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Fisheries in Mexico's Upper Gulf of California

A Rapid Analysis of the Shrimp Value Chain, Alternatives and Potential to Protect Livelihoods and Biodiversity

The AFIRMA Project, managed by DAI prepared this publication for USAID review.

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A Rapid Analysis of the Shrimp Value Chain, Alternatives and Potential to Protect Livelihoods and Biodiversity

by

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DAI

Cover photo: Shrimp Trawlers (background) and Pangas (foreground) in Puerto Peñasco, by Ingrid Ardjosoediro

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1.0. Executive Summary

The USAID-funded AFIRMA Project conducted this study to evaluate value chains for shrimp and other fisheries in the Upper Gulf of California in Sonora and Baja California. The study builds upon work of the Mexican Government and others to save the vaquita marina, a porpoise endemic to the Upper Gulf that faces imminent extinction if local fishing practices are not changed. The report focuses on fishing sector stakeholders unlikely to take up non-fishery activities, examining the potential for options that may be socially desirable, economically viable and ecologically sustainable.

In strict conservationist terms the short-term solution to saving the vaquita is simple: remove gillnets from the water. But the Upper Gulf gillnet shrimp fishery[1] makes a major contribution to the local economy and alternate fishing techniques have yet to prove effective locally. Most stakeholders recognize that nuanced approaches are necessary.

The US is the largest export market for Mexican seafood overall and is by far the most important market for the high quality Upper Gulf shrimp. Production from the Upper Gulf is categorized by size, with larger sizes frozen and exported to the US via three main US-based brokers. Mexico competes favorably with Asian and Latin American sources of shrimp in the top categories of shell-on frozen shrimp.

Within end markets, specialized segments include various types of restaurants, institutional food service providers, supermarkets, traditional retailers, and specialized retailers. Many domestic Mexican and international buying trends are converging, especially around the supermarket segment, as Mexican supermarkets are growing and taking market share from traditional market channels. Interest in "sustainable seafood" is growing across market segments, especially in Europe and the US (much less in Mexico), although this term suffers a lack of common definition and is sometimes self-proclaimed without independent verification.

Certified sustainable sources of seafood and shrimp may begin to gain preferential access to certain market channels, while non-sustainable seafood is gradually excluded. Buying guides generally give low sustainability ratings to tropical wild caught shrimp due to very high bycatch ratios and the impact that shrimp trawlers have on the seafloor. Ultimately any market premium or preferred access to attractive channels for those in a position to serve as stewards of diverse marine habitats like the Upper Gulf depends on willing buyers at one or more levels to absorb the real cost of producing sustainable seafood. While costs can be shared, ultimately real demand among retailers and consumers must exist for these approaches to scale effectively.

US demand for shrimp and the few companies that serve this demand via the Upper Gulf have predominant influence (i.e. value chain governance) in the shrimp chain, setting conditions for the largest shrimp that include packaging standards (passing related costs to fishermen) and conditions for (and availability of) trade credit. Most credit available to producers in the chain is informal or semi-formal trade credit that US and national brokers extend to fishermen, interest-free, prior to the shrimp season in return for commitments to sell them shrimp during the season. In addition to this traditional trade credit, there are

[1] A brief explanation of gillnetting is available at the Monterey Bay Aquarium's Seafood Watch Program: http://www.montereybayaquarium.org/cr/cr_seafoodwatch/sfw_gear.aspx#gillnetting

formal and informal sources of financial services in the region, although access to credit and savings for fisheries remains restricted.

Shrimp trawlers are important producers in the Gulf of California overall, but have been removed from the protected area and no longer factor into production in the Upper Gulf, which is left to artisanal fishermen. Licensed artisanal shrimp fishermen in the Upper Gulf are members of cooperatives whose primary function is to provide documentation for legal shrimp and fish commercialization. There is good export quality processing and transportation capacity in the Upper Gulf region, in each of the three communities.

Cooperatives have splintered in recent years, now representing extended families or small groups of families. Some cooperatives have offered loans to their members in the past, although this is limited, and less relevant as an external source of funds. The number of fishing licenses is declining as a result of the federal government's buy-out programs, designed in response an initiative by Mexican President Felipe Calderon to save the vaquita while supporting alternative livelihoods for fishermen. Important progress is being made, led by the Environment Ministry (SEMARNAT) and much work remains. But buy-out initiatives do not affect unlicensed fishermen that continue to operate, other than to give them less competition, and alternative opportunities are yet to be proven successful.

