



A Value Chain Analysis of the Sinaloa, Mexico Shrimp Fishery

Report Prepared for Environmental Defense Fund



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SPECIAL NOTE: During production of this report, the U.S. State Department announced a trade embargo beginning April 20, 2010 on wild-caught Mexican shrimp caught using industrial fishing boats. The decree was issued because of concerns over Mexican enforcement of turtle excluder devices, as required by the Mexican and U.S. governments. Due to the timing of this report, the implications of such a trade embargo are not incorporated into the analysis although such an event will clearly have a significant impact on the U.S. market opportunities for wild-caught Mexican shrimp.

This research was prepared on behalf of Environmental Defense Fund (EDF) de Mexico, A.C. EDF is dedicated to protecting the environmental rights of all people, including future generations. Among these rights are clean air, clean water, healthy food and flourishing ecosystems. EDF is guided by scientific evaluation of environmental problems, and its staff work to create solutions that win lasting economic and social support because they are nonpartisan, cost-effective and fair.

EDF has more than two decades of experience in regional U.S. fisheries, promoting sensible market-based management. EDF helped build the critical support required for the approval of the Gulf of Mexico red snapper fishery individual fishing quota and was essential to the technical design process. In the past several years, EDF has worked in Mexico and Belize to introduce new fishery management tools, including catch share systems for the Gulf of California. EDF has earned a reputation among policy makers, regulators and fishermen as a center for expertise in Incentive Based Fisheries Management (IBFM) and as a trusted and fair stakeholder seeking to improve fishery management to benefit both fishermen and fish stocks, recognizing that the ecological and economic health go hand in hand.
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The Duke University Center on Globalization, Governance & Competitiveness (CGGC) and EDF have collaborated to apply value chain analysis to several environmental issues. Value chain analysis highlights the linkages between firms and workers in an industry and offers both local and global levels of analysis. (<http://cggc.duke.edu/partnerships/edf.php>)

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Glossary of Terms

A. C.	<i>Asociación Civil</i> (Non-profit organization)
CANAINPESCA	<i>Camara Nacional de la Industria Pesquera</i> (National Chamber of the Fishing Industry)
CONAPESCA	<i>Comisión Nacional de Acuacultura y Pesca</i> (National Commission on Aquaculture and Fisheries)
EDF	Environmental Defense Fund
FAO	Food and Agriculture Organization of the United Nations
FIRA	<i>Fideicomisos Instituidos en Relación con la Agricultura</i> (Trust Funds for Rural Agriculture Development)
FSC	<i>Federación de Sociedades Cooperativas</i> (Federation of Cooperatives)
GOC	Gulf of California (also known as Sea of Cortez)
HACCP	Hazard Analysis Critical Control Points
IBFM	Incentive Based Fisheries Management
INAPESCA	<i>Instituto Nacional de Pesca</i> (National Institute of Fishing and Aquaculture)
IQF	Individually quick frozen
MBAq	Monterey Bay Aquarium
MCC	<i>Manejo Compartido por Cuotas</i> (Catch shares quota management)
MSC	Marine Stewardship Council
MXP	Mexican peso
NGO	Nongovernmental organizations
NOS	<i>Noroeste Sustentable</i>
OECD	Organization for Economic Cooperation and Development
OMP	<i>Operadora Marítima del Pacífico</i> (Operators of Marine Pacific)
PRONAR	<i>Programa Nacional de Acuacultura Rural</i> (National Program for Rural Aquaculture)
S. A.	<i>Sociedad Anónima</i> (Public Limited Company)
S.A. de C.V.	<i>Sociedad Anónima de Capital Variable</i> (Variable Capital Company)
S.C. de R.L.	<i>Sociedad Cooperativa de Responsabilidad Limitada</i> (Cooperative Limited by Shares)
S.C.P.P.	<i>Sociedad Cooperativa de Producción Pesquera</i> (Cooperative of Fishery Production)
SAGARPA	<i>Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación</i> (Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food)
SSA	<i>Secretaría de Salubridad y Asistencia</i> (Ministry of Health Assistance)
TAC	Total allowable catch
TED	Turtle excluder devices
UNFI	United Natural Foods, Inc.
USDA	The United States Department of Agriculture

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I. Executive Summary

Shrimp is Mexico's most important seafood export, accounting for 44% of the value of the entire fishing sector. Mexico was the 6th largest shrimp producer in 2006 and about 20% of their total production is exported to the U.S. market. The state of Sinaloa produces the most Mexican wild-caught shrimp and almost all first-grade wild-caught Sinaloa shrimp is exported to the United States.

However, the Sinaloa shrimp fishery faces a number of environmental challenges including poor stock status for at least one shrimp species, negative ecosystem impacts from some types of fishing gear, and other accumulative impacts from diverse productive inland activities. Appropriate sustainable fishery management, such as limiting catches across the industry, reducing the number of illegal fishermen, reducing bycatch rates, and improving on-board and on-shore handling and processing are needed to improve the viability of the resource and reduce the environmental degradation of the ocean habitat. Developing sustainable fishing practices also has the potential to increase the value of wild-caught Sinaloa shrimp in the U.S. market, when it is well labeled and verified as a sustainable seafood product.

In Sinaloa, industrial fishermen produce 60% of exported Sinaloa wild-caught shrimp, and artisanal fishermen produce 40%. Five industrial producers dominate the market, providing them with leverage within the industry. *Promarmex*, the largest single producer coalition, contributes up to 70% of Sinaloa's total wild-caught shrimp production. It is a vertically integrated actor in the value chain, which does its own processing, exporting, branding, and marketing. Conversely, between 4,000 and 5,000 artisanal fishermen organized into 140 local cooperatives aggregate shrimp for sale to the domestic and export markets. Each artisanal cooperative has a very small share of the market. Most of the nets used by artisanal fishermen have a much lower ecological impact than the trawl nets used by the industrial fishermen; however, a lack of refrigeration capacity on their boats and access to cold storage on shore limits their access to the export market. Further, artisanal fishermen are mostly restricted to bays and lagoons, in which they can only catch smaller shrimp, which are concurrently of lesser value in the market.

All artisanal producers and some industrial producers pay third-party processors to process and pack shrimp before it is sold to the export buyer. Current processing standards make it difficult for U.S. importers to trace the products' origin and some processors lack the technology and quality standards to meet the demands of large U.S. retailers.

Two U.S. importers, Ocean Garden Products (OGP) and Meridian Products, purchase approximately 90% of wild-caught Sinaloa shrimp exports. Another eight companies are exporting or importing wild-caught shrimp to the United States to a lesser degree. Importers and exporters dictate the quality protocols and the packaging and labeling of Mexican shrimp

products. However, these importers' labels currently do not include product source, environmental impacts, or sustainability criteria.

Specialty seafood distributors are selling the majority of Sinaloa wild-caught shrimp products in the United States. Ten regional specialty seafood distributors were identified as selling Sinaloa wild-caught shrimp in the U.S. market and they are primarily selling to high-end restaurants or full-line distributors that can pay the existing premium for these high-quality, large shrimp. These buyers do not recommend secondary processing of Sinaloa wild-caught shrimp because it would reduce the value of these high-quality shrimp.

In the retailer and food service markets, the vast majority of shrimp purchased is farm-raised due to its lower prices and the high level of quality control buyers can have over the product. Sinaloa wild-caught shrimp processing and packaging could be upgraded to meet the demands and interests of large U.S. retailers. However, this step must be taken cautiously and with input from large retail buyers. Branding sustainable shrimp products is another opportunity to appeal to U.S. seafood distributors, retailers, and food service companies but their willingness to pay more for such a product varies.

Only two small, cold-water sustainable shrimp products are available in the U.S. market. A product with Marine Stewardship Council certification or one included on the Monterey Bay Aquarium list of recommended seafood products would likely be in high demand if it could meet the quality and packing criteria of retail buyers. Finding new market opportunities such as these may incentivize fishermen to participate in new sustainability efforts.

This report identified a total of six recommendations for the client, Environmental Defense Fund and its partners.

- Pursue Marine Stewardship Council-certified shrimp products that would appeal to U.S. sustainable seafood markets;
- Develop an “environmentally friendly” shrimp product in collaboration with interested U.S. buyers;
- Improve existing shrimp products by developing more stringent quality, monitoring, and traceability guidelines for Sinaloa shrimp producers;
- Conduct additional research into domestic market opportunities and developing a national strategy for marketing wild-caught shrimp in the Mexican market;
- Continue to support and encourage government sustainability efforts; and
- Assist producers and processors in finding new value added opportunities for increasing sales to domestic and international markets.

II. Introduction

The Center on Globalization, Governance & Competitiveness at Duke University was commissioned by Environmental Defense Fund (EDF) to conduct a value chain analysis of wild-caught Gulf of California shrimp landed in the Mexican state of Sinaloa. This report is one step of a larger project EDF has undertaken in partnership with World Wildlife Fund, *La Comisión Nacional de Pesca* (CONAPESCA), *El Instituto Nacional de Pesca* (INAPESCA), and *Noroeste Sustentable* (NOS). The partnership's project will span a minimum of two years and will enhance the sustainability of fisheries in the Gulf of California (also known as the Sea of Cortez) by implementing catch shares. It will focus initially on Gulf of California wild-caught shrimp and over the next several years, in addition to working with other Gulf of California fisheries, the project will develop ways to improve the shrimp product's value in domestic and international markets.

Value chain analysis will be used in this report in three ways: a) to document the path by which wild-caught Sinaloa shrimp are landed and travel to the U.S. consumer's plate; b) to determine value-increasing opportunities for wild-caught Sinaloa shrimp; and c) to identify leverage points within the export value chain that have potential to increase the shrimp product's value. EDF intends to use the information from this report to guide market-based activities within the larger partnership project and to support sustainable fishing practices and fishery management in the Gulf of California.

Sustainable fishing practices enhance the long-term viability of valuable ocean resources, conserve important marine habitats, reduce unintentional impacts of fishing practices, and safeguard jobs. EDF supports sustainable fishery management and is assisting with implementation of catch shares – a system that dedicates a percentage of a total fisheries' catch to individual fishermen, fleets, or cooperatives – in a number of fisheries worldwide (EDF, 2007). In Mexico, shrimp is the most important seafood export (Gillett, 2008). In 2007, total shrimp production was valued at US\$675 million, or 44% of the value of the entire fishing sector (CONAPESCA, 2007). However, the Food and Agriculture Organization of the United Nations (FAO) indicates shrimp fishing has reached capacity and the resource faces depletion due to overfishing (FAO, 2003). In the 2009-2010 shrimp fishing season, many aspects of a catch share system are being implemented in the artisanal sector in the state of Sinaloa. To encourage the success of these changes, new market strategies for increasing the value of shrimp from the fishery may be important. This report will present such opportunities and highlight players within the value chain who may have leverage to increase the value of wild-caught Sinaloa shrimp.

III. Shrimp Industry Overview

3.1 Global Market

Internationally, shrimp, both farmed and wild-caught, is the highest value seafood export, accounting for 16% of worldwide seafood exports (Gillett, 2008). In 2006, Mexico was the 6th largest shrimp producer in the world (FAO, 2008). Over the last two decades worldwide production of shrimp has increased exponentially, growing from 2.6 million tons to 6.7 million tons between 1990 and 2007 (Gillett, 2008). Approximately 55% of this production is consumed domestically in producer markets, and 45% is sold in the world market at a value of U.S \$12.8 billion dollars. Asian countries such as China, India, and Indonesia have the largest growth in shrimp output, mainly by expanding aquaculture production. Between 1990 and 2007, aquaculture, or farmed shrimp, production increased almost fivefold from 679,976 tons to 3,275,726 tons (FAO, 2008).

Table 1. Global Production and Trade of Shrimp Products, 2006

Country	Production (tons)	Proportion Imported	Proportion Exported	Proportion of World Production	Proportion of World Imports	Proportion of World Exports
China	2,333,613	11.6%	2.5%	36.5%	11.9%	2.4%
Thailand	572,590	3.6%	60.5%	9.0%	0.9%	14.6%
Indonesia	567,746	0.2%	28.5%	8.9%	0.0%	6.8%
India	514,787	0.1%	36.0%	8.1%	0.0%	7.8%
Viet Nam	457,600	3.4%	8.1%	7.2%	0.7%	1.5%
Mexico	183,770	8.4%	20.1%	2.9%	0.7%	1.5%
Canada	181,429	29.3%	59.6%	2.8%	2.3%	4.5%
Ecuador	156,218	0.0%	76.2%	2.4%	0.0%	5.0%
U.S.A.	148,203	400.6%	6.3%	2.3%	26.1%	0.4%
Brazil	103,462	0.0%	32.9%	1.6%	0%	1.4%

Source: FAO Global Production Statistics (FAO, 2008)

Seafood industries in many countries have embraced aquaculture because of the ability to control precise size and quantities of output to meet anticipated demand, and the reliability of yields not as easily affected by seasonal changes (Gillett, 2008). Farm-raised products are also less likely to have broken shells or other damage from fishing nets, which lowers the product's grade. It is

estimated that with the expansion of aquaculture, global production of shrimp will increase to 7.86 billion tons by 2015 (Téllez Castañeda, 2009). In addition to Asian countries, several Latin American countries including Mexico are also making large investments in aquaculture. The vast growth in shrimp aquaculture has pushed the prices of shrimp downward and increased competition for wild-caught shrimp. However, many wild-caught shrimp products retain their own market niche due to demand for their relatively larger size, high quality, and taste.

The three principle shrimp importers in the global market are the European Union, the United States, and Japan. Together they imported approximately 1.3 million tons of shrimp in 2008. In 2007, the European Union led the shrimp import market with approximately 616,000 tons purchased, followed by the United States with 558,000 tons and Japan with 207,000 tons. (Téllez Castañeda, 2009)

3.2 Mexican Shrimp Industry

Shrimp is the highest value Mexican seafood product. In 2007, total shrimp production was valued at US\$675 million, or 44% of the value of the entire fishing sector (CONAPESCA, 2007). The shrimp industry in Mexico has grown significantly in the last half century, with production nearly tripling from around 66,000 tons in 1960 to over 183,000 tons in 2007 (FAO, 2008). Much of this increase is a result of the introduction and growth of shrimp aquaculture. Wild-caught shrimp production increased steadily until the 1980s when harvests began to taper off (CONAPESCA, 2006). From 1990 to 2008, wild-caught shrimp harvests grew less than 1% annually, while aquaculture production grew at an average rate of 21%. In 2008, aquaculture

Shrimp is the highest value Mexican seafood product, representing 44% of the entire fishing sector in 2007

accounted for 68% (133,959 tons) of total national shrimp production. Farm-raised shrimp production is expected to continue growing at a rate of 5.0% annually over the next six years, whereas wild-caught shrimp production is predicted to remain relatively stable (Téllez Castañeda, 2009).

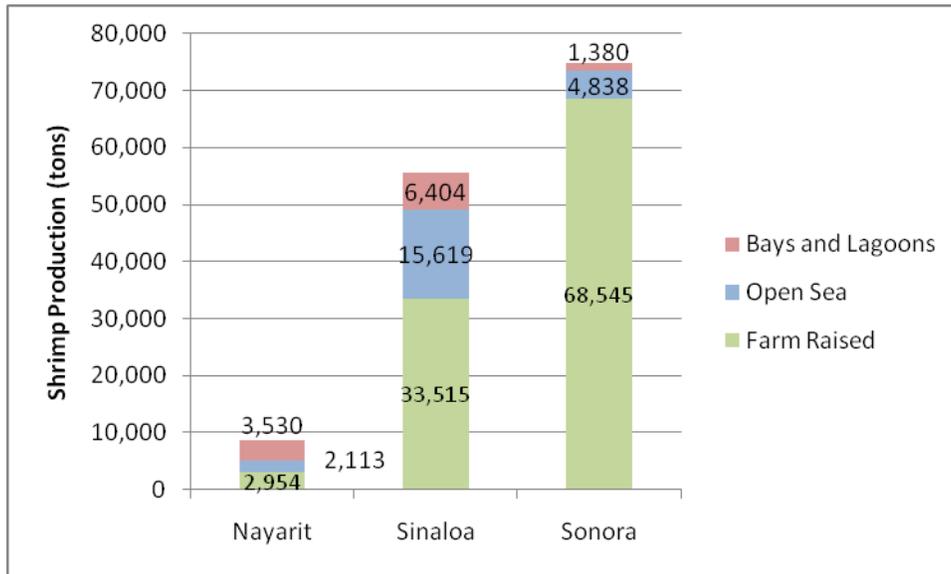
Trends and Geography

Shrimp production in Mexico takes place in two distinct regions: the Gulf of California and Pacific region, and the Gulf of Mexico and Caribbean region. The Gulf of California and Pacific region represent 89% of total national production and the Gulf of Mexico and Caribbean region supplies the remainder. Almost all (98%) of shrimp production in the Pacific region comes from the five states that surround the Gulf of California: Baja California, Baja California Sur, Nayarit, Sinaloa, and Sonora. Slightly more than 90% of shrimp production in this region comes from the states of Sinaloa and Sonora (CONAPESCA, 2006).

Mexico's development of shrimp aquaculture is primarily located in the states of Sonora and Sinaloa with the greatest production in Sonora (see Figure 1). Sinaloa has the largest production

of wild-caught shrimp in the Gulf of California. Sixty-nine percent of GOC shrimp caught in the open sea and 50% of GOC shrimp caught in the lagoons and bays comes from Sinaloa (CONAPESCA, 2007). This report will focus on this portion of the market, wild-caught shrimp from Sinaloa.

Figure 1. Volume of Shrimp Production by State, 2007 (in tons)



Source: (CONAPESCA, 2007)

Sinaloa Shrimp Fishery Characteristics

There are three wild shrimp species of commercial interest in Sinaloa: blue shrimp (*Litopenaeus stylirostris*), white shrimp (*Litopenaeus vannamei*), and brown shrimp (*Farfantepenaeus californiensis*) (FAO, 2008). Blue shrimp and white shrimp garner the highest values in the marketplace; thus, fishermen prioritize fishing those species each season. Blue shrimp also are, on average, the highest volume species landed in Sinaloa (*Instituto Nacional de Pesca & SAGARPA*, 2009).



White shrimp (*Litopenaeus vannamei*).

