680	26,190	19.90	2,323	1.98
2002	276,907	29,559	20.66	5,366	4.70
2003	335,525	74,004	49.62	6,285	5.01
2004	247,719	13,382	10.48	9,376	9.97
2005	315,224	80,409	68.69	6,511	6.55
2006	276,039	52,190	42.50	6,647	7.34
2007	301,425	53,929	68.02	8,972	13.24
2008	311,887	55,215	94.72	6,567	12.31
2009	267,802	20,922	22.75	11,51	15.74
2010	301,136	58,618	79.61	7,262	10.40
2011	273,152	44,886	67.50	7,994	14.77

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

Sardine

The biomass of the sardine in Japanese waters was insignificant before 1970, but drastically increased during the period between the 1970s and mid-1980s. At its peak in 1988, the amount of sardine production in Japanese waters was 4.5 million metric tons (Fishery Agency of Japan, 2011); this abruptly dropped in 2010 to 73,400 metric tons in 2010. The sardine population decline after 1988 possibly occurred as a result of the abrupt increase in sea surface temperature since 1988 in the Kuroshio Extension region, and this suggests a close relationship between inter-decadal climate–ocean variability and sardine population size (Noto & Yasuda, 1999).

In our interviews, we found that industry is committed to increasing the value of the industry by developing business in which fresh sardine is sold whole in retail stores for home consumption, in canning, drying, salting, or smoking, and in reduction into fish meal or oil; the balance is sold worldwide as bait for high-seas tuna fleets and as food for farmed tuna. The prices of sardine are primarily determined by supply and demand, but quality, size, origin, and species are also important. Japanese researchers are focusing on the first stage of this sardine business development by investigating the shelf-life of chilled and frozen products for whole, headed and gutted, and filleted sardine. Finally, sardine plays an important role in the fisheries sector, as its sales figures also serve as indicators of the supply and demand of other fishery products in Japan; the central wholesale market also generally provides price indices with regard to fishery products worldwide.

Table 8: Sardine Tuna Catch, Exported from Japan and Imported into Turkey, 2001–2011

Year	Catch Amount (Tons)	Export Value in Japan (Tons)	Export Value in Japan (Millions of USD)	Import Value in Turkey (Tons)	Import Value in Turkey (Millions of USD)
2001	178,423	1,306	0.87	2,155	0.92
2002	50,313	1,924	1.37	3,954	1.60
2003	52,050	1,471	1.04	11,45	5.34
2004	50,153	2,198	1.76	9,186	3.45
2005	27,601	1,508	1.27	9,436	4.61
2006	52,503	1,962	1.57	15,52	8.49
2007	79,099	3,881	3.38	15,441	9.01
2008	34,857	736	0.66	8,463	6.69
2009	57,429	646	0.82	1,248	0.74
2010	73,400	1,691	2.31	9,631	5.85
2011	185,341	12,705	9.10	7,644	8.05

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

The fishing industry is likely to support domestic market incentives, if larger export markets remain unthreatened. Figures pertaining to the Japanese export of sardine products between 2001 and 2011 are summarized in Table 8. In 2011, Japan exported 12,705 tons of sardine valued at USD9.10 million; this figure pertains to all sardine

products; much of the volume decrease was driven by lower sardine export figures. At one point, canned sardine was the most valuable export product in Japan (Lanier, 1981). In our interviews, we found that imports of sardine into Turkey are mostly in canned or frozen form; these are sardine caught or raised in Japan, and wholesome, palatable, and convenient canned sardine is consumed in nearly every community.

Sardine (*Sardina pilchardus*) is the most abundant fish species in the Aegean Sea; it is principally caught in the Marmara, Aegean, and Black Seas. Sardine is generally consumed fresh, canned, or salted, and the fish is also used in Turkey in the production of fishmeal and fish oil (Can, 2011). During our interviews, we learned that sardine is an important fish species of great economic importance to Turkey; assuming that sufficient amounts of sardine are available, there is the possibility of developing new sardine products. Sardines are very suitable as marine food, on account of their high fat content, and demand is also driven by the fact that the usage of marinated sardine has increased in recent years in Turkey. Sardine is a delicacy in Turkish cuisine, and for this reason, they are very common in fish markets along the western coastal regions of Turkey. Although canned tuna has held a high market share among canned fish products, canned sardines has enjoyed an increase market share in recent years. Imports by other countries have steadily increased—a trend has become more pronounced in recent years. Norway and Greece has consistently been the leading supplier to Turkey of sardine products in airtight containers. Overall, Turkey imported 7,644 tons of sardines in 2011 at a value of USD8.05 million (Turkstat, 2012).