Other fisheries that play a complementary role for artisanal fishermen in the Upper Gulf during the shrimp off-season vary across the three communities analyzed, but include curvina golfina, sierra, crab (*jaiba*), sole (*lenguado*), and shark.

While recognizing clear needs to continue traditional conservation efforts, the authors recommend complementing and supporting ongoing initiatives, with emphasis on improved market information, and market linkages that could promote alternative technologies, production techniques and fisheries. Specific recommendations include:

- Develop **market linkages for sustainable fisheries** in parallel with the Environment Ministry's (SEMARNAT) subsidized "try-out" of new fishing gear designed to eliminate vaquita bycatch and significantly reduce overall bycatch. The goal here would be to test the hypothesis that trends in sustainable seafood could lead to attractive market channels for sustainable shrimp and for alternative fisheries that are contributing to preservation of the vaquita marina.

- Define and help local actors meet Upper Gulf shrimp **sustainability standards**. The authors are not generally in favor of proliferation of certification standards because it confuses consumers, and consumer recognition and trust in certification schemes is fundamental to any potential differentiated price stability or premium. But given the circumstances, there is good rationale for interim "vaquita-free" or standards that the National Ecology Institute (within SEMARNAT) is considering. These might be designed to ultimately feed into more recognized standards.

- **Promote emerging aquaculture standards compliance** as a part of plans to re-activate shrimp farms in the Upper Gulf. International experience with shrimp farming has shown that shrimp aquaculture can be managed for both economic and environmental sustainability. Absent such efforts, shrimp farms can cause significant environmental damage. Local plans for converting shrimp fishing licenses to shares in a professionally managed shrimp farm should account

carefully for national and global trends in aquaculture, and access to markets, potentially related to Aquaculture Certification Council certification.

- **Support market linkages for alternatives to the shrimp fishery** for fishermen and cooperatives considering switching to alternative gear and licenses. Public subsidy is welcome, but there are few better incentives to switch than the success of a peer who has done so. Success depends on application of proven technologies and market connections; commercialization in an alternative fishery involves different sets of actors and dynamics. Potential alternatives include:

    - ***Geoduck Clam*** (*panopea abrupta*, *"almeja generosa")* a large high value clam that divers collect in Puerto Peñasco and sell to a single buyer who exports to Asia. Official collection in Puerto Peñasco is limited, as it is technically still in research stage, but there is concern that the clams are being collected without sufficient replacement. Once the species is better understood and a sustainable management plan is established, it may present important opportunities. One possibility is to consider looking into catch shares, in which the fishery is managed for overall sustainability and long-term business viability and stakeholders own shares of the returns, which would require greater organization and coordination.

    - ***Crab fishery*** (Puerto Peñasco) – Recent declines in blue crab production in the US may represent an opportunity for crab fisheries in Puerto Peñasco. Phillips Foods, a distributor of Maryland-style seafood is reputed to be looking into new sources.

    - ***Trapped Pescado Extranjero*** may be relatively more easily certified as a sustainable fishery since this technique does not have any major bycatch and could be one alternative to gillnet fishing. The fishery shows good early results in terms of yields but more work is necessary on marketing. Such initiatives should be supported and encouraged by looking into potential domestic and export markets in the short-term and in the long term considering different certification schemes based on the needs of conservation and end markets.

    - Upgrading the ***curvina golfina*** fishery in Golfo Santa Clara to be managed for increased long-term value, producing a range of products beyond third-tier whole gutted fish (the only product produced today). This would require investment at the level of 1-2 processors in Golfo Santa Clara and deep coordination with fishing cooperatives and local and federal government on post-catch handling.

- **Maintain Agility in Support Programs** - the fluid situation in the Upper Gulf will require continuing to refine and adjust subsidy programs, as the Government of Mexico has done, ensuring that they keep pace with changes in the environment, changes in the market, and changes among those they're meant to benefit. For instance, if over time fishermen acquire better market information and linkages, and further diversify their income sources, subsidy might shift from direct support of individuals to greater emphasis on sector-wide efforts.