Source: (Muñoz-Nuñez, 2009)

Fishermen from Sinaloa catch shrimp in two principal zones: the open sea, or deep waters of the Gulf of California and the Pacific Ocean, as well as and the lagoons, bays, and estuaries of Sinaloa. Open-sea fishermen are primarily business-oriented companies using industrial trawlers, whereas artisanal fishermen have small boats and fish the lagoons, bays, and estuaries. There are approximately 1,000 open-sea trawlers, referred to in this report as industrial fleets, in the Gulf of California (Licón-González, 2010). These are larger boats approximately 18-25 meters in length that operate at depths ranging from 9 to 64 meters (Gillett, 2008). The boats are usually powered with

240-624 horsepower engines and are equipped with two large industrial trawl nets with a headline between 23 and 36 meters (Gillett, 2008). On average, industrial boats make between two and six fishing trips lasting approximately 15 to 28 days each and catch between 7.5 and 15 tons of shrimp each season (Gonzalez, 2009; Licón-González, 2009; Téllez Castañeda, 2009). In general, the companies staff the boats with six employees, including a captain, mechanic, mechanic’s assistant, cook, and two deckhands (Téllez Castañeda, 2009). The shrimp is sorted, processed and frozen on board the vessel.

The average catch is approximately three tons per trip, but the first trip may bring in up to half the season’s catch (see Table 2). There are high concentrations of shrimp in the sea at the opening of the season, so industrial trawlers rush to sea and fish longer and more intensively in order to take advantage of the high shrimp stocks and to beat out the competition. Total annual expenses for an industrial vessel are estimated to be US\$149,284. The three most significant of these costs are diesel (US\$68,930), processing (US\$28,477), and labor (US\$20,846) (Téllez Castañeda, 2009).

Table 2. Production Schedule of Sinaloa Industrial Fleet Vessels*

% Capture Trip 1	50%
% Capture Trip 2	20%
% Capture Trip 3	12%
% Capture Trip 4	5%
% Capture Trip 5	8%
% Capture Trip 6	5%

*Based on a 72-foot boat with a 550 horsepower engine and an average total season capture of 15 tons.
Source: (Téllez Castañeda, 2009)

According to CONAPESCA, there are 5,988 registered pangas in Sinaloa and 10,824 officially registered fishermen with photo identifications (Licón-González, 2009). Artisanal fishing boats, called *pangas*, measure between 6 and 9 meters in length and are powered by 50-100 hp outboard motors. Artisanal fishermen use a variety of nets, including small trawl nets, suripera nets, cast nets, and gill nets (discussed more in section 3.3). Artisanal producers operate in waters averaging 5-15 meters deep that are closer to shore, such as Sinaloa’s bays, lagoons, and estuaries (Gillett, 2008). Artisanal crews usually consist of two to three persons whose fishing trips are made daily and confined to daylight hours (Gonzalez, 2009; Rodriguez, 2009). The crews bring in an average of 40-100 kilograms of shrimp a day (Serna, 2009). For the individual shrimp fisherman, the breakeven point is approximately 15 kg per day, and their average annual catch is between 700 and 1,500 kg, depending on the quality of the season (Gonzalez, 2009). Daily fishing costs for artisanal boats are approximately US\$66.78 and the major expenses include fuel (69%), food (21%), and oil (10%) (Gillett, 2008; Gonzalez, 2009; Téllez Castañeda,

2009). The outboard engines are not fuel efficient, thus some cost savings could be recovered by putting in more efficient engines.

3.3 Environmental Problems in the Gulf of California

The Gulf of California is widely recognized as an especially productive and diverse marine ecosystem with a number of unique species. It has the highest rates of endemic species in the Western hemisphere (The David and Lucile Packard Foundation, 2007). Therefore, it is important to acknowledge any environmental or economic impacts shrimp fisheries may have in the region. The most consequential issues are related to physical disturbances of the ocean floor and high bycatch rates as a result of trawl nets. The ratio of bycatch to shrimp in the Gulf of California region is 10:1. The bycatch includes up to 200 different species of marine life, 105 of which are fish. The total bycatch for a season is estimated at about 90% of the total shrimp catch volume (Caudillo, 2009). The extent to which the marine environment is altered as a result of these figures is not known. However, some monitored impacts include a massive shift of biodiversity in deep sea life, resulting in a loss of larger, longer-living species in exchange for smaller, shorter-lived species (Pauly & Christensen, 1995).



Shrimp bycatch often includes other profitable target species.
Source: (Fruitsmaak, 2008)

This dynamic of shrimp trawling raises economic concerns as well. The most common of these is the fact that a discarded bycatch by the shrimp industry is a potential target catch for another industry (Clucas, 1997). Some studies estimate the value of discarded bycatch equal to twice the shrimp catch (García Caudillo & Gómez Palafóx, 2005; The David and Lucile Packard Foundation, 2007). Furthermore, the shrimp fishery appears to be fished to capacity, illustrated by low annual growth rates (0.5%) (Gillett, 2008; Téllez Castañeda, 2009). Industrial shrimp fishing vessels use two trawl nets with a headline of 23-36 meters each (Gillett, 2008). Nearly 100% of the boats use turtle exclusion devices (TEDs) due to a U.S. government regulation that requires industrial fleets to use TEDs in order to export shrimp to the U.S. market. Fish exclusion devices (FEDs), also called bycatch reduction devices (BRDs), have the potential to reduce bycatch between 30% and 60%; however the trawl nets are still considered to have a high impact on the ecosystem by dragging along the ocean floor (Watling, 1998).

Although boats in the artisanal fleets may be equipped with a variety of different nets, the most commonly used nets in Sinaloa are cast nets, gill nets (*chinchorro de línea*), suripera nets, and small trawl nets (*chango*) (Amezcuca, 2006; Gonzalez, 2009). Cast nets offer the most sustainable method as they have a very low bycatch and a very low impact on the ecosystem and habitat. *Chango* nets are bottom trawling nets. They are most likely to impact the ocean floor and have

the highest bycatch ratio. Suripera nets are modified cast nets that drag along the ocean floor, but have a significantly lower bycatch ratio than the *chango* nets (Amezcuca, 2006; Gonzalez, 2009).

3.4 Role of the Mexican Government

The Mexican government recognizes the economic value of the shrimp industry both in terms of job opportunities and export value. Shrimp is the most valuable fishing commodity in production and export value, and is behind only tuna and sardines in terms of its domestic monetary value (CONAPESCA, 2007). In fact, in the states of Sinaloa and Sonora, the fishing industry provides 4.0% and 2.3% of local GDP, respectively (FAO, 2003). As a result, the Mexican government funds various agencies that offer financial and technical support to the fishing industry.

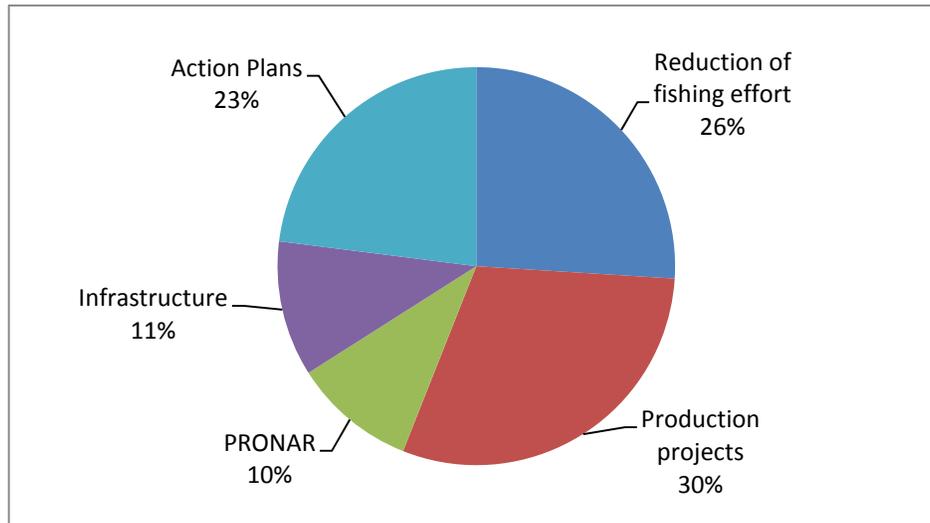
Perhaps the most influential of these is the National Commission of Aquaculture and Fisheries (CONAPESCA). Much of the financial support provided by CONAPESCA comes under the umbrella of the *Programa de Alianza Contigo*, a series of programs focused on increasing the productivity of Mexican fisheries and ensuring their sustainability. The program's objective is to "promote and increase the integrated development of the fisheries and aquaculture sector through the rational and sustainable use of fisheries and aquaculture resources in order to increase the level of well-being of producers, their families and the fisheries and aquaculture communities" (OECD, 2006). Although the programs are funded mostly by the federal government, they are allocated on the state level. They serve to improve infrastructure, transfer technology, prevent and combat aquatic diseases, and promote integrated development among local communities. In 2005, *Alianza Contigo* provided a total of 836 million pesos (US\$78 million) to the fisheries and aquaculture sector. These funds were divided among several programs including the development of production projects and action plans, infrastructure, reduction of fishing effort, and aquaculture support through the *Programa Nacional de Acuacultura Rural* (National Program for Rural Aquaculture, PRONAR) (OECD, 2006) (see Figure 2).

The Secretary of Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA) initiated The Marine Diesel Subsidy Program, part of *Alianza Contigo*, in 2000 as a means to improve the fishing sector's social and economic profitability. CONAPESCA took over the program in 2002, and from 2002 to the end of 2004 the program subsidized more than 1 billion liters of diesel for a total of 1,78 billion pesos (approximately US\$160 million). During this period, more than 3,200 producers benefitted from the program. As of 2006, the subsidy covered US\$.09 of the US\$.45 cost of a liter of diesel, or approximately 20% (Gillett 2008).

The diesel subsidy of MXP\$2 per liter significantly reduces costs. Without the subsidy, each industrial vessel would incur an additional US\$24,929 in costs. Considering that the net profits for each vessel are only US\$12,916, the removal of the subsidy would cause the industry to incur significant economic losses on average of around US\$12,000 per vessel. This figure is an average, so the least competitive boats would go out of business. A reduced number of industrial

boats would likely increase catch yields per vessel, which would ultimately lead to higher profits for the remaining boats.

Figure 2. Distribution of Government Support for Aquaculture and Fisheries Under *Alianza Contigo*, 2005



Source: (OECD 2006)

Another government-run program established to support the fishing industry is the *Fideicomisos Instituidos en Relación con la Agricultura-Fondo para la Pesca* (FIRA-FOPESCA). FIRA-FOPESCA is a second tier development bank that also provides training, technical support, technology transfer, and credit to the fishing sector (FIRA, 2010). In 2003, total government financial transfers provided 1,575 billion pesos (US\$146 million) in financing. Between 1994 and 2003, there was a noticeable shift in fisheries funding away from the processing and large-scale fleet sectors and toward the aquaculture and small-scale fleet sectors. The artisanal fleets and aquaculture producers have been the recipients of the bulk of this extra funding, and it has come largely at the expense of the processors. (OECD, 2006)

While the aforementioned financial supports are focused on producers and processors in the shrimp industry, environmental sustainability also is a key goal of government support for the industry. One project implemented to ensure the long-term viability of the Gulf of California as a resource is the Shrimp Vessel Decommissioning Scheme, conducted under *Alianza Contigo*. The Shrimp Vessel Decommissioning Scheme began in 2005 in response to an oversaturation of shrimp fishing vessels in the Pacific and Gulf of California regions. The excessive number of industrial fishing vessels and their crews resulted in a depletion of natural shrimp stocks and a persistent decline in prices and profitability. Although no official number of decommissioned vessels was ever established, the program seeks to reduce the number of industrial boats by approximately 30% between 2005 and 2010 (Licón-González, 2009). To do so, it offers

approximately 1,3 million pesos (US\$100,000) for voluntary retirement of vessels that can demonstrate an average catch of at least 3 tons per year over the last three years. Since 2005, 211 vessels have been retired in the Gulf of California, 84 of which were retired from Sinaloa (Licón-González, 2010). This represents between 15% and 20% of the country's total industrial shrimp fishing fleet. The program is currently being reviewed, and based upon funding, may be continued in the shrimp fisheries, as well as in other fisheries.

Efforts to improve the fishery's sustainability are hampered by disorganization within the industry, which makes it hard to manage and monitor. One challenge the fishery faces is tracking the large number of artisanal boats. Therefore, in 2009 CONAPESCA began implementing a project to identify and organize those boats, the fishermen and their operating ports, referred to as the *ordenamiento*. The goals of the *ordenamiento* are to improve fishery management by assigning permits to restrict access, regionalizing fishing efforts, identifying legal fishermen,



Microchips matching pangas' serial numbers are installed to identify those with shrimp fishing licenses.

Source: (Muñoz-Nuñez, 2009)

cooperatives, and landing sites, and improving social and economic conditions for fishermen. As part of the *ordenamiento*, CONAPESCA identified and verified the number of shrimp fishing licenses handed out through the existing system of cooperatives and the fishermen registered to fish under these licenses. Boats registered by the *ordenamiento* have a non-replicable microchip which helps to identify each pangas' cooperative, permit, and landing site. The microchip is fundamental to improving capture registration and establishing a relationship among the boats' production and the port and coastal system where they are allowed to operate. By the end of October 2009,

5,988 microchips were assigned to artisanal vessels in Sinaloa and 10,092 fishermen were identified as legal fishermen (Licón-González, 2009). This project will not completely eliminate fishing by nonregistered boats, but it was designed to fortify the legal channel for shrimp to reach market, and to make it easier for CONAPESCA to identify the *pangas*, know their port of origin, follow them, implement and enforce quotas, and maintain a monitoring system in which each fisherman can see the total catch of the cooperative.

The *ordenamiento* operating rules are not yet complete and these will be indispensable to increase consistency and interoperability among the various participants and stakeholders in the program. Aspects of the operating rules that would be valuable include: a) creation of an electronic public registry of fishermen, individuals, and organizations within the fishery; and b) a

definition of the quota shares' sustainability indicators with the appropriate quantitative and qualitative measurement mechanisms.

As part of the *ordenamiento*, CONAPESCA also instituted a catch shares system for the first time in 2009, known in Mexico as *Manejo Compartido por Cuotas* (MCC). The goal of the catch shares system was to determine a specific total allowable catch (TAC) for the fishery as a whole, and then assign to each cooperative a percentage of this TAC. This management system was put in place in an effort to develop a more responsible use of the resource. In future seasons, allocating shares per boat will ensure the fishermen a certain volume of fish over the course of the season. This is meant to incentivize them to fish more slowly, allowing the shrimp to mature and for fishermen to catch a higher quality, higher value product over a more extended period. In

CONAPESCA initiated a quota system for the first time in 2009 with the goal of developing a more responsible use of the fishery as a resource.

the past, many fishermen focused on catching as much as possible as quickly as possible, which can lead to overfishing the resource. CONAPESCA and its partners used stakeholder meetings to help convey to fishermen the value and benefits of a quota system to the resource. The idea was received positively and both sectors of the shrimp industry

initially planned to participate. However, in summer 2009 the industrial sector decided not to participate in the 2009-2010 season because it first wanted to see a real demonstration of artisanal fishermen's commitment to the model. Thus, the catch shares system was implemented this season only among artisanal fishermen. Using an actual total allowable catch determined by INAPESCA, CONAPESCA designated a percentage of the allowable catch to each artisanal cooperative. Each cooperative was given responsibility to share quotas among registered boats within the group.

3.5 Mexican Shrimp in the Domestic and International Markets

Domestic Market

The size of the domestic shrimp market is large: 80% of total Mexican shrimp production is consumed domestically (Gillett, 2008). Mexican shrimp consumption grew at an average annual rate of 13% from 2002 to 2008, increasing from 0.74 kg to 1.47 kg per capita. To satiate this increase in demand, Mexico imported 12,816 tons of shrimp in 2008, up 30% from 2007 (Télez Castañeda, 2009). Growth in shrimp consumption is largely due to the increasing availability of inexpensive shrimp which are mostly smaller, farmed products (Robles, 2009).

There are three major commercialization channels in Mexico: a) large distribution centers (*centrales de abasto*) in Mexico City, Guadalajara, Monterrey, and most state capitals; b) self-service stores and supermarkets; and c) restaurants, hospitals, tourism, and catering services. A fourth segment is the informal sector through which shrimp are sold in street markets, street cart

vendors, and seafood shops (Jiménez, 2009). However, first grade wild-caught shrimp are primarily exported and lower grade wild-caught shrimp are sold in domestic market. Wild-caught shrimp is expensive in Mexico; thus, the domestic market opportunities are more limited. One barrier to expanding the domestic shrimp market is that *coyotes*, or intermediaries, play a very large role in bringing shrimp from the artisanal producers to the largest distribution markets (T. Carrillo, 2009). The *coyotes* buy shrimp directly from artisanal fishermen and sell them to processing plants or to domestic operators. The benefit of these intermediaries is that they inject valuable liquidity into the artisanal sector, which enables artisanal fishermen to stay in business (Jiménez, 2009). The disadvantage is that artisanal producers earn less selling to *coyotes* compared to the domestic market value. Direct access to the market could enable fishermen to earn greater profits. Currently there are no certification and regulation systems to improve the domestic seafood supply chain structure.

Some individuals interviewed for this study believe there is an opportunity to increase sales and profits of wild-caught shrimp sold domestically in Mexico. Tonatiuh Carrillo, the General Manager of the Mexican Shrimp Council, believes the U.S. market for shrimp is relatively well developed, thus the Mexican Shrimp Council is shifting its focus to increased demand in the domestic market (T. Carrillo, 2009). Multiple interviewees suggested the need for a wild-caught shrimp marketing campaign in Mexico. The Mexican Shrimp Council is preparing for a new promotional campaign to support Mexican shrimp products and it is considering a national campaign rather than an international one. Considerations for such a domestic campaign include teaching people to look for information about where a shrimp product comes from and marketing the health values of seafood (T. Carrillo, 2009). The state of Sinaloa's Economic Development Secretary (el Secretario de Desarrollo Económico del Gobierno de Sinaloa) and Sinaloa shrimp producers developed a shrimp marketing campaign named, "Sinaloa Mexican Wild Shrimp: The Finest." This campaign has expanded opportunities in the U.S. market and it has connected producers with final consumers, reducing the intermediaries often involved in domestic market sales.

International Market

Mexico exports about 20% of its shrimp production, approximately 96% of which is goes to the United States. The remaining 4% of exports are consumed mainly by China and Spain (Gillett, 2008). In 2008, Mexico exported 38,000 tons of shrimp to the United States, making it the United States' sixth largest shrimp import market by volume (USDA, 2009a). These exports were valued at more than US\$340 million, thus Mexico is the United States' fourth largest shrimp import market by value (USDA, 2009b).