Pacific Salmon

The world salmon supply has been diminishing drastically for decades on account of large demand, mostly from Japan. Approximately half of the wild Pacific salmon sold in Japan is caught in the coastal areas of northern Japan. While Japan's salmon fisheries are closely linked ecologically to the fisheries of the Russian far east, Japan has taken a very different development path. More than 98% of Japan's salmon rivers have been dammed and artificially modified, so that commercial fisheries now rely heavily on hatcheries in order to maintain their productivity (Willoughby, 1999). Nevertheless, important wild salmon biodiversity remains. In northern Japan, the Wild Salmon Center is working with local partners, scientists, government agencies, and private landowners to safeguard the last free-flowing salmon rivers in the region and protect the unique salmon biodiversity of the southern range of Pacific salmon.

The total Pacific salmon catch peaked in 2001 at approximately 282,130 tons, but it has been in decline since then. In 2011, 179,630 tons were produced (Trade Statistics of Japan, 2012). Recently, offshore fish-farming installations have been promoted by the Japanese government in an attempt to bring the industry to more exposed locations; however, the true potential of offshore farming has not to be fully assessed. Pacific salmon in Japan is not only the species to be farmed in the greatest volumes; it is the first farmed species to be sold in all main markets globally, in potential competition with its wild cousins. However, based on past observations, we expect that global warming will reduce salmon production in Japan, especially if sea surface temperatures rise again (Willoughby, 1999).

Norwegian companies have assisted many countries in establishing salmon farms, but the Japanese government does not offer financial incentives to salmon farmers. In our interviews, we found that since regulations do not allow companies to expand operations within their own countries, several Japanese companies have exported their salmon-farming technologies to other countries where favorable environmental conditions or potential markets exist. Japan now exports Pacific salmon products to all the major markets, including the United States and the EU. Overall, Japan exported 28,076 tons of Pacific salmon in 2001, increasing to about 64,176 tons in 2010. This is an increase of approximately 129% within a single decade (Table 9).

Table 9: Pacific Salmon Tuna Catch, Exported from Japan and Imported into Turkey, 2001–2011

Year	Catch Amount (Tons)	Export Value in Japan (Tons)	Export Value in Japan (Millions of USD)	Import Value in Turkey (Tons)	Import Value in Turkey (Millions of USD)
2001	282,130	28,076	30.54	81	0.55
2002	291,079	31,921	26.41	137	0.80
2003	345,247	62,119	61.05	155	0.83
2004	319,362	59,854	80.71	620	2.98
2005	306,440	65,362	131.47	1,353	6.56
2006	280,694	65,534	149.21	1,388	7.48
2007	285,015	56,975	108.16	2,259	11.39
2008	224,383	44,642	97.24	2,454	14.03
2009	276,206	55,388	139.22	2,611	14.51
2010	228,227	64,176	201.36	3,181	22.09
2011	179,630	22,371	83.75	4,369	34.52

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

Pacific salmon live in the cold freshwater and sea waters in and around the North Pacific Ocean. This fish does not exist in Turkish water, given their different habitats at different life stages. Some Turkish companies are looking to produce Pacific salmon that cannot be easily found in the natural Turkish water environment. Pacific salmon has high commercial value in Turkish society, whose members look to consume healthy doses of omega-3 fatty acids; for this reason, Pacific salmon was considered very important by interview participants.

Pacific salmon that was imported mainly from Norway started to sell in the Turkish fish market, in four different forms: whole, sliced, filleted, and smoked (Rad, 2012). During our interviews, in recent years, opening-day fish auctions at Turkish fish markets have seen record-setting prices for Pacific salmon, thus reflecting market demand. Round-sliced salmon is cheaper than demand for imported salmon, and Turkish companies choose it for either immediate human consumption or immediate processing for human consumption. Overall, 4,369 tons of Pacific salmon were imported into Turkey in 2011, at a value of USD34.52 million. Please see Table 9 for more details about the salmon trade.