2.0. Introduction & Background

The USAID-funded AFIRMA Project conducted this study to evaluate shrimp and fisheries practices in the Upper Gulf of California / Sea of Cortez (*Alto Golfo*) in the Mexican states of Sonora and Baja California. As part of the project's initiatives in preservation of biodiversity in Mexico, AFIRMA has prioritized this region in response to clear and urgent threats to the world's smallest marine mammal, the vaquita marina, and to the attractive export market served by the inshore (artisanal) fishermen whose gillnets capture vaquita as incidental bycatch.[2]

Ongoing conservation efforts and livelihoods are intricately intertwined in the three primary fishing communities of the Upper Gulf analyzed here. Most public and private sector and NGO stakeholders in the Upper Gulf and at national and international levels now recognize that alongside traditional conservation methods, meaningful alternative livelihoods and/or alternative fishing techniques will be part of any lasting solution.

2.1. Objectives and Approach

This study builds upon the intensive work of the GoM and others to save the vaquita, focusing here on the segment of the fishing sector that is *unlikely* to take up non-fishery activities[3], but who could ultimately contribute to saving the vaquita while also preserving their livelihoods. The authors use a value chain approach to examine current and potential market dynamics in Upper Gulf fisheries, focusing primarily on the shrimp value chain, by far the region's most important in economic terms. The study also examines other fisheries and techniques that could potentially emerge as attractive alternatives to gillnet shrimp fishing.

The study addresses economic and financial dynamics, within firms and cooperatives and among firms, cooperatives and other value chain actors, to suggest interventions that might spur viable results throughout the chain, while also mitigating threats to biodiversity.

This notion is simple to put on paper and complex to implement. Nevertheless, by recognizing and honoring the years of effort of the region's many organizations, individuals, families and firms involved in fisheries, and the years of effort that conservationists and biologists have dedicated to saving the vaquita, the authors hope to make a modest contribution; assessing market options that are *socially desirable*, *economically viable* and *ecologically sustainable* and offering insights to support new ways forward.

The findings presented here are based on review of existing literature and on field interviews carried out in March-April 2009 with leaders of fishing cooperatives and federations, intermediaries and buyers, as well as public and private sector fisheries experts, biologists and conservationists.

[2] AFIRMA initially prioritized the Alto Golfo in coordination with Mauricio Cervantes, Director of the Northwest Regional Office of Conservation International, and is grateful for the introductions and head-start on this initiative that Mr. Cervantes provided.

[3] AFIRMA / DAI has conducted a parallel study on the potential for ecotourism in the region: Miguel Baca, Ivana Fertziger, "Ecoturismo en Alto Golfo, Evaluacion de la cadena de valor y oportunidades." AFIRMA, Development Alternatives, Inc., May, 2009.

The report is organized into four main sections in addition to the executive summary and this introduction. The next section is a brief overview of conservation efforts in the Upper Gulf meant to give the reader a sense of the context in which the study was conducted, rather than as a resource on vaquita conservation. The following section analyzes broad trends in the world market for shrimp production, and Mexico's role in the global shrimp market, followed by a section on trends in end markets for shrimp, with emphasis on sustainable seafood and shrimp. An analysis of dynamics among actors in the Upper Gulf shrimp value chain follows. The final section outlines opportunities for upgrading in the shrimp value chain with a focus on sustainability, and diversification away from gillnet shrimp fishing towards alternative techniques and fisheries.

2.2. Brief Overview of Vaquita Conservation Efforts[4]

The World Conservation Union lists the vaquita marina (*Phocoena sinus*, Figure 1) as critically endangered. It is now the world's most endangered marine cetacean, following the loss of the Baiji river dolphin in the Yangtze River in China, the first marine mammal declared extinct.[5] The most recent estimate of the number of remaining vaquitas based on sighting expeditions and acoustic detection conducted in late 2008 is 150 animals.

Figure 1 – Illustration of Vaquita Marina, by William Shepard

Source: William Shepard, in "Phocoena sinus, North American Conservation Action Plan", Trilateral Commission on Environmental Cooperation (CEC) report on the Vaquita, Montreal, Quebec, Canada, 2008.

Biologists and experts have established that the vaquita's principal threat is incidental bycatch in gillnets set for shrimp and fish, and estimate recent mortality by this means at 30-40 per year. Many conservationists, biologists and other stakeholders agree on the need for a permanent ban on gillnets in the area of the three main fishing villages in the Upper Gulf: Golfo Santa Clara and Puerto Peñasco in Sonora, and San Felipe in Baja California, although there is much less agreement across sectors on *how* to carry this out.