According to interviews with industry experts, U.S. shrimp buyers perceive Mexican wild-caught shrimp to be one of the highest quality and highest value shrimp products available on the international market. The United States primarily imports beheaded or peeled frozen shrimp

from Mexico, and Mexican shrimp account for between 25% and 45% of U.S. import sales for the three largest shrimp sizes (less than 15, 15/20, and 21/25).¹ Furthermore, comparing the value of import sales and import volume for these sizes illustrates that Mexico's share of import sales in each case is greater than its share of volume. Thus, Mexican shrimp is commanding a higher price premium than shrimp of the same size from other countries (U.S. International Trade Commission, 2009).



Mexican wild caught shrimp exports are predominantly sold as five-pound ice blocks, like those pictured above.

Source: (Alibaba.com, 2010)

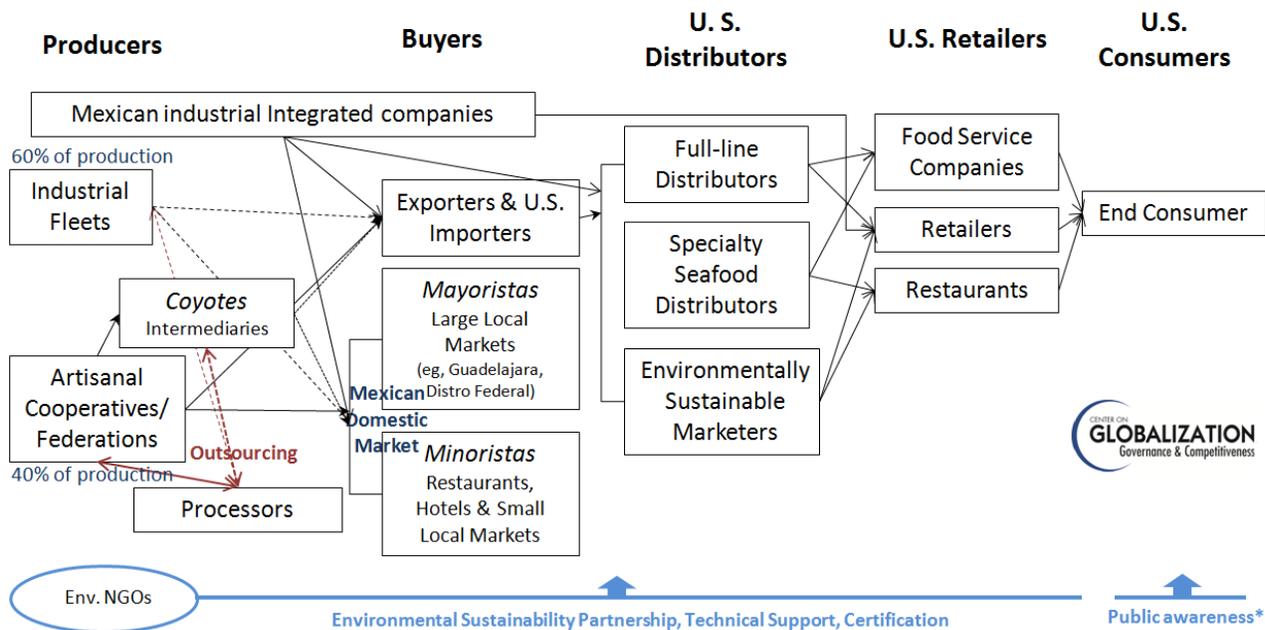
Currently U.S. buyers are mostly selling Sinaloa wild-caught shrimp in the U.S. market. Despite this, some U.S. buyers interviewed expressed interest in expanding sales to foreign markets like Japan and Europe (Medrano, 2009; Serna, 2009). Japanese consumers like wild-caught brown shrimp and European consumers are willing to pay for head-on processed shrimp that can be sold at a higher price than the shrimp ice blocks mainly sold in the United States (Medrano, 2009). Also buyers expect that new Chinese wealth will increase demand in that country for products like large Sinaloa wild-caught shrimp (Serna, 2009).

¹ Shrimp sizes are defined as the total number of shrimp in a pound. Therefore, the largest sizes are referred to as less than 15 shrimp per pound.

IV. Sinaloa Shrimp Industry and U.S. Export Value Chain

The main flow of shrimp produced in the Mexican state of Sinaloa and exported to the United States is depicted in Figure 3. The process begins with Sinaloa “Producers” who are divided into the categories of industrial fleets and artisanal cooperatives. The industrial and artisanal producers provide roughly 60% and 40%, respectively, of wild-caught shrimp to the market (Télez Castañeda, 2009). Some artisanal fishermen sell shrimp to *coyotes*, or intermediaries, who sell products to processing plants for the export market. Before being sold to buyers, shrimp are processed. Within the Sinaloa artisanal sector, processors tend to be third-party players who are paid to process shrimp but are not directly connected to the sale of shrimp. Many large industrial fleets have their own processing plants, whereas smaller fleets or independent boats outsource processing much like artisanal fishermen. All processing plants are responsible for meeting and maintaining the quality and safety standards mandated by the Mexican government and the U.S. Food and Drug Administration guidelines for imports.

Figure 3. Sinaloa Wild-Caught Shrimp Export Flow Process



* Public awareness includes producer, consumer, and governmental awareness.

Source: CGGC based on industry sources and interviews.

Producers then sell their processed shrimp to “Buyers” in the next segment of the value chain. This segment includes the *minoristas* (retailers), *mayoristas* (wholesalers), and exporters and importers. *Minoristas* buy relatively small quantities of shrimp for local retailers and restaurants along the coast. *Mayoristas* buy larger quantities of shrimp to be distributed and sold throughout

the domestic market. Exporters and importers² represent Mexican export and U.S. import companies that buy shrimp to be sold internationally.

Sinaloa shrimp is almost entirely sold through “Distributors,” a segment that includes full-line distributors, specialty seafood distributors, and environmentally sustainable marketers. Shrimp products are then sold to “Retailers” including restaurants, grocery and specialty foods stores, and food service and food management companies. The “Consumer” segment consists of the end consumers who purchase shrimp from those in the “Retailers” segment. Environmental “Nongovernmental Organizations” (NGOs) are included in Figure 3 because numerous NGOs are working with actors across the value chain to reduce the ecological impact of fishing practices, purchasing decisions, and consumption patterns. This report focuses on the export path Sinaloa shrimp take as it moves into the U.S. market and the actors involved along that flow process. A value chain illustrating the various players involved along the chain is illustrated in Figure 4 at the end of Section 4.

4.1 Producers

In 2008 wild shrimp production in Sinaloa totaled 17,184 tons, representing approximately 31% of total shrimp production in Sinaloa, over 27% of total national wild-caught shrimp production, and 8.7% of total national shrimp production. Of this amount, industrial fishermen contributed 11,263 tons and artisanal fishermen contributed 5,921 tons (Télez Castañeda, 2009). The target shrimp species in Sinaloa are *F.californiensis* (brown shrimp), *L.styliosiris* (blue shrimp) and *L.vannamei* (white shrimp) (Gillett, 2008). Blue shrimp and white shrimp are fished first because they have higher values in the marketplace. The majority of blue shrimp is caught in the Sinaloa bays by artisanal fishermen whereas brown shrimp is the primary species caught by industrial



Artisanal fishermen from Cerro Cabezón in their pangas at the Navachiste Bay, Sinaloa, Mexico.
Source: (Muñoz-Nuñez, 2009)

fishermen and accounts for 60% of their total catch (*Instituto Nacional de Pesca & SAGARPA*, 2009).

Most artisanal fishermen belong to a cooperative that aggregates shrimp from its members and is responsible for selling the catch (Romero, 2009). In Sinaloa between 4,000 and 6,000 pangas and over 10,000 fishermen are members of 140 local cooperatives (Guadarrama, 2009). The majority of those cooperatives are organized into 11 federations which are a part of the *Confederación Nacional* (see Table 4). The federations are

primarily responsible for promoting, planning, implementing, coordinating, and monitoring the

² In this report, exporters are defined as companies headquartered in Mexico that sell products to the U.S. market. Importers are defined as companies headquartered in the U.S. that buy shrimp from Mexican producers.

cooperatives' fishing activities, including ensuring they comply with general fishing laws (R. Leal, 2009). Some federations also offer financial assistance to cooperative members for equipment upgrades (R. Leal, 2009). The responsibilities of the cooperatives vis-à-vis the federations are case specific, and may change or overlap. Generally the cooperatives aggregate member catches and arrange consignment deals with the buyers. The cooperatives receive a down payment against delivery based on a price list published by the buyer and, when the product is finally sold, the cooperatives receive the balance from the buyer (Romero, 2009). Most cooperatives also are responsible for paying to have the shrimp processed and packed according to the buyer's specifications and for transporting the shrimp in refrigerated trucks from the reception points to the processing plants or federations (Gonzalez, 2009).

Artisanal fishermen store their shrimp catch either in chests of ice on the boat or simply in buckets. They bring the catch to one of several reception points where it is sorted, beheaded, washed, and weighed. From this point the shrimp is either sold immediately to large buyers with refrigerated trucks, or it is transported to a point where it is aggregated with shrimp from other cooperative fishermen and sent to be processed (Bojórquez, 2009). After the shrimp is processed and frozen, it is delivered to the buyer in the packaging with the specified brand label (Romero, 2009).

Table 4. Major Artisanal Shrimp Federations in Sinaloa

Federation Name	# of Cooperatives	Number of Boats (# workers)	Largest Cooperatives (# boats)	2008 Catch Volume	Shrimp Type Exported/ Imported	% Use of Cast, Gill, or Suripera Nets	% of Catch Exported
<i>FSC Municipio de Guasave</i>	23	1,058	<i>S.C.P.P. Pescadores Unidos del Caracol, S. de R.L. de C.V.</i> (109 boats)	600 tons	70% white, 30% blue	40% gill nets	90% of catch exported through OGP (400 tons), <i>Lobo Mar</i> (80 tons), and Meridian (70 tons)
<i>FSC Siglo XXI</i>	19	594	<i>S.C.P.P. Cerro de San Carlos S.C. de R.L.</i> (54 boats)	N/A	N/A	30% suripera nets	N/A
<i>FSC Centro de Sinaloa</i>	11	577 (1,200 members)	<i>S.C.P.P. David Porter</i> (95 boats)	N/A	60% blue, 30% brown, 10% white	100% suripera nets	30% exported to the U.S.
<i>FSC Laguna de Caimanero</i>	12	530 (1,130 members)	<i>S.C.P.P. Ribereños de Matadero</i> (110 boats)	17 tons	70% white, 30% blue	100% cast nets	N/A (selling products to <i>coyotes</i> for the domestic market)
<i>FSC Guerreros del Sur de Sinaloa</i>	10	450 (900 members)	<i>Francisco I. Madero</i> (70 boats)	450 tons	95% white, 5% blue	100% cast nets	N/A (selling products to <i>coyotes</i> for the domestic market)
<i>FSC Sur de Sinaloa</i>	14	450 (899 members)	<i>S.C.P.P. Pescadores del Nanchito</i> (60 boats)	189 tons	80% white, 20% blue & brown	100% cast nets	N/A (selling products to <i>coyotes</i> for the domestic market)

Table 4. Major Artisanal Shrimp Federations in Sinaloa

Federation Name	# of Cooperatives	Number of Boats (# workers)	Largest Cooperatives (# boats)	2008 Catch Volume	Shrimp Type Exported/ Imported	% Use of Cast, Gill, or Suripera Nets	% of Catch Exported
<i>FSC Camaroneros de Agua Verde</i>	7	370 (740 members)	<i>Sociedad Cooperativa de Producción Pesquera Álvaro Obregón</i> (115 boats)	300 tons	10% blue, 90% white	100% cast nets	50% catch sold to domestic market through <i>Congeladora del Parque S.A., Congeladora Internacional, S.A. and Congeladora Locza, S.A de C.V.</i>
<i>FSC Ensenada de Pabellón y Bahía de Altata</i>	13	N/A	<i>Barra de la Tonina</i> (100 boats)	N/A	90% blue, 5% white, 5% brown	100% suripera nets	20% of catch exported through OGP and Meridian
<i>FSC Dautillos</i>	2	N/A (600 members)	<i>S.C.P.P. Ribereña Dautillos</i> (137 boats)	N/A	99.5% blue & white, 0.5% brown	100% suripera nets	70% of catch exported through OGP
<i>FSC Norte de Sinaloa y Sur de Sonora</i> ^a	21	N/A	N/A	N/A	N/A	N/A	N/A
<i>S/N y S/F Playa Colorada</i> ^b	3	N/A	N/A	N/A	N/A	N/A	N/A

^a Interview request declined by Leonel Sanchez Cota, December 23.
Source: CGGC, based on company interviews and (EDF, 2009)

^b Contact information could not be found.

Large offshore shrimp fishing vessels, or industrial trawlers, are most often owned by private companies (Gillett, 2008). Many of these companies are members of one of the two principle Sinaloa industrial fishing associations: *Camara Nacional de la Industria Pesquera* (CANAINPESCA, National Chamber of the Fishing Industry) and *Unión de Armadores del Litoral del Océano Pacífico A.C.* (Shipowner's Union). These organizations represent their members in fisheries discussions at the national and international levels, inform them of fishing industry policy changes, and offer them business advice.

Many of the industrial trawlers aggregate their shrimp for sale to the export market through a coalition, such as *Unión de Armadores del Litoral del Océano Pacífico A.C.* The largest industrial producers and coalitions located in Sinaloa are listed in Table 5. They include *Promarmex*, *Grupo Maros*, *Operadora Marítima del Pacífico*, *Unión de Armadores del Litoral del Océano Pacífico, A. C.*, and *Pesquera 15 de Septiembre*. Some of these producers, such as *Promarmex*, *Grupo Maros*, *Operadora Marítima del Pacífico*, and *Pesquera 15 de Septiembre* are vertically integrated companies that own their own processing plants. Industrial fishermen sell their catch directly to importers who, in most cases, dictate the processing and packaging procedures. *Promarmex*, which accounts for approximately 70% of Sinaloa's total wild-caught shrimp production, is a very large vertically integrated company that develops its own unique company brands and acts as an exporter, selling directly to U.S. buyers.

The larger industrial boats have refrigeration capacity which enables them to keep the shrimp catch close to freezing and stay out on fishing expeditions for many days at a time. This capacity to freeze shrimp is extremely important to the quality of the shrimp and for potential sale to U.S. buyers. Some large U.S. buyers not currently purchasing from Sinaloa have strict written procedures for handling wild-caught catch and periodically recording its temperature prior to processing. These requirements would be impossible for most artisanal fishermen and would likely require industrial fleets to increase their manpower and/or streamline their processing and monitoring. Nonetheless, meeting these requirements could open up new sales opportunities for industrial fleets that are willing and able to make the necessary changes.

Industrial boats have more negative ecological impacts on the ocean floor and have higher bycatch than small *pangas*. However, many industrial fleets are responding to buyers' interests in sustainable fishing practices and are making improvements. For example, *Operadora Marítima del Pacífico* (OMP) upgraded its boats with ultra-light Spectra Ultra Cross Silver nets which consume less diesel and may have less drag on the ocean floor. OMP is in initial stages of exploring Marine Stewardship Council certification for its fleet. The company is willing to bear the costs of changing fishing practices to be more sustainable but it is concerned about the willingness of buyers to purchase their shrimp at a higher price once it has done so (Medrano, 2009).

Table 5. Major Industrial Shrimp Producers in Sinaloa

Industrial Producer/ Coalition Name	Number of Boats in Fleet	2008 Catch Volume, tons	Type of Shrimp Exported/ Imported	Most Common Wild- Caught Shrimp Product	Number of Plants Owned (Plant Name)	% of Catch Exported
<i>Promarmex</i>	300 boats	6,804 ^a	40% brown, 30% blue, 30% white	5 lbs. ice blocks ^b	4 (located in Mazatlan)	70% (OGP, Meridian, Empress, and Pacific Seafood)
<i>Grupo Maros</i>	40 boats, ~320 fishermen	800 annual average	60% white and blue blend, 40% brown	5 lbs. ice blocks	1 (<i>Congeladora Océanica</i>)	75% (OGP and Meridian only)
<i>Operadora Marítima del Pacífico</i>	28 boats, ~190 fishermen	363 - 544	65% blue, 20% brown, 15% white	5 lbs. ice blocks	1 (<i>Congeladora Union, S. A.</i>)	85% (Deep Sea buys 70%, Meridian buys 30%)
<i>Pesquera 15 de Septiembre</i>	25 boats, 350 fishermen	400 - 450	Blue, white, and brown	Ice blocks	1 (<i>Pesquera 15 de Septiembre</i>)	95% (Meridian, OGP, Pacific Wild Shrimp)
<i>Promarex</i> ^c	15 boats, 140 fishermen	N/A	Blue, white, and brown	N/A	N/A	N/A
<i>Unión de Armadores del Litoral del Océano Pacífico, A.C.</i> ^d	N/A	N/A	N/A	N/A	N/A	N/A

^a This is total capacity, not actual for 2008.

^b The product most commonly produced for export is a five-pound box of tightly packed frozen shrimp, referred to in the industry as the five pound ice block.

^c Interview declined by Paulina de la Cruz, January 26, 2010. Data included from: (Promarex, 2009; ProMexico, 2010).

^d Interview declined by Mario Alberto Davalos, December 16, 2009.

Source: CGGC, based on company interviews, (Promarex, 2009; ProMexico, 2010; Starway Industries, 2009).

4.2 Processing

Shrimp processing and packing plants are located near the port. The processors decapitate the shrimp as needed and sort, package, and freeze the products. In Sinaloa, artisanal producers and industrial producers that are not part of vertically integrated companies must first pay a processor for the processing and packaging before selling the product directly to the buyer. As mentioned previously, some of the larger industrial coalitions have their own processing facilities.

Promarmex, the largest industrial producer coalition and a vertically integrated company, is also the largest processor with four processing plants in Sinaloa. The second largest processor is *Congeladora Océánica S. A. de C.V.* which is owned by *Grupo Maros*. Processors that are not part of vertically integrated companies tend to be processing smaller volumes of shrimp and often process and pack both industrial and artisanal products, as well as farmed shrimp, in the same plant. Sinaloa processors process, freeze, and package anywhere between 50 and 1,000 tons of wild shrimp each season and export between 70% and 100% of the wild-caught shrimp processed (see Table 6). The product most commonly produced for export is a five-pound box of tightly packed frozen shrimp, referred to in the industry as the five pound ice block. Table 6 lists the top shrimp processors in Sinaloa.