Yellowfin Tuna

Yellowfin tuna (*Thunnus albacares*) is the backbone of the high-end tuna industry. Yellowfin is found in the Pacific, Indian, and Atlantic Oceans, and these distinct populations are under different amounts of pressure. Yellowfin is caught by many nations, but Japan, Indonesia, Mexico, and the Philippines account for the majority of the total annual catch worldwide. The yellowfin tuna logline catch is targeted for the Japanese sashimi market and, as such, has an economic value exceeding that of purse seine-caught fish (Makino & Matsuda, 2005).

Compared to bluefin, yellowfin comes with no major mercury concerns; that being said, these are still long-lived fish at the top of the food chain. The major market for tuna in Japan, therefore, is that for fresh sashimi, to which the majority of tuna raw material is directed, in terms of both volume and value. The sashimi market makes use of larger-species tuna, such as bluefin, bigeye, and yellowfin. Bluefin tuna attracts the highest prices, but is available in much lower volumes; yellowfin is popular as sashimi, but is priced lower than bigeye. These characteristics make yellowfin tuna popular for domestic consumption, where it is sold at supermarket chains and fish retailers. The fish is also used in frozen and canned exports as light-meat tuna (Fishery Agency of Japan, 2011). During 2001–2010, Japan's yellowfin tuna production averaged about 77,160 tons annually; during this period, catches were at essentially low levels (Table 10).

Table 10: Yellowfin Tuna Catch, Exported from Japan and Imported into Turkey, 2001–2011

Year	Catch Amount (Tons)	Export Value in Japan (Tons)	Export Value in Japan (Millions of USD)	Import Value in Turkey (Tons)	Import Value in Turkey (Millions of USD)
2001	98,466	3,949	4.25	318	0.34
2002	98,077	3,919	4.43		
2003	77,778	3,167	3.40	1,058	1.33
2004	65,264	9,047	9.73	1,716	2.20
2005	70,805	4,579	5.33	2,657	3.54
2006	72,694	5,122	5.94	2,622	4.27
2007	73,318	7,473	11.49	1,371	2.16
2008	78,206	6,371	11.71	1,679	3.80
2009	70,450	5,697	7.57	207	0.39
2010	76,457	5,370	7.96	383	0.86
2011	67,250	3,071	5.33	1,765	2.28

Source: Trade Statistics of Japan and Turkish Statistical Institute, various years.

In our interviews, we found that yellowfin is an important commercial tuna species; although tuna do provide individuals with both food and livelihoods, they are more than just seafood. However, not many countries possess this resource, and Japan selects from landings the best-quality tuna for export. Price differentials may be problematic for the same commodities in different wholesale markets, as they can often be large and are worthy of special note when Japan exports yellowfin tuna. The sashimi market is attractive for producers and exporters in terms of price; yellowfin tuna resources in Japan are fully utilized for export, regardless of product type: fresh, frozen, sashimi, or canned. Most product sold in Japan is super-frozen using a freezing infrastructure developed since the early 1980s. In the main markets in Japan, the export value of yellowfin tuna in 2011 was USD5.33 million, down 42% over the same period in 2010 (Table 10).

Yellowfin tuna are found in the open waters of all tropical and temperate oceans; in the waters around Turkey, they mainly exit into the Aegean Sea. The total estimated yellowfin tuna stock biomass has decreased dramatically in recent years (FAO, 2003). From our interviews, we learned that yellowfin tuna is an important part of the Turkish diet; the health-food and consumption volumes of tuna in Turkey are only slightly lower than those in EU countries. The quality factors that importers of Turkish fresh tuna consider include color, taste, flavor, and texture; unlike the Turkish domestic market, however, they consider fat content to be less important.

Yellowfin sells at higher prices than does Skipjack tuna; for EU exporters to Turkey, yellowfin is an opportunity to further penetrate existing ambient markets. We learned in the course of our interviews that when Turkish customer groups are compared, it is clear that, in terms of overall tuna consumption, the EU and US markets share similar characteristics but tend to differ from the Japanese market. When yellowfin tuna is imported into Turkey, it typically takes the forms of ambient, frozen, or fresh/chilled tuna. Compared to 2010 figures, the total volume of yellowfin tuna imported into Turkey in 2011 increased 460%, with the value of that tuna increasing 262%, to USD2.28 million (Turkstat, 2012).