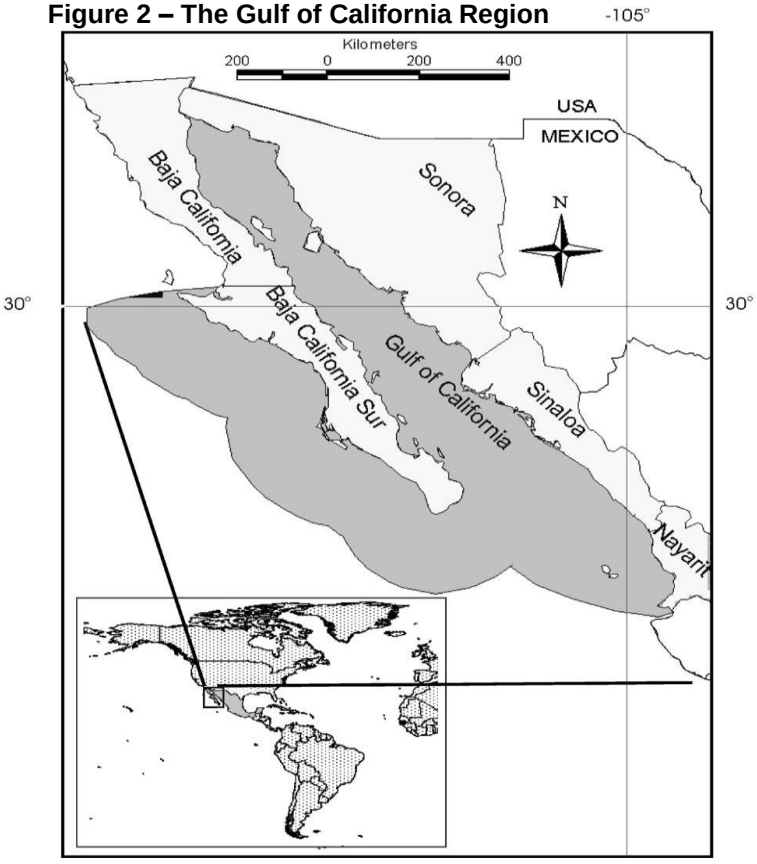
Given the stigma attached with catching a vaquita, there is currently no reliable way to track the number of vaquita caught in gillnets, but considering the remaining population, leading vaquita experts put the "acceptable" bycatch at no more than 1 per year.[6] If the *status quo* persists, at current rates of bycatch biologists estimate that the vaquita will last

[4] There are numerous authorities on this topic in Mexico and internationally publishing important work. This section is meant simply to provide context for the analysis presented in this report, not as a comprehensive review of the situation, which would be outside the study's scope. See Annex B for other sources of information.
[5] Covered by Independent filmmaker Chris Johnson, "Wake of the Baiji" Whale Trackers, http://www.whaletrackers.com/wake-of-the-baiji/ also written up by Richard Black, "Rare river dolphin 'now extinct'", BBC, August 2007. http://news.bbc.co.uk/2/hi/science/nature/6935343.stm
[6] Interview with one of the world's foremost experts on the vaquita marina, Biologist Lorenzo Rojas, April 6, 2009.

only 2 more shrimp seasons before falling below population numbers from which it could recover.

However, many government and private sector stakeholders, including some fishermen and their cooperatives, are making important efforts and commitments to *change the status quo*. Although the vaquita is endemic to the Upper Gulf, the Trilateral (Mexico, USA, Canada) Commission for Environmental Cooperation (CEC) lists it as a species of common conservation concern in North America. On 27 June 2007, the Council of Ministers of the CEC instructed its Secretariat to initiate collaborative actions to recover the vaquita and promote sustainable local livelihoods (CEC 2007). On World Environment Day, 5 June 2008, President Felipe Calderon highlighted saving the Vaquita among Mexico's top priorities for conservation, instructing federal agencies to address the threats facing vaquita while ensuring the well-being of local fishermen.[7]

Figure 2 – The Gulf of California Region



The Gulf of California Region accounts for approximately 10% of Mexico's GDP, with a human population of about 8.6 million, and a projection of 10.4 million by the year 2010. More than 500,000 tons of shrimp, sardine, tuna and squid, among others species, are caught annually, worth more than US $300 million. Approximately 40% of Mexico's agricultural production comes from the region, mainly from the states of Sonora, Sinaloa and Nayarit. The study area includes the uppermost part of the Gulf of California between the states of Baja California and Sonora.