Table 6. Top Sinaloa Wild-Caught Shrimp Processors

Processor Name	Tons of Shrimp Processed, 2008	% of Processed Wild-Caught Shrimp Exported	Most Common Wild-Caught Shrimp Product
<i>Promarmex</i> (4 plants)	680 - 1,360 ^a wild-caught	70%	5 lbs ice blocks
<i>Congeladora Océánica S. A. de C.V.</i> (owned by <i>Grupo Maros</i>)	800 wild-caught (100% industrial)	75%	5 lbs ice blocks
<i>Congeladora Union, S. A.</i> (owned by <i>Operadora Marítima del Pacífico</i>)	363 - 544 wild-caught (100% industrial)	85%	5 lbs ice blocks
<i>Pesquera 15 de Septiembre</i>	400 – 450 ^a wild-caught (100% industrial)	95%	5 lbs ice blocks
<i>Mariscos Congelados de Los Mochis S.A. de C.V.</i>	300 wild-caught (100% artisanal); 1,500 farm-raised	90%	Ice blocks
<i>Congeladora Bajamar</i>	250 wild-caught (100% industrial); 550 farm-raised	80%	Ice blocks

Table 6. Top Sinaloa Wild-Caught Shrimp Processors

Processor Name	Tons of Shrimp Processed, 2008	% of Processed Wild-Caught Shrimp Exported	Most Common Wild-Caught Shrimp Product
<i>Congeladora Productos Marinos Japomex S.A. de C.V.</i>	140 wild-caught (20% artisanal, 80% industrial); 400 farm-raised	95%	Ice blocks, peeled and deveined
Ahome Village Seafood	50 wild-caught (50% artisanal, 50% industrial); 1,000 farm-raised	100%	Ice blocks
<i>Congeladora Mar y Sol S.A. de C.V.</i>	40 wild-caught (20% wild-caught, 80% industrial); 200 farm-raised	100%	5 lbs ice blocks
<i>Integradora Badepesca, S.A. de C.V.</i> ³	80 - 90 wild caught (100% artisanal)	70%	Ice blocks
<i>Planta Congeladora Las 13</i> (co-owned by <i>FSC Camaroneros de Agua Verde</i>)	8 per day wild-caught	15-20 tons per season	5 lbs ice blocks (exports), 4.4 lbs ice blocks (domestic)
<i>Congeladora Doña Choco</i>	N/A (100% industrial wild-caught)	97%	5 lbs ice blocks
<i>Pesca Siglo XXI</i> ^b	N/A	N/A	N/A
<i>Pesquera Jalili</i> ^c	N/A	N/A	N/A
<i>Promarex</i> ^d	N/A	N/A	N/A

^a Average range produced

^b Interview questionnaire not yet returned.

^c Contact information could not be found.

^d Interview declined by Paulina de la Cruz, January 26, 2010.

Data included from: (Promarex, 2009; ProMexico, 2010).

Source: CGGC, based on company interviews, company website and (Starway Industries, 2009)

Processing wild-caught shrimp for export is more expensive than processing it for domestic sale (Bojórquez, 2009; R. Carrillo, 2009). Research interviews indicated the cost of shrimp export processing in Sinaloa can range from US\$0.50 per pound to US\$0.80 per pound (R. Carrillo, 2009; Martin, 2009). The costs included in export processing include, in order of value: processing, packaging, freight, Mexican customs, insurance, and U.S. customs (see Table 7). Rene Carrillo indicates this price is the same regardless of size, thus the costs dictate what sizes

³ This processing company was developed by eight northern Sinaloa artisanal cooperatives that collaborated to jointly store and process their shrimp (J. Leal, 2009).

and quantities are sold to the export market versus the domestic market. Alfonso Chaparro Bojórquez claims that processing for the domestic market costs 8 pesos per pound, or US\$0.65 per pound on average. In addition to processing costs producers also must pay the importer a sales commission fee of 5% to 7% of the catch value (García Caudillo, 2010).

Table 7. Shrimp Export Processing Costs, U.S dollars per pound

Processing	\$0.65
Packaging	\$0.076
Freight	\$0.046
Mexican Customs	\$0.019
Insurance	\$0.004
U.S. Customs	\$0.003
Total Export Processing Costs	\$0.798
Additional Sales Commission Fees	5% - 7% of capture value

Source: (R. Carrillo, 2009; García Caudillo, 2010)

All Sinaloa shrimp processors interviewed have incorporated Hazard Analysis Critical Control Points (HACCP) systems and are licensed by the *Secretaría de Salubridad y Asistencia* (SSA or Ministry of Health Assistance). Furthermore, in order to ensure quality control standards are being met, buyers conduct annual audits of the plants processing the shrimp they purchase. When asked about potentially implementing a more stringent monitoring process in order to satisfy large U.S. buyers who may have stricter requirements, each of the processors interviewed said they would be willing to do so in order to remain competitive in the U.S. market although most felt their monitoring and quality control processes were well up to buyer standards. However, interviews with existing, smaller U.S. buyers indicated various levels of satisfaction with processing quality, thus, it seems unlikely processors would meet the more stringent requirements of large U.S. buyers.

4.3 Exporters and Importers⁴

First grade wild-caught shrimp accounts for approximately 60% of total wild-caught production from the Gulf of California (GOC) and the majority of it is exported to the United States. A small percent of first grade shrimp is exported to China, Spain, and Japan. The grade of wild-caught shrimp is determined by texture, the extent of melanosis (black spots) on the shrimp, and damage to the shrimp shells during the capture process. About 40% of total wild-caught shrimp

⁴ In this report, exporters are defined as companies headquartered in Mexico that sell products to the U.S. market. Importers are defined as companies headquartered in the U.S. that buy shrimp from Mexican producers.

production is second and lower grade shrimp and these products are primarily sold to the domestic market (Atchiso, 2009).

Two U.S. importers, Ocean Garden Products (OGP) and Meridian Products, dominate the Sinaloa wild-caught shrimp export market. Together they account for 90% of wild-caught shrimp exports from Sinaloa to the United States. Over the last four years, OGP's share of exports was approximately 50% while Meridian's share was 40% (Serna, 2009). The remaining 10% of Sinaloa wild-caught exports flow through fewer than ten other U.S. importers and Mexican exporters. Table 8 lists the major exporters and importers of Sinaloa wild-caught shrimp, the estimated quantity of shrimp each exported to the United States in 2008, and the type of shrimp exported. U.S. importers purchasing wild-caught shrimp from other areas of the Gulf of California and Mexican Pacific, but not currently from Sinaloa, include Eastern Fish, Pescanova, and Tai Foong/Northern Chef.

Table 8. Top Exporters and Importers of Sinaloa Wild-Caught Shrimp

Company Name	Type (Exporter, Importer, Marketer)	Pounds of Shrimp Exported/Imported, 2008	Type of Shrimp Exported/Imported
Deep Sea Shrimp Importing	Processors and importer	1 million	60% brown, 40% white
Empress International	Importer/distributor	100,000	100% white
Meridian Products	Importer/distributor	11.5 million (40% of all Sinaloa wild-caught ^a)	Brown and white
M.P.I. Fisheries Inc.	Importer/distributor	N/A ^b	100% white
Ocean Garden Products	Importer/distributor	7 million (50% of all Sinaloa wild-caught ^a)	Brown (and white)
OFI Markesa International	Importer/distributor	338,000	50% brown, 50% white
Pacific Breeze Seafood	Importer	87,000	N/A ^b
Pacific Seafood	Importer/distributor	475,000	100% white
Pacific Wild Shrimp (Family company of <i>Pesquera 15 de Septiembre</i>)	Importer/distributor	75,000	Brown, white and blue
<i>Promarmex</i> (own brand, Shrimparadise, marketed in U.S. through Amende & Schultz)	Exporter/distributor	500,000 (Shrimparadise brand, 10% of company's total exports)	Brown, white and blue

^aThe share of (%) exportable production, average of last 4 years (Serna, 2009). ^bThe data was not provided.

Source: CGGC, based on company interviews and (ProMexico, 2010), (Mexican Shrimp Paradise, 2009)

Ocean Garden Products is a former government-owned company which historically held a large share of Gulf of California wild-caught shrimp production. Since five large aquaculture proprietors bought interests in OGP in 2005,⁵ OGP's share of wild-caught shrimp purchased from the Gulf of California decreased from 60% in 2005 to 50% in 2008 (Meltzer & Chang, 2006; Serna, 2009). Currently OGP's wild-caught is only 30% of company's total shrimp purchases, and 60% of the wild-caught shrimp, 7.2 million pounds, comes from Sinaloa (Serna, 2009). By contrast, OGP's farm-raised shrimp production increased to 70% of total production, approximately 28 million pounds. Although the share of farm-raised shrimp purchased by OGP is increasing, the company continues to serve the wild-caught shrimp market, for which it has dedicated U.S. buyers. After privatization, OGP stopped providing producers with financial assistance for repairing boats or for gasoline (Serna, 2009).

Conversely, Meridian Products' Mexican shrimp exports depend largely on Sinaloa wild-caught shrimp, which account for 60% of regional shrimp purchases. Meridian provides some loans to producers for exportable production to the United States (Martin, 2009). Thus, it is clear these

Meridian Products is committed to wild-caught shrimp from Sinaloa whereas Ocean Garden Products is diversified between both Sinaloa and Sonora producers and wild-caught and aquaculture products.

two leading firms have very different stakes in the wild-caught shrimp industry: Meridian Products is committed to wild-caught shrimp products and focused on Sinaloa as a source whereas Ocean Garden Products is diversified between both Sinaloa and Sonora producers and wild-caught and aquaculture products and is moving more towards aquaculture. Producer support from buyers is relatively rare.

Most U.S. importers are purchasing shrimp from both artisanal and industrial producers. The shrimp purchased is processed and packaged according to the buyer's request. Only one U.S. importer, Deep Sea Shrimp Importing, indicated ownership of a processing plant (Wood, 2009). The ratio of artisanal source to industrial source varies by company. For example, OGP purchases 60% of its wild-caught shrimp from industrial producers, primarily through a purchasing agreement with *Promarmex*, and 40% from artisanal fishermen. Deep Sea is mainly buying from artisanal producers. A few importers like OGP import both value added products like peeled and deveined individually quick frozen (IQF) shrimp and non-value added products, like head-off, shell-on shrimp ice blocks, but the majority of wild-caught shrimp products sold out of Sinaloa are head-off, shell-on shrimp in five-pound ice blocks.

All importers interviewed are buying shrimp based on market price. Some importers have commercial agreements with the producers to buy shrimp based on the weekly market price. Once the shrimp is packed out at the processing plant and verified by the importer's hired quality

⁵ In 2005 OGP was purchased by five Sonora-based shrimp operation companies: *Granjas Aqua Tech*, *Acuícola Boca*, *Grupo Industrial Pesquero*, *Aqua Soles*, *Granjas Santa Margarita* (Shrimp News International, 2005).

Importers' labeling systems focus primarily on shrimp grade and size. Product source, artisanal versus industrial production, environmental impacts, and sustainability criteria are not incorporated on the labels.

control sectors, the importer gives the producer a deposit, which is 80% of market price. The shipment is double-checked in the United States and then the importer pays the remaining 20% of the market price to the shrimp producer. Most U.S. importers interviewed have their own internal quality protocols and they directly audit producers and processing plants. U.S. importers have strong influence on processors who must meet importer

labeling and product requirements. Currently, importers' labeling systems focus primarily on shrimp grade and size. Product source, artisanal versus industrial production, environmental impacts, and sustainability criteria are not incorporated onto the labels.

A large importer like OGP hires truck companies to deliver products from processing plants to its multiple inventory locations in the United States (Serna, 2009). OGP determines the amount of shrimp transported to the each region based upon the market price and warehouse cost in each region. Large importers, including OGP and Meridian, also sell small amounts directly to small regional supermarkets and restaurants.

4.4 Distributors

The next stage in the value chain is the distributors who store products and sell them to retailers, food service and food management companies, and restaurants. Research for this report identified three types of distributors: specialty seafood distributors, full-line distributors, and environmentally sustainable marketers. Specialty seafood distributors specialize in seafood products and develop regional supply chains. Full-line distributors are selling a wide range of food products and they have national distribution networks. Full-line distributors include Sysco, U.S. Food Service, and UNFI. Environmentally sustainable marketers are promoting and in some cases developing sustainable or environmentally friendly food products, including seafood. These companies may be labeling the products based on their own environmental sustainability standards or promoting products certified by other organizations. In addition to these three main distributor types, a very limited amount of shrimp is sold through street distributors located near large U.S. ports, such as Portland, Oregon.

The majority of Sinaloa shrimp is sold through specialty seafood distributors. Specialty seafood distributors may be importers themselves, such as Ocean Garden Products and Meridian Products, or they could be purchasing wild-caught shrimp from other importers or through large vertically-integrated producers, such as *Promarmex*. Research for this report identified ten regional distributors purchasing Sinaloa wild-caught shrimp: Empress International, Meridian Products, M.P.I. Fisheries Inc., OFI Markesa International, Ocean Garden Products, Pacific Seafood, Pucci Foods, Pacific Wild Shrimp, Santa Monica Seafood, and Tampa Bay Fisheries.

The companies willing to share information on the quantities of shrimp purchased from Sinaloa indicated purchasing anywhere between 50,000 pounds and 11.5 million pounds annually (see Table 9). Most companies interviewed are purchasing both wild-caught and farmed shrimp, and some of the companies are purchasing a portion of their farmed shrimp from the Gulf of California, as well.

Specialty seafood distributors are mainly selling wild-caught shrimp to high-end restaurants because of owner preferences for the higher quality attributes of wild-caught shrimp, such as the texture, flavor and size, compared to those of farm-raised shrimp. High-end restaurants generally

Specialty seafood distributors are mainly selling wild-caught shrimp to high-end restaurants because of owner preferences for the higher quality attributes of wild-caught shrimp compared to those of farm-raised shrimp.

prefer shrimp sized under 10 to 26/30 shrimp per pound, which is predominantly available from wild-caught shrimp stocks. In addition, headless shell-on blocks, which are the main wild-caught shrimp export product from Sinaloa, are not popular with retail buyers who prefer individually quick frozen (IQF) seafood products. At least one distributor suggested the lack of IQF machines in Sinaloa processing plants limits buyers'

distribution opportunities within the U.S. market (Atchiso, 2009).

Full-line distributors are another potential and existing market for Sinaloa wild-caught shrimp. Two major shrimp importers, Ocean Garden Products and Meridian, are selling shrimp products to full-line distributors. Ocean Garden Products is mainly selling to Sysco and U.S. Food Service (Serna, 2009). Some full-line distributors are making commitments to promote sustainable seafood products. For example, Sysco is committed to evaluating the environmental sustainability of its top seafood product sources and is partnering with World Wildlife Fund to improve the sustainability of those suppliers (Fiorillo, 2009; Lopuch, 2009).

Environmentally sustainable marketers in the United States were identified as potential buyers of sustainable seafood products developed in Sinaloa. Two such marketers include CleanFish and EcoFish. These companies identify existing seafood products that are environmentally sustainable or use more environmentally friendly fishing practices, and the companies work to develop new products meeting such criteria. The marketers then label and promote the products through their brands. EcoFish became Marine Stewardship Council's first certified seafood distributor in 2001 and it initially targeted its products to high-end restaurants but has since expanded to retailers and full-line distributors as well. EcoFish is currently only selling wild-caught MSC-certified shrimp to restaurant purchasers, but also is selling sustainable farm-raised shrimp from Ecuador to retailers. Founder and President Henry Lovejoy suggested a high market demand for sustainable wild-caught products and an interest in any MSC-certified shrimp products developed in the Gulf of California (Lovejoy, 2009).

Table 9. Specialty Seafood Distributors Purchasing Sinaloa Wild-Caught Shrimp, 2008

Distributor (Headquarters location)	Pounds of Shrimp Purchased, 2008	Pounds of Sinaloa Wild- Caught Shrimp Purchased, 2008 (% of total)	Sinaloa Shrimp Source	Notes from Interview
Meridian Products (Vernon, CA)	N/A ^a	11.5 million	N/A ^a	<ul style="list-style-type: none"> - Selling to street distributors, large regional distributors, national distributors, retailers, club stores, and seafood specialty stores. - Increasing the value of the product through packaging changes is possible but developing a consumer brand is a very costly and long-term project.
Ocean Garden Products (San Diego, CA)	40 million ^b	7 million (17.5%)	N/A ^a	<ul style="list-style-type: none"> - Selling to national distributors including Sysco, U.S. Foodservice, and regional distributors. Selling small amounts to small regional supermarkets and restaurants. - Demand for sustainable products has decreased since economic downturn but there is long-term demand for sustainable products.
Pacific Seafood (Portland, OR)	N/A	475,000	<i>Promarmex</i>	<ul style="list-style-type: none"> - Mostly sells to restaurants because retailers don't like to buy headless shell-on blocks. - Mexican w/c shrimp is best quality but price is high. - Huge opportunities for primary processing value added like IQF. - Definite demand for sustainable products, although interest has slowed since the recession. Interested in MSC-certified shrimp.
OFI Markesa International (Vernon, CA)	5.2 million	338,000 (6%)	N/A (Both industrial and artisanal producers)	<ul style="list-style-type: none"> - Selling shrimp of all types to retailers, restaurant chains, and full-line distributors. - 90% of boat owners working with OFI are taking some measures to improve environmental sustainability, mostly using lighter nets. - Economic incentives for artisanal boats are needed to improve environmental sustainability.
Empress International (Lake Success, NY)	1 million	100,000	<i>Promarmex</i>	<ul style="list-style-type: none"> - Purchasing headless tail-on, white w/c shrimp. - Mostly selling to retailers.