CONCLUSION

Japan's place in Turkey's foreign trade is quite insignificant, in terms of both exports and imports; Turkey's place in Japan's foreign trade is even less so. Upon examining the fisheries relationship between the two countries, it is opposite Japan does favor of fish (bluefin tuna and sea snails) importing from Turkey. We asked Turkish fisheries business people, "How do you initiate business with Japanese companies and improve their confidence in you?" They said that they met Japanese companies at business fairs and through the internet. We discussed potential fish species in a scientific manner, to foster a more positive attitude toward them and to mediate any lack of knowledge with respect to the fisheries sector between the two countries. In the course of our interviews, it became clear that economic relations between the two countries are not far from reflecting the forecasted potential.

At the moment, 25% of Europe's demand for sea bass and sea bream is met by the Turkish aquatic products sector; approximately 33% of the rainbow trout and almost 100% of the Striped Venus clams caught in Turkey are

exported to the EU (Turkstat, 2012). During our interview, we learned that Turkish fisheries products are distributed and produced while compliance with international health and quality standards; this has especially been the case since 2001. These high standards represent great business potential for Turkish companies, for if an exporter wishes to successfully export fish to Japan, he or she must be knowledgeable about product quality and handling operations. Indeed, success in the Japanese market rests largely in the stringency of a company's quality-control policies. There is no doubt that Turkey's primary focus in adhering to these standards is to access new markets in Japan.

The packing of most fresh chilled fish for export from Turkey is done at a shore-based pack-house or processing facility. These establishments are set up to handle fresh fish and have appropriate health and sanitation certifications vis-à-vis local requirements and those of the export markets for which the fish are destined (e.g., Japanese consumers). In the Japanese market, trout are mostly marketed whole; sales of frozen salmon trout in Japan are rising sharply after more than a decade of market development. Sea bream and bass fillet sales are also increasing in the Japanese fish market; nutritional, economic, and environmental value can be increased by expanding the throughput of raw material in fish-filleting operations. Turkish fisheries organizations are looking to secure USD2.5 billion in annual exports by the year 2023; for this very reason, Japan is a very important marketing target for them.

Japan is one of the most important countries for tuna and sardine importers, as tuna and sardine fisheries are critical to Japan's fishery industry, in terms of export and import value. Reflecting Turkey's recent boom in sales of gourmet fish, the consumption of tuna and sardine per average household in fresh, frozen, or canned form has been increasing in recent years. The EU abolished customs duties on Turkish fisheries products, as of 1996; however, if Turkey imports any fish products from Japan, customs duties are levied in the form of a 15–30% of tax. This tax naturally leads to a loss of actual or potential customers. Japan and Turkey agreed in 2001 to look into the possibility of negotiating a bilateral free-trade agreement. The free-trade agreements between Japan and Turkey may also be advantageous to Japan in selling fisheries products to Turkey.

All of our Turkish survey participants were quoted as saying that Japanese companies pay attention these comments before export fisheries products to Turkey. Indeed, with respect to the delivery of value that has been hitherto identified as lacking in the market, research into the new-product creation process is central to satisfying consumer expectations and a prerequisite to the long-term sustainability of the sector. The best way for Japanese exporters to receive the highest returns from exporting tuna to Turkey is to send fish in fresh, frozen, or canned form that has been properly graded and packed, and to cater to buyers' demands. Relationships between sellers and buyers can be optimized by undertaking publicly funded research among academic, industrial, and governmental entities.

Turkey and Japan are both surrounded by water and possess rich inland water resources; they also have high catching and production capacities in those inland areas. By correctly using resources and placing of even more emphasis on marketing activities abroad, the potential for Turkish fishery exports can surely rise. Turkish fisheries organizations can promote their goods in new markets by participating each year in international fairs held in countries known to be marketing targets; they can also expand their volume of business to existing markets. As producers remain steadfast in increasing the volumes of good-quality fish sent from Turkey to the rest of the world, importers too will continue to researching new business opportunities and possibilities.

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