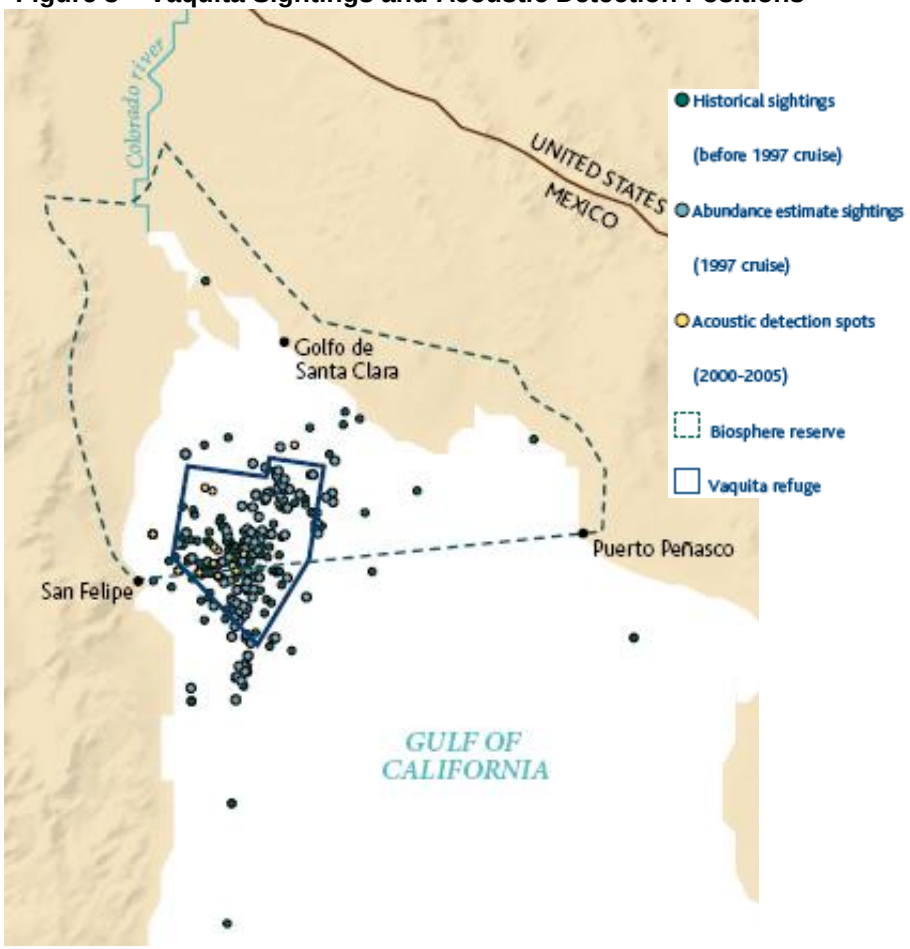
Under President Calderon's leadership, the federal government has dedicated substantial human and financial resources to this end, creating a biosphere reserve and vaquita refuge in the Upper Gulf and a polygon (see Figure 3) in which gillnet fishing is prohibited (and where licensed fishermen are compensated for not fishing) managed by the National Protected Areas Commission (CONANP) with restrictions enforced by Mexico's Environmental Protection Agency (PROFEPA), both under the Environment Ministry (SEMARNAT).

The federal government has convened the public-private International Committee for the Recovery of the Vaquita (CIRVA) to recommend protection measures, and is implementing a plan to remove gillnets from the vaquita's range and compensate fishermen with alternative livelihood options. It is employing 3 well-funded tactics to date through the PACE program:

[7] Speech of President Felipe Calderon "El Presidente Calderón en la Celebración del Día Mundial del Medio Ambiente", 5 de Junio de 2008. http://www.presidencia.gob.mx/prensa/?contenido=36132

- Buy-out: compensating *licensed* fishermen with cash for approved alternative investments (many related to tourism),
- Switch-out: converting to alternative gear, primarily for alternative fisheries since alternative gear that may have worked well elsewhere (e.g. the *Suripera*) has yet to prove effective in the shrimp fishery in the Upper Gulf, and
- Rent-out: a subsidy paid to compensate fishermen for not fishing in the vaquita refuge polygon.