Table 9. Specialty Seafood Distributors Purchasing Sinaloa Wild-Caught Shrimp, 2008

Distributor (Headquarters location)	Pounds of Shrimp Purchased, 2008	Pounds of Sinaloa Wild- Caught Shrimp Purchased, 2008 (% of total)	Sinaloa Shrimp Source	Notes from Interview
Pacific Wild Shrimp (San Diego, CA)	75,000	75,000	<i>Pesquera 15 de Septiembre</i>	<ul style="list-style-type: none"> - Purchases 5 lbs ice blocks. - Selling primarily to retailers and restaurants and also to distributors.
Pucci Foods (Hayward, CA)	500,000	50,000 (10%)	OGP, Meridian, and others	<ul style="list-style-type: none"> - Purchasing primarily white shrimp. - Selling primarily to retailers and restaurants.
Santa Monica Seafood (Santa Monica, CA)	1,008,000	36,300 (36%)	Deep Sea Importing (small amounts from Meridian and OFI)	<ul style="list-style-type: none"> - Likes that w/c products are hand- packed compared to mechanically-packed farmed shrimp. - 85% to 90% of business sales to restaurants, then to distributors (e.g., SYSCO) and retailers (e.g., Jensens Markets). - Sold Fisherman's Daughter shrimp. - In 2009, moving some business from Asian tiger shrimp to Mexican w/c because of lower price for Mexican w/c. - Likes Deep Sea because of the exclusivity of the brand. - Quality issues more pronounced among larger producers.
M.P.I. Fisheries Inc. (Vernon, CA)	N/A ^a	N/A ^a	N/A ^a	<ul style="list-style-type: none"> - Selling mainly to distributors, also to retailers and restaurants.
Tampa Bay Fisheries (Dover, FL)	N/A (said millions of pounds)	N/A (50% of total is wild-caught, not exclusively Sinaloa)	Deep Sea Importing	<ul style="list-style-type: none"> - Selling Mexican breaded shrimp and cold water shrimp from Canada & U.S. Pacific. - Sells 1/3 to restaurants, 1/3 to retailers, and 1/3 to large restaurant chains. - The percentage of w/c versus farm-raised shrimp varies based on fuel prices and shrimp market price. Increased w/c shrimp purchases vis à vis farm-raised in 2009 due to low w/c price. - Interested in sustainable wild-caught shrimp products.

Source: CGGC, based on company interviews

CleanFish, originally collaborating with Sustainable Fisheries Partnership and World Wildlife Fund, developed a more environmentally friendly labeled shrimp product, Fisherman's Daughter shrimp, with a Sonora producer. The product was produced using shrimp trawlers that featured lighter nets and smaller doors that had less drag on the ocean floor, incorporated bycatch reduction and turtle excluder devices, and used satellite monitoring to document that shrimp was caught in legal fishing zones. The product also was created with third-party monitoring to ensure compliance with claims and traceability across the full chain of custody. Unfortunately, market forces and concerns about verifiability of the sustainability claims hindered the success of the product and it is no longer being produced. Nonetheless, it exemplifies the process required to

Most distributors interviewed stated an interest in verifiable, environmentally sustainable shrimp products and some expressed willingness to pay a premium for such products.

develop an environmentally friendly or sustainable shrimp product in the Gulf of California and could illustrate some of the barriers that must be overcome to reach market success in the United States.

The purchase of artisanal versus industrial caught shrimp products varies by distributor. For example, Santa Monica Seafood is purchasing artisanal products through Deep Sea Importing, whereas Pacific Seafood buys products from *Promarmex*, and CleanFish worked with an industrial fleet. The quality of the shrimp products is very important to distributors and most distributors send quality assurance personnel to check processing plant activity.

The purchase of artisanal versus industrial caught shrimp products varies by distributor. For

Most distributors interviewed for this report stated an interest in environmentally sustainable shrimp products. Some expressed willingness to pay a premium for sustainable shrimp products although they noted the importance of being able to verify the validity of the products' claims.

4.5 Retailers and Food Service

Currently, the primary end consumers of Sinaloa shrimp are high-end restaurant customers. None of the large restaurant chains and retailers who account for a large proportion of seafood purchases in the United States and who were interviewed for this report indicated buying Sinaloa wild-caught shrimp. Instead, most are purchasing Asian farm-raised shrimp and U.S. domestic wild-caught shrimp, because of its lower price, larger supply, and more stringent processing standards compared to Mexican wild-caught shrimp. One retailer, Trader Joe's, was identified as selling Mexican wild-caught blue shrimp but the exact source of that product could not be identified because the company denied a request to be interviewed.

Most food service companies and restaurants are purchasing shrimp from distributors except in the few occasions when they need seasonal seafood directly provided by producers. Conversely, most large U.S. retailers, including Walmart, Harris Teeter and Costco, are purchasing shrimp directly from producers. Large retailers have their own internal quality

protocols and they directly audit producers and processing plants. Experiences from some large retailers suggest wild-caught shrimp producers like those in Sinaloa would have to fundamentally change on-board processing before the products would meet their quality protocols. Challenges noted in interviews with respect to the quality control of seafood processing in Sinaloa included lack of monitoring systems that can identify shrimp by lot number, insufficient temperature recording of shrimp products throughout processing stages, and mixing of wild-caught and farmed products at the processing plant. Many retailers

Significant quality and monitoring improvements would need to be made within Sinaloa wild-caught shrimp production and processing in order to access the large retailer segment of the U.S. market.

require improvements in traceability such that mistakes leading to problems with the production source (wild-caught vs. farm-raised) and the size and grade classification can be quickly identified and fixed. Thus, significant quality and monitoring improvements would need to be made within Sinaloa wild-caught shrimp production and

processing in order to access the large retailer segment of the U.S. market.

Many U.S. buyers expressed interest in purchasing environmentally friendly wild-caught shrimp products that are both verifiable and traceable. The products caught by artisanal fishermen may also appeal to the social interests of buyers. Some retailers, restaurants, and food service companies prefer products with a “good story,” such as supporting fairly paid fishermen. Thus it is possible that new branding or marketing which incorporates the social aspects of Sinaloa wild-caught shrimp may appeal to the U.S. market.

4.6 Nongovernmental Organizations

In addition to the companies identified above as main players in the Sinaloa wild-caught shrimp flow process and value chain, governmental and nongovernmental organizations also impact the value chain in various ways. Government influence on the value chain was discussed in section 3.4, “Role of the Mexican Government” and it is prudent also to mention the involvement nongovernmental organizations have in moving the fishery towards environmental sustainability. We found 15 nongovernmental organizations and interest groups are working to improve the sustainability of wild-caught shrimp worldwide and eight of those have been or are currently working on projects related to seafood sustainability in the Gulf of California. Most of the organizations focus their work in more than one segment of the value chain. There are many partnerships established among the organizations, and frequently these partnerships allow for multiple organizations to coordinate efforts along several segments of the value chain at once.

Table 10 illustrates the segments of the value chain where each of the 15 identified organizations focuses its efforts. A solid-filled space indicates the primary segment(s) of the value chain where the organization dedicates energy to shrimp or other seafood sustainability projects. A lightly

shaded space indicates segments where the organization may also work, but are not the principal foci of the organization. Segments also labeled with “GOC” indicate the organization has a specific Gulf of California focus on sustainability at that stage of the value chain. Most of these

Most NGOs identified the retailer and consumer segments of the value chain as important areas to affect change.

organizations have identified the retailer stage of the value chain as an important area to affect change. Most also are focused on raising consumer awareness of sustainable and unsustainable products. More than half work with producers to promote best practices but fewer are connecting with importers and distributors.

At the producer stage of the value chain, nongovernmental organizations working in the Gulf of California are involved in a variety of activities. Sustainable Fisheries Partnership focuses on fleet reduction and encourages low-impact gear that reduces bycatch and fuel consumption. *Alto Golfo Sustentable*, a Mexican non-profit focused on environmental issues, works with World Wildlife Fund (WWF) to reduce bycatch and protect endangered species in the upper Gulf of California by initiating net retirement programs and policies to expand marine protected areas. World Wildlife Fund also worked closely with INAPESCA to develop and test a new industrial trawl net with several excluder devices and net changes that significantly reduce diesel consumption. Among other efforts, EDF is working with government institutions and producers to implement catch share systems in the region. The Packard Foundation has spent more than a decade working with government institutions to develop marine protected areas and sustainable policies such as the boat buyback and gear replacement programs. Greenpeace and the Monterey Bay Aquarium are both involved in environmentally focused research regarding the Gulf of California which Greenpeace used to support development of marine protected areas and Monterey Bay Aquarium is using to determine sustainability recommendations for shrimp from the region.

At the importer and distribution stages of the value chain, two organizations have projects involving Gulf of California importers and distributors. Sustainable Fisheries Partnership is working to encourage importers and other buyers of Gulf of California shrimp to support sustainable efforts among producers and to gauge interest in sustainable shrimp products. Monterey Bay Aquarium recently began working with distributors to connect them with sustainable seafood products, although thus far they have not been connecting distributors or retailers with Mexican wild-caught shrimp.

Moving through the retailer and consumer segments of the value chain, most organizations are involved in some type of seafood sustainability efforts. However, the connection to Gulf of California shrimp becomes more indirect at this level. The widespread focus on retailers and consumers indicates most nongovernmental organizations believe retailers and consumers have significant potential to effect change in fishery sustainability through changes in product

demands. A number of organizations are working with retailers to evaluate the sustainability of their seafood purchases and to recommend sustainability changes to the supply chain or new, sustainable products (Blue Ocean Institute, EDF, FishWise, MBAq, NEAq, SFP, WWF). Other organizations provide training for retail employees about the sustainably caught seafood products they sell. Greenpeace publishes a watchdog report outlining the sustainability of seafood practices by the top 10 U.S. supermarkets and, as a result, has been effective in increasing consumer awareness and pushing many retailers toward improving the sustainability of the seafood they source and sell (Greenpeace USA, 2009). Others also target consumer awareness through information available online, through text messaging, and with signage and brochures (BOI, EDF, FishWise, MBAq, MSC, NRDC, NEAq, WWF).

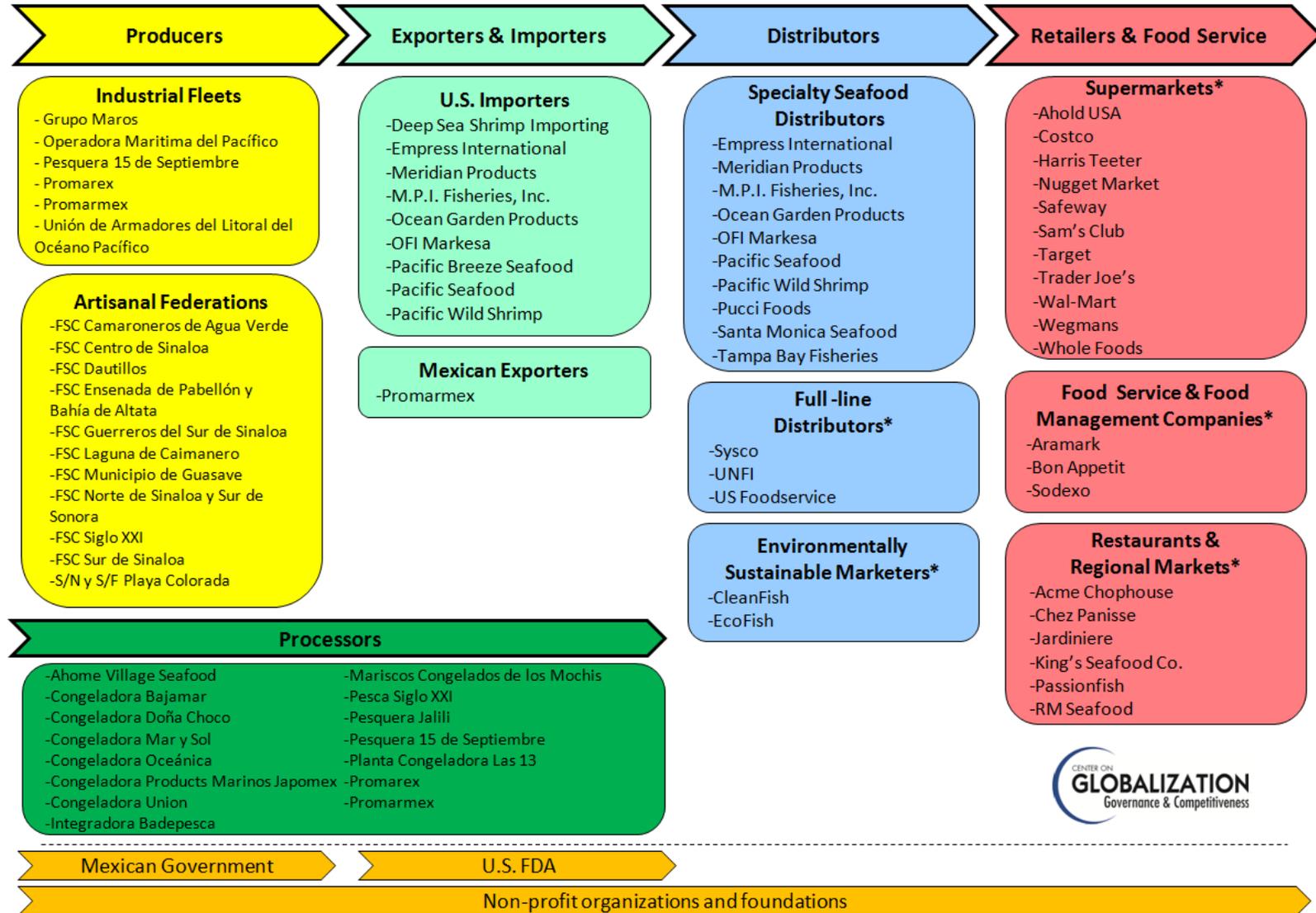
Table 10. Nongovernmental Organizations Focused on Improving the Sustainability of Wild-Caught Shrimp

Organization	Producers	Importers	Distributors	Retailers	Consumers
Alto Golfo Sostentable (AGS)	GOC				
Blue Ocean Institute (BOI)			GOC	GOC	GOC
Chefs Collaborative					
Environmental Defense Fund (EDF)	GOC				
FishChoice Inc.					
FishWise					
Food Marketing Institute					
Greenpeace					
Marine Stewardship Council (MSC)					
Monterey Bay Aquarium Foundation (MBAq)	GOC		GOC	GOC	GOC
Natural Resources Defense Council (NRDC)					
New England Aquarium (NEAq)					
David and Lucile Packard Foundation	GOC				
Sustainable Fisheries Partnership (SFP)	GOC	GOC	GOC	GOC	
World Wildlife Fund (WWF)	GOC			GOC	GOC

Source: CGGC, based on company interviews, websites, and written publications.

Understanding the various roles of the organizations working to improve sustainability in the Gulf of California region is important to future efforts to affect change. Working in collaboration or at least in cooperation with the World Wildlife Fund (WWF), the David and Lucile Packard Foundation, and Sustainable Fisheries Partnership will be very important to the future of EDF's current initiative. EDF has already begun this process with partnerships with WWF and further collaboration with Packard and SFP also has the potential to enhance the reach of EDF's engagement in the region.

Figure 4. Sinaloa Wild-Caught Shrimp Value Chain



* Companies listed in these boxes are illustrative companies for each category. They may not be actual purchasers of Gulf of California shrimp.

Source: CGGC, based on industry interviews and websites

V. Sustainable Shrimp Market in the United States

Within the United States there is growing attention to sustainable food products, including seafood. Understanding more about the U.S. sustainable seafood market and niche opportunities for environmentally friendly products will help determine market potential for newly developed shrimp products from the Gulf of California. For this section of the report, “sustainable” shrimp products are defined as those that meet Marine Stewardship Council (MSC) certification. There are a number of organizations and companies promoting other environmentally friendly seafood products. However, the Marine Stewardship Council is the only organization following the Food and Agriculture Organization of the United Nations’ fishery certification guidelines (Marine Stewardship Council, 2008) and it was identified by interviewees as the gold standard in terms of trusted sustainable wild-caught seafood. Thus, this section will focus on a variety of niche U.S. markets within which wild-caught Sinaloa shrimp has the potential to compete: sustainable shrimp, environmentally friendly shrimp, and wild-caught shrimp products.

5.1 Sustainable Wild-Caught Shrimp Products

The Marine Stewardship Council (MSC) is an internationally recognized leading sustainable certification and eco-labeling program for wild-caught seafood (Marine Stewardship Council, 2002b; Oceanic Développement: MegaPesca Lda, 2007). In 2008, 26 fisheries worldwide were MSC certified, 65 were under assessment, and between 20 and 30 were under confidential pre-assessment (Marine Stewardship Council, 2008). Seventy retailers, including large major supermarkets such as Walmart, Target, and Whole Foods are selling MSC-certified seafood in the United States. Currently, there are two MSC-certified cold water shrimp fisheries in Canada and Oregon, but no warm water shrimp fisheries with MSC certification.

Currently, there are two MSC-certified cold water shrimp fisheries in Canada and Oregon but no warm water shrimp fisheries with MSC certification

MSC-certified shrimp products became available only a few years ago in the U.S. market (see Table 11). MSC-certified shrimp consumption in the United States was 15,770 tons in 2008 (Marine Stewardship Council, 2009a), accounting for about 2.4% of total U.S. shrimp consumption. All Oregon MSC-certified shrimp is sold in the U.S. market

(Marine Stewardship Council, 2009a) and 15% of the Canadian MSC-certified shrimp is sold in the United States and Canada (Suddaby, 2009). The remaining Canadian MSC-certified shrimp is exported to the European market. These MSC-certified cold water shrimp products are generally called “cocktail shrimp” because of their small sizes, ranging from 50-70 to more than 500 pieces per pound. The products have a wide variety of forms including frozen, peeled and cooked, cooked shell-on, raw shell-on, and canned (Marine Stewardship Council, 2009b). The main MSC shrimp producers are Barry Group, Clearwater Seafoods Limited Partnership, Notre Dame Seafoods, and Ocean Choice International (Marine Stewardship Council, 2009b).

Table 11. Marine Stewardship Council-Certified Shrimp Fisheries

Country	Fisheries	2008 Shrimp Production, tons	Market	U.S. Market Sales, tons	Certified Date
Canada	Gulf of St. Lawrence northern shrimp ^a	28,800	85% exported to Europe 15% sold in Canada and United States	4,200	Sept 2008 (and Mar 2009)
United States	Cold pink shrimp in Oregon ^b	11,570	Primarily U.S. west coast retail and food service markets.	11,570	Dec 2007

Source: ^a Suddaby, 2009

^b <http://www.msc.org/documents/fisheries-factsheets/net-benefits-report/Canada-northern-prawn-shrimp.pdf>

There are six shrimp and prawn fisheries in the process of MSC assessment (see Table 12) (Marine Stewardship Council, 2010). However, they are unlikely to be competitors with wild-caught Sinaloa shrimp because all but one are cold-water shrimp and all are much smaller in size than shrimp from the Gulf of California. Thus, they will likely appeal to a different type of buyer. Furthermore, some of them are not marketed in the United States.

Table 12. Comparison of Shrimp and Prawn Fisheries Undergoing Marine Stewardship Council Standard Assessment and Gulf of California Wild-Caught Shrimp

Shrimp Type	Species (warm-, cold-water)	Average Size, millimeter (mm)	Commercial Market
Canada offshore northern and striped shrimp	<i>Pandalus borealis</i> , <i>Pandalus montagui</i> (cold-water)	6-33	Marketed primarily in Russia, Ukraine, China, Japan and Western Europe.
Skagerrak, Kattegat and Norwegian Deeps prawn	<i>Pandalus borealis</i> (cold-water)	6-33	Domestic and import markets.
West Greenland coldwater prawn	<i>Pandalus borealis</i> (cold-water)	6-33	All exported.
Suriname Atlantic seabob shrimp	<i>Xiphopenaeus kroyeri</i> (warm-water)	15-16	Marketed in Europe and North America as peeled small meats used in salads, toppings and as breaded products.
Germany North Sea brown shrimp	<i>Crangon crangon</i> (cold-water)	30-50	Cooked shrimp peeled and graded ready for use in packaged and product forms. Small quantities also sold locally.
North Sea brown shrimp	<i>Crangon crangon</i> (cold-water)	30-50	Marketed mostly in the European Union.
Gulf of California white shrimp	<i>Litopenaeus vannamei</i> (warm-water)	60-70	Primarily marketed to the United States.

Table 12. Comparison of Shrimp and Prawn Fisheries Undergoing Marine Stewardship Council Standard Assessment and Gulf of California Wild-Caught Shrimp

Shrimp Type	Species (warm-, cold-water)	Average Size, millimeter (mm)	Commercial Market
Gulf of California brown shrimp	<i>Farfantepenaeus californiensis</i> (warm-water)	120-155	Primarily marketed to the United States, and also Japan.
Gulf of California blue shrimp	<i>Litopenaeus stylirostris</i> (warm-water)	172	Primarily marketed to the United States.

Sources: (Aragon-Noriega, 2005; Aragón-Noriega & Razo, 2005; ARKive Wildscreen, 2009; Castro et al., 2005; Edwards, 1977; Marine Stewardship Council, 2010; Parsons & Khan, 1986)

MSC certification is developed based on three standard principles: maintaining sustainable fish stocks, minimizing environmental impacts, and effective fishery management (Marine Stewardship Council, 2002a). It is common for fisheries and producers considering going through MSC certification to conduct a pre-assessment prior to beginning the certification process. A pre-assessment evaluates a fishery’s potential success in meeting MSC criteria and identifies data gaps and other barriers to certification.

The criteria used to certify each fishery are unique but a look at the MSC certification process for cold water shrimp in Canada can illustrate the type of criteria that may be used. That process included the following criteria: limiting the number of fishing boats and setting a total catch allowance for the boats; requiring boats use nets with a mesh size of 40 mm or more to allow undersized shrimp to escape; requiring use of bycatch reduction devices (BRDs); and requiring fishermen to release endangered species like wolfish (Suddaby, 2009). Oregon’s MSC certification also is based on well regulated BRD use and mesh size adjustment (Marine Stewardship Council, 2007). Given those examples, it is conceivable that an effort to certify shrimp in the Gulf of California may include meeting criteria such as: requiring the use of nets with turtle excluder devices and bycatch reduction devices; development of well-managed monitoring systems which prevent damage to marine preserves; strict monitoring of licensed fishing vessels and regulation of unlicensed fishing vessels; and lighter nets, smaller doors and hydrodynamic designs for less drag on the ocean bottom.

5.2 Environmentally Friendly Wild-Caught Shrimp Products

Beyond MSC-certified sustainable shrimp, a number of different entities are working with producers, suppliers, and buyers to reduce the negative environmental impacts of wild-caught seafood products and to market those products towards environmentally conscious consumers. EcoFish and Clean Fish, discussed in the distributor section of this report, are two such examples. EcoFish, in addition to selling MSC-certified shrimp from Oregon, also offers

sustainably sourced wild-caught “spot shrimp” from Alaska that is caught using a low bycatch trap system (EcoFish, 2009).

Monterey Bay Aquarium’s Seafood Watch program, although it does not certify shrimp products, fisheries or producers, makes recommendations regarding what seafood products are environmentally friendly through its Seafood Watch ranking system. Monterey Bay Aquarium evaluates the ecological impact of seafood species from different countries and regions and uses a color-coded ranking system to suggest consumers eat products ranked green (“Best Choices”) or yellow (“Good Alternatives”), while suggesting consumers not eat red (“Avoid”) species. Monterey Bay Aquarium’s recommendations for shrimp are presented in Table 13.

Table 13. Monterey Bay Aquarium Seafood Watch Wild-Caught Shrimp Rankings

Seafood	Rating	Market Names	Where Caught
Pink Shrimp	Best Choice	Ocean shrimp, salad shrimp, cocktail shrimp, ebi	Oregon
Shrimp ^a	Best Choice	Pacific white shrimp, West Coast white shrimp, ebi	United States
Spot Prawn	Best Choice	Prawn, spot shrimp, amaebi	British Columbia
Northern Shrimp	Good Alternative	Salad shrimp, cocktail shrimp, ebi	U.S., Canadian Atlantic
Rock Shrimp	Good Alternative	Rock shrimp	United States
Shrimp ^b	Good Alternative	Pacific white shrimp, West Coast white shrimp, ebi	United States
Shrimp	Good Alternative	White, brown, pink, and rock shrimp, ebi	U.S. Gulf of Mexico, U.S. South Atlantic
Spot Prawn	Good Alternative	Prawn, spot shrimp, amaebi	U.S. Pacific
Shrimp	Avoid	Black tiger shrimp, tiger prawn, white shrimp, ebi	Imported

^a Caught in closed systems and inland ponds. ^b Caught in open systems.

Source: (Monterey Bay Aquarium, 2010)

Although shrimp from the Gulf of California currently falls in the “Imported” category and, thus, is listed as a species to avoid by Monterey Bay Aquarium, the organization is currently in the process of evaluating Mexican shrimp production. Thus, Sinaloa leaders and EDF partners should contact Monterey Bay Aquarium staff to determine if their evaluation will result in ranking changes for any Gulf of California shrimp species.

5.3 U.S. Wild-Caught Shrimp Market

The U.S. government’s official import data does not differentiate shrimp based on source, such as wild-caught or farm-raised. The USDA classifies by form (frozen, fresh, and others) and by size. Thus, to estimate the market size of U.S. wild-caught shrimp imports, we chose shrimp sized less than 20 count per pound as a proxy for wild-caught shrimp.

In 2007, 12,051 tons of shrimp sized less than 20 count per pound were imported to the U.S. from Mexico, accounting for 7.3% of the total U.S. market for shrimp this size (see Table 14). In 2003, Mexico’s share of U.S. imports accounted for only 3.9%. This change between 2003 and 2007 was due to a more than 60% increase in Mexican imports of shrimp that size and a decrease in total imports.

Table 14. Large U.S. Shrimp Imports and Domestic Production, in tons

	U.S. Large-Sized Shrimp Imports: Less than 20 counts per pound ⁽¹⁾		U.S. Domestic Wild-Caught Shrimp ⁽²⁾	Total Wild-Caught Shrimp Supply in the United States	Mexico's Estimated Share of U.S. Wild-Caught Shrimp Supply
	Import from Mexico	Import Total			
2003	7,389	49,341	142,261	191,602	3.9%
2004	7,879	47,131	139,830	186,961	4.2%
2005	8,187	47,757	118,336	166,093	4.9%
2006	11,520	44,371	145,230	189,601	6.1%
2007	10,943	45,108	105,031	150,139	7.3%
2008	12,051	44,326	N/A	N/A	N/A

Source: (1) (Harvey, 2009); (2) (FAO, 2009)

Thus, it appears Mexico’s share of large shrimp in the U.S. marketplace has been increasing compared to other sources of U.S. imports. In addition, some buyers indicated in interviews for this report that as the market price for wild-caught Mexican shrimp declined in 2008 and 2009, they increased purchases of Mexican wild-caught shrimp products and reduced farm-raised shrimp purchases from other importing countries.

5.4 Wild-Caught Shrimp Current and Potential Buyers

Marine Stewardship Council-certified shrimp is sold to a small number of distributors and retailers. Verified distributors selling MSC-certified shrimp are Notre Dame Seafoods, Northern Chef, and EcoFish. Wegmans Food Markets and Costco are two leading retailers currently selling MSC-certified shrimp. Wegmans Food Markets was the first retailer to start selling MSC wild-caught shrimp and their processing and supply chain is MSC-certified (Marine Stewardship Council, 2008). Fishery Products International and Wild Planet are processors and marketers of MSC-certified shrimp.

CleanFish’s “Fisherman's Daughter” products were sold to four regional seafood distributors: Fortune Fish, Cambridge Packing, The Berkeley Bowl and San Francisco Fish Market, and Santa Monica Seafood (SeafoodSource.com, 2008). EcoFish distributes its wild-caught shrimp products to high-end restaurants and some of its other pre-packaged seafood products are now available at retail stores (Lovejoy, 2009).

Table 15. Company and Market by Wild-Caught Shrimp Certification

Wild-Caught Shrimp Certification/ Marketer	Companies Selling Shrimp Product	Market
Marine Stewardship Council ^a	<ul style="list-style-type: none"> - Costco - Ecofish - Fishery Products International - Northern Chef - Wild Planet - Wegmans Food Markets 	European and U.S. distributors, food services and retailers
CleanFish (Fisherman's Daughter products) ^b	<ul style="list-style-type: none"> - Fortune Fish - Cambridge Packing - The Berkeley Bowl and San Francisco Fish Market - Santa Monica Seafood 	U.S. distributors

Sources: a) (Marine Stewardship Council, 2009b); b) (CleanFish, 2009)

Although the limited number of sustainable shrimp products means there are only a few distributors and retailers currently selling sustainable or other environmentally friendly shrimp products in the United States, there are many companies who have committed to sell MSC-certified products or which have developed internal company standards related to seafood sustainability. For example, Sodexo, Sysco, and Walmart have made public commitments to ensure some portion of their seafood product lines include MSC-certified products (see Table 16). These companies are working with suppliers and environmental nongovernmental organizations to either obtain MSC certification for their suppliers or to source products from fisheries with MSC certification. In addition, some large retailers and food service companies

Sodexo, Sysco, and Walmart have made public commitments to ensure some portion of their seafood product lines include MSC-certified products.

follow Monterey Bay Aquarium Seafood Watch guidelines when purchasing seafood. Others such as Ahold USA, Harris Teeter, Safeway, Target, Wegmans, and Whole Foods Market have established internal seafood sustainability standards. Some of these standards are focused on aquaculture products but a number of them also include wild-caught products.

Internal company standards also tend to be more focused on safety and quality issues than environmental sustainability criteria. However, some companies such as Wegmans and Whole Foods Market are developing their own wild-caught seafood standards which more centrally incorporate environmental sustainability standards.

Table 16 outlines the various types of seafood sustainability goals or standards announced by some large U.S. retailers. As the environmental sustainability of shrimp in the Gulf of California improves, there may be an opportunity to promote Sinaloa shrimp products to these companies through their seafood sustainability programs. Additionally, obtaining MSC certification may open up opportunities in the European market. Currently almost of all Canadian MSC-certified shrimp is exported to Europe because many European retailers have a significant demand for sustainable products, and there are several retailers in the United Kingdom that sell only MSC-certified products (Suddaby, 2009).

Table 16. U.S. Companies with Seafood Sustainability Goals or Standards

Company Name	Type of Sustainability Commitment	Commitment Details
Ahold USA	Company standard	In partnership with New England Aquarium, the company instituted the "Choice Catch" program which evaluates the sustainability of existing seafood sources and either encourages those sources to improve their practices or identifies seafood sources that are more sustainable.
Bon Appetit Management Company	Company standard	The company is an associate partner with Monterey Bay Aquarium's Seafood Watch program and purchases seafood in accordance with Seafood Watch sustainability guidelines.
Giant Eagle	Company standard	In partnership with WWF, it evaluates the sourcing of the top 20 species by volume and is developing a strategy to improve the sustainability of those seafood sources, including encouraging some to move towards MSC-certification.
Harris Teeter	Company standard	The company has its own seafood procurement guidelines for both wild-caught and farmed seafood. It buys only domestic wild-caught shrimp.
Safeway	Company standard	The company is in the process of creating an internal sustainable seafood policy and labeling system.
Sodexo	MSC- related	All contracted seafood purchases will be MSC-certified by 2015. The company currently purchases wild-caught, small cold water shrimp and is working with suppliers to have that supplier certificated by MSC.
Sysco	MSC- related	In partnership with WWF, Sysco is evaluating the sourcing of the top 20 species by volume and developing a strategy to improve the sustainability of those seafood sources, including encouraging some to move towards MSC-certification.
Target	Company standard	The company has its own seafood sustainability program, "Sustainability Vision," which includes quantity and quality criteria as well as minimal or no impact on the species or ecosystem.
Walmart	MSC- related	All wild-caught seafood purchased for the North American market will be MSC-certified by 2011. Working with SFP, WWF, and EDF.
Wegmans Food Markets	Company standard	The company's standard includes bycatch rates, species stocks, and social and marine ecology impacts.

Table 16. U.S. Companies with Seafood Sustainability Goals or Standards

Company Name	Type of Sustainability Commitment	Commitment Details
Whole Foods Market	Company standard	The company is developing its own wild-caught seafood standards and the shrimp standards should be complete in early spring 2010. The company is sensitive to MBAq labeling and is more likely to source a product with an MBAq green label.

Source: CGGC, based on company interviews and websites

Report interviews identified several companies that expressed interest in verifiable, sustainable wild-caught shrimp products from the Gulf of California. Table 17 lists some of the distributors and retailers with specific interests in sustainable products. However, in addition to verifiable sustainability standards, all of these companies would require the highest quality products and purchase decisions would depend upon the market price for such products.

Table 17. Potential Buyers for Sustainable Wild-Caught Shrimp

Potential Buyers	Comments Related to Sustainable Shrimp Products
Aramark	Makes every attempt to purchase sustainable shrimp. Their employees were critical in raising corporate awareness through their own observation of consumer purchasing habits and where they saw room for improvement.
Costco	Is interested in sustainable products, but quality improvement is most important. Needs documentation of quality control for all processes.
Eastern Fish	May be willing to pay a small premium for sustainable products, but believes marketing the enhanced value of sustainable products will be difficult.
Ocean Garden	Has been encouraging fishermen to use BRDs to protect <i>vaquitas</i> * in northern part of GOC during past four years. In the long-term, it believes there is a niche in the U.S. market for sustainable shrimp products.
OFI Markesa International	Wants quality and safety plus sustainability. The Mexican shrimp industry needs to make quality control and food safety improvements.
Pacific Seafood	If MSC-certified shrimp is available in the GOC, this will drive the company's demand for sustainable shrimp purchases.
Northern Chef	Could become a multi-million pound purchaser if the quality is better. It would consider exporting the product to Canada, Asian countries, and Europe. The company wants to support sustainable shrimp producers because the sky is the limit- it is a great product and a great story.
Santa Monica Seafood	Looks first at quality of the product, the exclusivity of the brand, and then the price. The company prefers smaller importers because they have fewer plants and more quality control. Sustainable Mexican wild-caught shrimp could receive a price premium.

*A *vaquita* is a rare species of porpoise that is found in the upper Gulf of California.

Source: CGGC, based on company interviews

5.5 Implications for Sinaloa Shrimp Opportunities in the U.S. Market

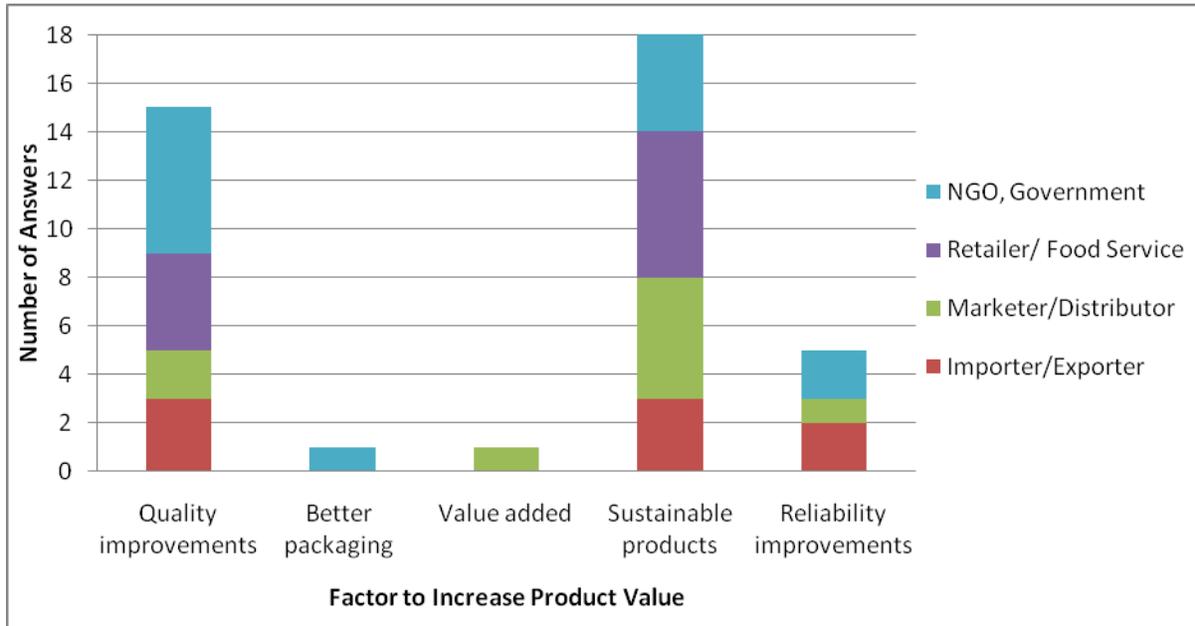
The study authors evaluated responses to industry interviews to determine which factors have the greatest likelihood of increasing the value of Mexican wild-caught shrimp in the U.S. market. Five potential factors were noted from the interviews:

- a) *Reliability improvements.* Traceability of shrimp source and monitoring of shrimp separation by grade, size, and production source (farm-raised vs. wild-caught).
- b) *Sustainable product interest.* Market interest in a product harvested using environmentally friendly fishing equipment and techniques.
- c) *Value added opportunities.* Primary processing (individual quick frozen - IQF, beheaded, peeled, deveined) and secondary processing (canned, breaded, ready to eat) opportunities.
- d) *Better packaging.* Packaging providing more information regarding country of origin, production source, nutrition, and/or recipes.
- e) *Quality improvement.* Temperature control, handling, and documentation of quality control from the boat to the retailer.

Twenty six total interviews were analyzed. Interviewees included U.S. players such as importers, distributors, retailers, and food service representatives, as well as seafood experts in Mexican governmental organizations and U.S. environmental nongovernmental organizations. Figure 5 illustrates how many interviewees mentioned the potential for each factor to have an impact on the value of wild-caught Mexican shrimp.

Most interviewees (17) identified development of new, sustainable shrimp products as a potential factor to increase value or purchases of wild-caught shrimp from the Gulf of California. Fifteen interviewees identified quality control improvements as having the potential to increase the value of Mexican shrimp. Five interviewees mentioned reliability improvements as an important change and this is notable because most interviewees were not directly asked about reliability. Factors of value added opportunities and better packaging were each only mentioned by one interviewee. In fact, many interviewees stated that the U.S. markets for large, high quality, wild-caught shrimp such as those from the Gulf of California did not lend themselves well to secondary processing changes. The only interview subject requesting a value added change suggest it would be valuable to increase access to individually quick frozen (IQF), peeled and deveined shrimp from the region.

Figure 5. Potential Factors for Increasing Wild-Caught Mexican Shrimp Value



Note: The interview questions asked of each interview subject were not uniform. Thus, the results do not represent a direct prioritization or comparison of the identified factors. For example, all subjects were asked specifically about sustainable shrimp products but better packaging was not directly asked of most subjects.

Source: CGGC, based on company interviews

The most striking result of the interview analysis was the significant interest in quality improvements. Most industry subjects identified quality as the number one priority for shrimp purchases and a few interviewees who are also buyers mentioned challenges with shrimp quality from the region.

The overall conclusion from our interviews indicates there is a U.S. market niche for sustainable shrimp products as well as a demand for the high quality wild-caught shrimp products currently coming from Sinaloa and throughout the Gulf of California. Not all producers will be able to meet the standards necessary to receive MSC certification for their products. Nonetheless,

There is a niche demand in the U.S. market for sustainable wild-caught shrimp and processing quality improvement also could further enhance the demand for Sinaloa wild-caught shrimp products.

interviews indicated some quality improvements could be made to increase interest in existing wild-caught products. Connecting directly with distributors and companies, like Wegmans and Whole Foods, that are developing specific seafood sustainability standards, would help identify which quality and sustainability changes may offer the greatest opportunities to increase

sales to those specific buyers. Furthermore, due to the public commitments of some large retailers, it appears advisable that producers with the interest and capacity to adopt

environmentally sustainable fishing practices work closely with local nongovernmental agencies, EDF, and other interested institutions to develop an MSC-certified product for the U.S. market.

The challenge to Mexican government entities, producers, and processors will be in changing fishing management practices and implementing more environmentally friendly fishing technologies with appropriate monitoring to be able to verify the sustainability of such products. The following section looks at the economic actors along the value chain and their relative leverage which may have the potential to either bolster efforts towards environmentally sustainable fishing practices or act as barriers to change.

VI. Sinaloa Wild-Caught Shrimp Export Industry: Economic Actors and Leverage

6.1 Criteria Description

Duke CGGC developed a set of criteria to examine the relative leverage of each of the actors in the value chain of the Sinaloa shrimp export market. This process enables us to identify opportunities along the value chain where developing new strategies for increasing the sustainability of shrimp fishing practices may have the most impact.

We applied the following criteria to our value chain to determine leverage:

- *Direct control of fishery management.* Government regulations and policies dictate fishery management practices and producers make decisions about fishing practices based on regulations, costs, and market opportunities.
- *Indirect control of fishery management.* Indirect control of the fishery can occur through economic, political, or cultural influence over resource management. Government institutions, producers themselves, and buyers can influence shrimp fishing practices in Sinaloa.
- *Highly concentrated market.* A market is considered concentrated when the top five companies in a sector control more than 50% of the market. Market concentration can impact fishing practices because a small number of companies may influence a large number of small producers.
- *Single player with greater than 20% market share.* When a single player controls 20% or more of the market share in a sector, producers may find it difficult to find an alternative buyer, thus enabling the large player to use its buying power to make product demands.
- *New market potential.* New market opportunities have the potential to influence fishing management or practice changes if they are viable economic opportunities that may cover any costs associated with those changes.

Table 18. Sinaloa Wild-Caught Shrimp Export Industry: Economic Actors and Leverage

Leverage Criteria	Value Chain Economic Actors						Interest groups	
	Producers		Processors	Exporters/ U.S. Importers	U.S. Distributors	Retailers & Food Service and Mgt	Mexican Government	Env. NGOs
	Artisanal cooperatives	Industrial fleets						
Direct Control of Fishery Management	Fishing decisions based on cost and market	Fishing decisions based on cost and market					Quota, <i>veda</i> , <i>ordenamiento</i> , mandatory TED	
Indirect Control of Fishery Management	Potential, may not follow gov't programs	Political power, no quota participation		Potential!	Potential!	Potential!	Gas subsidies, tax relief, voluntary BRD, buyout program	
Highly Concentrated Market				Very small number of exporters & importers	Market niche for restaurants, high value products			
Single Player with >20% Market Share		<i>Promarmex</i>		Meridian, OGP		Potential! (demand for traceability and quality monitoring)		
New Market Potential			Potential! (quality control, packaging)	Potential! (demand for sustainable product)	Potential! (demand for sustainable product)	Potential! (demand for MSC product)		Coordinate sustainable product dev't and producer-gov't discussion

Note: Dark, solid colored boxes represent actors with strong influence on fishery management practices in Sinaloa. Lightly, partially shaded boxes indicate actors not currently exerting limited influence on Sinaloa's fishery but with potential to influence.

Source: CGGC, based on industry interviews

6.2 Direct Control of Fishery Management

- Government institutions
- Producers

Government institutions and producers themselves have the most direct control over fishery management and fishing practices in Sinaloa. The Mexican government regulates the length of the fishing season, season opening and closing dates, restricted and permitted fishing areas, licensing and registration of fishing vessels and producers, mandatory use of turtle excluder devices and, most recently, total allowable catch quotas for artisanal fishermen. Many of these policies are implemented to ensure the shrimp fishery is well managed and continues to be a viable resource well into the future. In managing the resource, the Mexican federal government must balance the environmental health and sustainability of the resource, and its value as an employment sector and economic engine in the region. Developing new policies to increase the sustainability of the resource may have adverse affects on fishermen's earnings, thus affecting the economy of the region. If the economy is affected, such decisions may also be politically unpopular. Thus, the economic, environmental, and political costs and benefits of each decision must be considered before making significant changes to policy.

Producers have ultimate control over how they fish and their fishing practice decisions are generally made based on fishing costs, the market potential for their products, and traditional fishing practices. Most producers comply with government regulations and work to make a profit within those limits. However, research interviews suggested a number of instances in which producers make their own decisions about fishing practices based on anticipated benefits. For example, some fishermen may not use the required turtle excluder devices (TED) if they perceive the TEDs to negatively impact catch rates. Mexican authorities are working hard to stop this problem so that the majority of the Mexican shrimp fishermen who make a real effort to participate in management best practices are not punished for the actions of a few. In addition, there are a significant number of artisanal fishermen who catch shrimp without licenses and sell to the black market, but the government hopes implementation of the *ordenamiento* and the shrimp fishing quotas will discourage illegal fishing and commercial practices.

The control fishermen have over the viability of the fishery suggests government efforts to inform fishermen of the environmental and economic values of sustainable fishing policies and to involve them in policy decisions may have long-term positive impacts. The more the fishermen understand the consequences of unsustainable fishing practices, the more likely they are to use fishing practices that consider the health of the resource.

6.3 Indirect Control of Fishery Management

- Government institutions
- Industrial producers
- *Artisanal producers* (potential)
- *Exporter/importers* (potential)
- *Distributors* (potential)
- *Retailers/food service* (potential)

Indirect control of the fishery is currently seen among government institutions and industrial producers. In addition, there is potential for buyers such as exporters, importers, distributors, retailers, and food service and food management companies to influence fishing practices.

The Mexican government has indirect control over fishermen through fiscal policies such as gas subsidies and tax breaks and through voluntary programs, such as recommended use of bycatch reduction devices and the boat buyback program. Currently, the fiscal policies are used to ease the overall costs associated with fishing to promote the economic viability of the industry. However, these policies may be having unintended negative impacts on the environment by subsidizing fishermen who otherwise would not be profitable, and thus contributing to overcapitalization and potentially environmental degradation of the resource. Instead, these fiscal policies could be used to influence sustainable fishing practices. For example, multiple interviewees noted the opportunity to offer gas incentives only to those fishermen who are either using the latest technologies to reduce bycatch and improve sustainability or who are participating in the quota system. Such a change would likely be very politically unpopular and, as a significant departure from traditional use of the subsidies, is not expected to occur. Nonetheless, these incentives could offer an opportunity to leverage more control over fishing practices in the region.

The voluntary recommendation that producers use bycatch reduction devices is an effort by the government to try to improve sustainability of the fishery. Similarly, the boat buyout program was introduced to reduce the total fleet of boats fishing and thus, reduce the environmental impact on the fishery. However, the voluntary nature of these programs limits their potential impact.

Many large industrial fleet owners have significant political power and influence. As a result, their preferences may influence public fishery management decision making. It is notable that although they have not closed the door on future involvement in the catch shares system, industrial fishermen refused to participate during the 2009-2010 season. Artisanal fishermen have potential indirect control over fishery management due to their large numbers and capacity to demonstrate when they view government policies as unfavorable.

Indirect control could be exerted on the fishery by shrimp purchasers in the value chain. Most wild-caught shrimp exports are purchased by U.S. importers. These companies have significant control over price negotiations and their quality standards also influence shrimp handling and processing. Currently, there are no importers trying to impact sustainable fishing practices in Sinaloa. However in research interviews, several Gulf of California shrimp buyers, including importers and distributors, expressed interest in sustainable shrimp products. While this interest did not appear strong enough to influence changes using financial support or pressure exerted on producers, it seems to indicate a market for verifiably sustainable shrimp products. Such a market interest suggests the potential to influence at least some portion of producers to change fishing practices in order to appeal to this niche market. Nonprofit organizations are implementing sustainable fishery management practices and collaborating with producers. Thus, some of these organizations have influence on fishery management in Sinaloa, but their leverage is relatively limited.

6.4 Highly Concentrated Market

- Exporters/importers
- Distributors

The export/import market for wild-caught Sinaloa shrimp is highly concentrated. As of February 2010, this report identified 10 exporter and U.S. importer companies purchasing wild-caught shrimp in Sinaloa. Most importantly, research interviews indicate the market share of the two largest importing companies, Ocean Garden Products and Meridian Products, Inc. to be approximately 85%-90% of the export market. With the majority of wild-caught shrimp exports being purchased by two companies, there is less opportunity for producers to leverage power over the shrimp sale price by seeking other buyers. As a result, U.S. importers have leverage at this level of the supply chain. Currently, there are no signals pointing to efforts by these importers to improve sustainable practices among fishermen. However, as shown in Table 16, some import companies mentioned interest in a sustainable shrimp product. This indicates a potential market for shrimp meeting sustainability specifications, but it does not necessarily indicate the importer has plans to use its influence to assist development of such a product.

The distributor stage of the U.S. shrimp import value chain also indicates a relative concentration of distributors purchasing and distributing shrimp from the Gulf of California. Ten U.S. specialty seafood distributors, selling primarily seafood products, and a few full-line distributors, dealing with a wide range of food products, were identified, whereas no sustainable seafood marketers or retailers disclosed purchases from the region. Thus, it appears U.S. specialty seafood distributors have relative leverage over shrimp import purchases. All distributors interviewed noted the high value and quality of wild-caught shrimp products from the Gulf of California and some indicated an interest in a sustainable product from the region that could meet the demands of niche customers. Most mentioned a willingness to pay some premium for that type of product, but all

indicated it would be a relatively small premium due to the fact that the product is already one of the highest priced in the shrimp market.

6.5 Single Player With Greater than 20% Market Share

- Industrial producer (*Promarmex*)
- Exporters/importers
- *Retailers, food service* (potential)

Promarmex is the single largest producer coalition in Sinaloa. With 300 trawl boats and a potential fishing capacity of 6,800 tons (ProMexico, 2010), it accounts for approximately 70% of Sinaloa's wild-caught products. As mentioned above, both Ocean Garden Products and Meridian Products have greater than 20% market share in the exporter and importer stage of the value chain and, thus, have leverage over a large number of producers. This leverage could heavily impact fishing practices if they chose to use it to incentivize environmental sustainability. On the other hand, as large profitable businesses in the current market environment, it may prove difficult to move these companies towards new market opportunities if they require costly investments and broad-based changes.

Although interviews with retailers, food service companies, and food management companies indicated that very few are currently sourcing wild-caught shrimp products from Sinaloa, some expressed interest in sustainable wild-caught shrimp products. If producers in Sinaloa were able to develop a verifiable, high quality sustainable shrimp product, it is possible that one of the larger buyers would consider purchasing it. If they did so, the large quantities needed to supply a large retailer, or in some cases a food service or food management company, would likely mean that company would have a greater than 20% market share for those products. As a result, the company would have greater influence on the product price, potentially reducing the premium available.

6.6 New Market Potential

- Nongovernmental organizations
- *Processors* (potential)
- *Exporters/U.S. importers* (potential)
- *Distributors* (potential)
- *Retailers, food service and food management companies* (potential)
- *Mexican domestic market* (potential)

New market opportunities have the potential to influence changes in fishing management or practices if they are viable economic opportunities that may cover costs associated with those changes. There are a number of small actors who may be involved in developing new markets

for Gulf of California shrimp. The economic downturn experienced from 2008 until the present (March 2010) is forcing many producers, marketers, and importers to look for new market opportunities for wild-caught shrimp. Within the value chain actors, however, only one group stood out as working distinctly in this area and that is non-profit organizations and foundations. Many of these are environmentally focused organizations, such as EDF, World Wildlife Fund and Sustainable Fisheries Partnerships, which see new market potential as a way to encourage sustainable fishing management practices.

Despite the fact that nongovernmental organizations appear to be the only major actors currently making strides to increase market opportunities for sustainable products, many other actors have the potential to influence new market opportunities. They include processors, exporters and importers, U.S. seafood distributors, U.S. retailers and food services and food management companies, and the Mexican domestic market. New market opportunities lie with each of these actors and if producers are able to tap those opportunities, these actors would gain leverage within the supply chain.

For example, as mentioned above, if large U.S. retailers or food service companies were to begin sourcing wild-caught shrimp from the Gulf of California, sustainable or not, the large quantity and high quality of the product needed would likely give them power over how producers and processors are handling the catch and the product's price. Additionally, processors that are part of large, vertically integrated companies, may have an opportunity to develop their own environmentally friendly branded products and to make changes that would improve the marketability of those products through new packaging and processing, such as more individually quick frozen products or providing more information about positive fishing practices on product labels. Smaller processors are less likely to have such opportunities because their processing and packing requirements are dictated by their buyers. However, all processors could work to implement improvements in the traceability of the shrimp products processed in their plants, thus increasing the desirability of their products in the U.S. marketplace.

Exporters, U.S. importers and distributors could collaborate with producers and processors to develop sustainable or environmentally friendly wild-caught shrimp products if they see a market for these in the United States. Furthermore, the domestic market offers potential to expand wild-caught shrimp sales regardless of sustainability status, particularly when sales to the U.S. market are weak. Lastly, the European Union is another market that may have interest in sustainable or environmentally friendly shrimp products. Thus, if Marine Stewardship Council certification is received, that is another market to which these products may appeal.

VII. Recommendations

Wild-caught Mexican shrimp is one of the highest value shrimp products available in the U.S. market. As such, it garners a price premium over many other shrimp products. It appeals primarily to high-end restaurants and specialty shrimp distributors. However, the Gulf of California shrimp fishery faces a number of environmental challenges including poor shrimp stock status for some species, negative ecosystem impacts from fishing gear, and overall fishery management concerns. The federal, state, and local government institutions involved with fishery management are making positive steps to reduce the impact of shrimp fishing on the resource while maintaining shrimp as a valuable commodity. Further steps to improve fishing practices in an environmentally sustainable way will require collaboration from fishermen themselves. Thus, finding new market opportunities to help offset the costs of making sustainable fishing practice changes may increase their willingness to participate in new sustainability efforts.

This value chain report focused on illustrating the paths of Sinaloa wild-caught shrimp to U.S. markets and the various players involved along the value chain. Our research uncovered a number of new market opportunities for Sinaloa wild-caught shrimp and we identified six main recommendations for the report client, EDF:

- 7.1 Pursue Marine Stewardship Council certified shrimp products that would appeal to the U.S. sustainable seafood markets;
- 7.2 Develop an “environmentally friendly” shrimp product in collaboration with interested U.S. buyers;
- 7.3 Improve existing shrimp products by developing more stringent quality, monitoring, and traceability guidelines for Sinaloa shrimp producers;
- 7.4 Conduct additional research into domestic market opportunities and developing a national strategy for marketing wild-caught shrimp in the domestic market; and
- 7.5 Continue to support and encourage government sustainability efforts;
- 7.6 Assist producers and processors in finding new value added opportunities for increasing domestic and international market.

The recommendations outlined above and described in more detail below are targeted to EDF, the report client, and are suggested directions for its continued work on sustainable fishery management in the Gulf of California. It is not expected that EDF can pursue all of these recommendations simultaneously. Each recommendation is independent of the others and could be completed independently or in coordination with another recommendation. The report authors also suggest that EDF continues to expand its partnerships with government institutions, nongovernmental organizations, and shrimp buyers in the United States to complement the recommendations it selects to pursue.

7.1 Pursue a Marine Stewardship Council Certified Sinaloa Shrimp Product

EDF and/or its partners should develop a team of stakeholders interested in creating a Marine Stewardship Council (MSC)-certified shrimp product and pursue fishery pre-assessment and product certification. This recommendation was identified based on the potential to appeal to the niche U.S. sustainable seafood market within which there is currently no large, warm-water MSC-certified shrimp product. Furthermore, some large U.S. retailers and food service management companies have made public commitments to buying only MSC-certified wild-caught seafood products. Many of the buyers interviewed expressed an interest in a sustainable shrimp product from the Gulf of California region. Due to this interest and market momentum among some large companies to publicly commit to purchasing MSC-certified products, the report authors recommend pursuing MSC certification, which is widely recognized as the gold standard for sustainable seafood products.

Potential stakeholders include producers interested in pursuing MSC product certification, government officials from CONAPESCA, INAPESCA and SAGARPA, other nongovernmental organizations working in the Gulf of California on shrimp-related issues such as Sustainable Fisheries Partnership and World Wildlife Fund, and any U.S. buyers interested in purchasing the product.

Implementation of this recommendation would include:

- a) Hiring an MSC-approved assessment organization to conduct a fishery pre-assessment to identify barriers or challenges producers face to successful MSC certification;
- b) In partnership with stakeholders, addressing certification barriers identified in the pre-assessment and modifying the practices of producers interested in developing the sustainable product; and
- c) Funding a full MSC assessment of selected Sinaloa producers.

This is a long-term recommendation that would most likely take four to five years to complete. A full assessment following a pre-assessment will probably take one to two years and, if certification is received, it may take an additional year or two to develop a new brand and marketing strategy for the certified product. In addition, funding is needed for both the pre-assessment and full assessment, which together may cost between US\$50,000 and several hundred thousand dollars. Based on the potential challenges facing the Gulf of California shrimp fishery as a whole and the costs and time frames of the MSC certification process, the report authors recommend EDF and its partners initially pursue MSC certification with a select group of producers. Depending on the success of the certification process and U.S. market response to the product, EDF and other participating stakeholders may at a later time consider the possibility of a full assessment including more producers or the larger Gulf of California shrimp fishery.

7.2 Develop an “Environmentally Friendly” Shrimp Product

EDF and/or its partners should collaborate with buyers interested in “environmentally friendly” shrimp products to develop wild-caught shrimp products that would meet their environmentally friendly criteria. This recommendation is the result of interest expressed in interviews by many U.S. buyers to purchase a more environmentally friendly wild-caught shrimp product that is both verifiable and traceable. Levels of interest surrounding sustainability vary from buyer to buyer, thus, it will be necessary to connect directly with buyers individually to determine their specific environmental interests.

Implementation of this recommendation would include:

- a) Contacting U.S. specialty seafood distributors or specific retailers and food service companies interested in environmentally shrimp products to discuss their specific interests in Gulf of California shrimp products;
- b) Identifying shrimp producers willing and able to make the changes necessary to meet individual buyer interests;
- c) Differentiating these products from other wild-caught shrimp products from the Gulf of California through new branding and marketing; and
- d) Assisting producers and processors in developing a labeling system to ensure the traceability of these products throughout the value chain.

The report authors suggest a three-tiered strategy for contacting interested buyers. First, contact Monterey Bay Aquarium to determine if any shrimp produced in Sinaloa would meet their standards for “best choice” or “good alternative” seafood. If any of the products would meet those criteria, discuss the potential to work with Monterey Bay Aquarium to supply its established network of U.S. partners focused on sustainable seafood. Second, contact specialty seafood distributors identified in this report as having an interest in sustainable seafood to determine their criteria and volume interest with respect to such a product. Third, contact large retailers with specific seafood sustainability goals, such as Wegmans and Whole Foods, to determine if some Sinaloa producers could meet those criteria and supply products to them. The great variation in buyer sustainability interests, quality requirements, purchasing volumes, and buying price necessitates company by company communication to determine viability of environmentally friendly Sinaloa wild-caught shrimp products in the U.S. market.

7.3 Improve Quality Standards, Traceability, and Monitoring

EDF and/or its partners should create guidelines to help producers and processors meet the quality standards of large U.S. buyers not currently purchasing Mexican wild-caught shrimp products. These guidelines should improve the quality control standards on boats and in processing plants and ensure traceability along the entire Sinaloa shrimp value chain.

Research interviews identified quality of the shrimp product as one of the primary factors in purchasing decisions for U.S. buyers. One buyer had concerns about the grade of shrimp products sent from the region and some buyers indicated they did not purchase wild-caught shrimp from the Gulf of California because the processing quality did not meet their high standards. In a few cases, U.S. buyers had concerns regarding a processor's accuracy of classifications by source and size. Thus, improvement of trustworthiness and processing quality has the potential to increase U.S. buyer demand for Sinaloa shrimp and may increase its market value. Sinaloa producers and processors seem unaware of buyer concerns regarding production and processing quality. New guidelines produced by EDF could have a significant impact if producers and processors are made aware of these buyer concerns and if the guidelines are effectively implemented to improve quality standards along the value chain.

Implementation of this recommendation would include:

- a) Working with U.S. importers and retailers not currently purchasing shrimp in Sinaloa to determine the quality and monitoring standards needed to meet their purchasing requirements;
- b) Developing guidelines for monitoring systems that identify shrimp by lot number, record shrimp product temperatures from catch through all processing and packing stages, and prevent mixing of wild-caught and farmed or differing classification grade shrimp products;
- c) Making producers and processors aware of quality concerns; and
- d) Partnering with producers and processors to implement the proposed guidelines.

Making the necessary quality, monitoring, and traceability changes required by a new set of monitoring and traceability guidelines could take a few years. Thus, while developing guidelines may be a shorter-term recommendation, implementation of those guidelines by some producers and processors may be a long-term process. Furthermore, this recommendation is generally focused on efforts to increase market opportunities for industrial producers whose boats have the capacity to refrigerate catch and on which a larger crew of fishermen would be working. It is unlikely that artisanal fishermen would be able to make the necessary changes to adopt the fishing practices and documentation required to meet large U.S. buyer demands. Nonetheless, improving the quality, monitoring, and traceability of artisanal products would be important to any efforts to differentiate artisanal shrimp in the U.S. market.

7.4 Develop New Domestic Market Opportunities

EDF and/or its partners, in connection with the Mexican Shrimp Council, *Secretario de Desarrollo Económico del Gobierno de Sinaloa*, and other domestic players, should complete additional research into existing and new domestic market opportunities for wild-

caught Gulf of California shrimp and develop a national strategy and policies for tapping the domestic market. Multiple interviewees noted the possibility of increasing sales for wild-caught shrimp in the domestic market. While recent growth in domestic shrimp consumption is largely due to the increasing availability of inexpensive, smaller, farm-raised products (Robles, 2009), almost all the individuals interviewed believe the domestic market is underdeveloped and could be a potential new outlet for wild-caught shrimp.

Implementation of this recommendation would include:

- a) Conducting further research into domestic market demand for higher quality, larger shrimp, marketing strategies for wild-caught shrimp products, and opportunities to reduce the use of intermediary networks.
- b) In partnership with other stakeholders, developing a coordinated, national strategy for accessing the domestic market.

Although this report did not include an in-depth study of domestic market opportunities, the domestic market may offer good alternative sales options for wild-caught shrimp producers, particularly when the international price for shrimp falls significantly as it has done over the past two years. Furthermore, some domestic market strategies may be applicable in the near-term, while other international market opportunities may take longer to develop. Thus, research into these opportunities by EDF or its partners would likely benefit Mexican shrimp producers.

7.5 Encourage and Support Government Sustainability Efforts

EDF and/or its partners should continue to work closely with Mexican federal, state, and local authorities to implement more sustainable fishing management systems and assist them with evaluating incentive and support programs for producers. This recommendation was identified because of the relative leverage the government has with respect to both direct and indirect control over producers. In some cases, it is possible that the government's indirect leverage may be more effective in incentivizing environmentally sustainable changes. For example, subsidies and tax relief for producers are financial benefits that producers want to access; thus, government institutions could use these as rewards for meeting certain environmental policy changes.

Implementation of this recommendation would include:

- a) Continuing support and assistance to CONAPESCA in implementing the quota system and gaining industrial producer participation;
- b) Continuing to support and assist CONAPESCA in implementing the *ordenamiento* and monitoring fishing boats;
- c) Working with government agencies to evaluate the economic, environmental, and social impacts of their fishery support programs and determine what opportunities, if any, may exist for modifying those programs such that they continue to offer

economic benefits to producers while concurrently supporting environmentally sustainable fishing techniques and technologies. Examples include:

- i. Replacing the gasoline tax subsidy with measures to incentivize sustainable fishing (support for acquiring bycatch reduction devices, rewards for quota participation, etc.);
- ii. Evaluating effectiveness of the Shrimp Vessel Decommissioning Scheme.

The Mexican government appears to be making significant efforts toward improving the sustainability of shrimp fishery management in Sinaloa and throughout the Gulf of California. Implementation of the *ordenamiento* and quota system experienced some success thus far in the 2009-2010 season. However, continued support for those programs will be needed to help them expand and improve monitoring.

Current subsidies given to fishermen appeal to fishermen's economic interests and may have unintended negative consequences on the environment. For example, the Marine Diesel Subsidy Program which subsidizes 20% of a fisherman's diesel costs is enabling some fishermen who otherwise would not be profitable to continue fishing despite evidence that a reduction of catch may benefit the health of the fishery. Instead, funding for this program could be used to help incentivize fishermen to upgrade their boats or change fishing practices in a way that would decrease their environmental footprint. For example, the government could consider only providing diesel subsidies to fishermen using approved artisanal nets or whose industrial boats' catch systems incorporate bycatch reduction devices to reduce the impact trawl boats and other nets have on non-target species. Alternatively or in addition, the subsidy could be offered only to participants of the quota system. Similarly, evaluating the effectiveness of the Shrimp Vessel Decommissioning Scheme to reduce overall fishing effort could help the government determine if this is a valuable use of government resources and should be continued or modified in any way.

7.6 Help Find New Value Added Opportunities

EDF should work with producers interested in appealing to new U.S. markets to expand value added opportunities for their wild-caught shrimp products. Research interviews indicated many Sinaloa producers lack capacity to supply individually quick frozen (IQF) products that are in high demand among retailers and other U.S. buyers. In addition, other interviewees suggested that in both the U.S. and domestic markets, more attractive and informative packaging that indicates the product's source, nutritional value, and cooking suggestions could increase interest and attention to the wild-caught shrimp products (T. Carrillo, 2009). Research uncovered other ideas for value added processes with potential to increase demand in the domestic market such as selling more shrimp in boxes rather than on open ice and developing smoked shrimp products for the domestic market (Gonzalez, 2009).

Implementation of this recommendation would include:

- a) Coordinating with government financial institutions and nongovernmental organizations to determine a funding source to assist processors in purchasing new machinery for value added processing, such as those for producing IQF products.
- b) Collaborating with existing buyers to develop more attractive and informative packaging, particularly for the domestic market.
- c) Evaluating potential market interest for shrimp sold in different sized boxes or for new smoked shrimp products.

Research indicates there are no value added opportunities for secondary processing, such as breaded, canned and microwave cooking products, because such processing is only done with lower-quality shrimp products to increase its appeal in the market. It does not offer any value addition to high quality, large, wild-caught shrimp products like those produced in Sinaloa. This recommendation is lower in priority than the other recommendations because it was mentioned as a new market opportunity by only a few interviewees. Nonetheless, with select U.S. buyers or within the domestic market, this recommendation may open up new sales opportunities.

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IX. List of Interviewees

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- Cassano, Edward. Senior Director, Monterey Bay Aquarium. October 17, 2009.
- García Caudillo, Juan Manuel. Consultant on Central American and Caribbean Fisheries, Sustainable Fisheries Partnership. September 25, 2009.
- Church, Brent. President, OFI Markesa. September 16, 2009.
- Cottone, Michel. Buyer, Empress International. January 20, 2010.
- Cudney, Richard. Associate Program Officer; Jeanne McGinnis, Program Associate; Packard Foundation. October 20, 2009.
- Dennill, Robert. Associate Vice President, Aramark. November 4, 2009.
- Elliott, Matthew. Senior Associate, Sea Change Management, LLC. October 13, 2009.
- Fitzgerald, Tim. Scientist, EDF Oceans Program. September 17, 2009.
- Franklin, Eric. President, Pacific Breeze. December 11, 2009.
- García Caudillo, Juan Manuel. Consultant on Central American and Caribbean Fisheries, Sustainable Fisheries Partnership. September 25, 2009.
- Greenberg, Mitch. Senior Director, Supply Management; Sodexo. October 9, 2009.

- Guadarrama, Luis. Project Manager for the joint EDF/WWF fisheries project, World Wildlife Fund. August 31, 2009.
- Harvey, David. Agricultural Economist, The United States Department of Agriculture Economic Research Service. November 4, 2009.
- Holler, Stephan. Naturland International. November 4, 2009.
- Ish, Teresa. Kuulakai Consulting. September 11, 2009.
- Johnson, Howard. Director, Global Programs, Sustainable Fisheries Partnership. September 23, 2009.
- Kimble, Ken. Assistant General Merchandise Manager of Corporate Foods and Sundries, COSTCO. September 25, 2009.
- Kock, Logan. Vice President of Strategic Purchasing & Responsible Sourcing, Santa Monica Seafood. September 21, 2009.
- Lam, Davy. President, Tai Foong/Northern Chef. September 23, 2009.
- Lovejoy, Henry. Founder & CEO, EcoFish. October 9, 2009.
- Martin, Rick. Executive Director, Red Chamber/Meridian Products. October 6, 2009.
- More, William. Director, Aquaculture Certification Council. November 23, 2009.
- O'Shea, Tim. Chairman and Co-Founder, CleanFish, Inc. October 6, 2009.
- Ozuna, Pablo. Director of Operations, Pacific Wild Shrimp. December 20, 2010.
- Pelc, Robin. Fisheries Research Analyst, Monterey Bay Aquarium. October 12, 2009.
- Reilly, Amy. Manager of Communications, Target. November 10, 2009.
- Reyes, Allan. Sales, Pucci Foods. January 22, 2010.
- Rodriguez, Laura. Fisheries Analyst, Environmental Defense Fund. August 31, 2009.
- Sales Representative, Crystal Cove. November 19, 2009.
- Sales Representative, M.P.I. Fisheries, Inc. January 8, 2010
- Sales Representative, Inland Seafood. November 16, 2009.
- Sales Representative, Pacific Breeze Seafood. December 11, 2009.
- Sales Representative, Pescanova. October 12, 2009.
- Sales Representative, SouthFresh. January 22, 2010.

- de la Serna, Rodrigo. Operations Manager, Ocean Garden Products. November 4, 2009.
- Shin, Ryan. Seafood Sales Representative, Pacific American Fish Co. January 13, 2010
- Taranovski, Tania. Operations Manager, Sustainable Seafood Advisory Services, New England Aquarium. October 8, 2009.
- Thompson, Jennifer. Director of Communication, Harris Teeter. November 19, 2009.
- United States Department of Commerce, Office of Sustainable Fisheries, International Fisheries Division. November 13, 2009.
- United States National Marine Fisheries Service, November 12, 2009.
- Wood, Daniel. President, Deep Sea Shrimp Importing, Inc. October 17, 2009.
- York, Helene. Director of Strategic Initiatives, Bon Appétit Management Company. November 11, 2009.

Mexican Interviewees

- Ahumada Inda, Omar. Director, *Productos Congelados Bajamar S.A. De C.V.* December 30, 2009.
- Becerril, Alfredo Gonzalez. WWF Project Consultant. November 10, 2009.
- Camacho Torres, Norma Judith. General Manager, Ahome Village Sea Food. December 3, 2009.
- Capaceta, Cristina. Assistant of Director, *Congeladora Doña Choco*. January 27, 2010.
- Carrillo, René. Director, *Comité Sistema Producto Camarón Bahía Sinaloa*. November 23, 2009.
- Chaparro Bojorquez, José Alfonso. *Presidente del Consejo de Administración, Federación de Sociedades Cooperativas Pesqueras, Pescadores del Siglo XXI*, November 23, 2009.
- Cisneros Mata, Miguel Ángel. Director, *Instituto Nacional de Pesca (INAPESCA)*. October 29, 2009.
- De Nicolás Gutiérrez, José Ignacio and Peraza, Daniela. *Secretaría de Desarrollo Económico del Gobierno del Estado de Sinaloa*. December 3, 2009.
- Figueroa, Francisco. President, *Federacion de Cooperativas Pesqueras Guerreros del Sur*. January 21, 2010.

- Hernández, Efrén Romero. *Presidente del Consejo de Administración, Federación de Sociedades Cooperativas de Producción Pesquera Ribereña de Dautillos S.C. de R.L. de C.V.* December 3, 2009.
- Jiménez, Enrique. Director, *Mariscos Congelados de Los Mochis S.A. de C.V.* December 14, 2009.
- Leal, Armando Castro. *Presidente del Consejo de Administración, Federación Regional de Sociedades Cooperativas de la Industria Pesquera del Centro de Sinaloa, F.C. DE R.L. de C.V.* December 11, 2009.
- Leal, José. *Gerente General, Integradora Badepesca, S.A. de C.V.* December 1, 2009.
- Leal Félix, Raúl. *Presidente del Consejo de Administración, Federación de Cooperativas Pesqueras del Municipio de Guasave S.C. de R.L.* December 4, 2009.
- Licón, Héctor. *Dirección General de Ordenamiento Pesquero y Acuícola, Comisión Nacional de Acuicultura y Pesca (CONAPESCA).* October 23, 2009.
- Medrano, Fernando. Director, *Operadora Marítima del Pacífico S.A de C. V. Mazatlán, Sin.* December 18, 2009.
- Mendoza López, J. Guadalupe. President, *Federación Unidos de la Laguna del Caimanero, S.C. de R.L.* January 21, 2010.
- Melendres, Melchor. Director, *Congeladora Mar y Sol S.A. de C.V.* December 28, 2009.
- Morales, Ricardo. *Gerente General, Grupo Maros.* December 22, 2009.
- Muñoz, Jorge. *Presidente, Confederación Nacional Cooperativa Pesquera.* November 30, 2009
- Ontiveros, Félix Jaime. *Presidente de la Federación de Sociedades Cooperativas de Producción Pesquera de Bahía y Aguas Marinas, Altata y Ensenada el Pabellón, S.C. de R.L. de C.V.* December 4, 2009.
- Ono Endo, Sadayoshi. Director, *Congeladora Productos Marinos Japomex S.A. de C.V.* December 17, 2009.
- Osuna, Rogelio. Director, *Pesquera 15 de Septiembre S. A de C. V.* January 13, 2010.
- Osuna Medina, Mario. President, *Federación de Cooperativas Camaroneras de Agua Verde.* January 25, 2010.

- Reyes Moreno, Jorge Luis. Director, *Dirección de Pesca y Recursos Renovables – Fideicomisos Instituidos en Relación con la Agricultura (FIRA)*. November 11, 2009.
- Robles, Alejandro. Program Director, *Noroeste Sustentable*. October 30, 2009.
- Santos, Jorge García. President, *Federación de Sociedades Cooperativas de Producción Pesquera del Sur de Sinaloa*. January 21, 2010.