Figure 3 – Vaquita Sightings and Acoustic Detection Positions



Source: Armando M. Jaramillo-Legorreta, in *"Phocoena sinus: North American Conservation Action Plan*", Secretariat of the Commission for Environmental Cooperation (CEC), 2008.

The PACE program, led by CONANP, is having good initial uptake among the target (licensed) fishermen, in terms of compensating changes in livelihoods and techniques (Annex A has further program detail). One limitation of the program is that it can only work with officially licensed operations which in one of the three communities covered, Golfo Santa Clara, are in the minority of all fishermen.

In mid-2009 SEMARNAT will institute a "try-out" strategy to compensate fishermen to try a new fishing gear based on a modified trawler that the National Fisheries Institute (INAPESCA) under the Agriculture Ministry (SAGARPA) has designed (with support from WWF and the Walton Foundation) to minimize incidental bycatch and reduce negative impacts on the ocean floor, as compared to a traditional shrimp trawler. The modified trawler (*chango modificado*) has proven to work well for large shrimp boats, significantly reducing bycatch and improving fuel efficiency, but is yet to be proven for pangas, the only shrimp boats allowed to operate in the protected area.[8] Because this gear requires towing a net (as opposed to the gillnet which is set) biologists believe it is unlikely to catch the notoriously shy vaquita since trawling, despite other negative environmental impacts, was never found to be a major direct threat to vaquita.[9]

[8] Interview with a developer of this technology, Daniel Aguilar, INAPESCA, Mazatlan, April 2009.
[9] Some biologists see this potentially as an interim technology because it will have some negative impact on the local ecosystem, including creating more noise and potentially harming vaquitas' means of communication.

The various agencies leading these initiatives, principally the Commissions on Protected Areas (CONANP) and Biodiversity (CONABIO) and the National Ecology Institute (INE), all under the auspices of the Environment Ministry (SEMARNAT) are doing so in partnership with the private sector, donors such as the Packard Foundation and local and national cooperatives and NGOs, as well as cooperating agencies of other governments, notably through the trilateral (Mexico, US, Canada) Commission for Environmental Cooperation and the US National Oceanic and Atmospheric Administration (NOAA) and the Governments of Great Britain and Japan (in acoustic porpoise detection technology). Annex A gives a brief description of organizations and initiatives the authors found related to saving the vaquita.

Rich Biodiversity in the Gulf of California

The Gulf of California (Sea of Cortez) is among the world's five most biologically diverse and productive marine ecosystems. It is known worldwide for the diversity of cetaceans; almost 40% of all known cetaceans are found in the region. The Vaquita Marina (*phocaea sinus*) or desert porpoise in English, endemic to the Upper Gulf, has the most restricted habitat range of any marine cetacean in the world.

The Gulf of California Region is, for the most part, in a good state of conservation relative to most of the worlds seas. According to the National Biodiversity Commission (CONABIO) at the national level, the region encompasses 23 priority sites for marine biodiversity, 42 priority sites for terrestrial biodiversity and 62 priority sites for the conservation of birds. In addition, the region encompasses 24 out of 110 of the country's priority hydrological basins.

Approximately 4,800 inter-tidal invertebrate species have been identified in the Gulf of California, more than 740 of them endemic, as well as 875 fish species, of which 77 are considered endemic. Five of the seven species of sea turtles existing in the world are found in the region, at least 17 species of seabirds use the islands in the Gulf of California for reproduction purposes, 11 of them are migratory, six residents and five are considered quasi-endemic.

In purely conservationist terms, the short-term solution is simple: remove gillnets from the water. But fishing in general and the Upper Gulf shrimp fishery in particular make major contributions to the local economy and to local livelihoods, especially in Golfo Santa Clara where tourism still plays a lesser role than in Puerto Peñasco and San Felipe. Although the most direct and pressing threat to the Vaquita is now well understood, the social and economic interests involved are less so. These human livelihood aspects are widely acknowledged as important but not easily resolved, in particular for fishermen who want to remain fishermen. Stakeholders agree on the importance of finding alternative solutions for the fishermen involved. They and the value chains in which they participate, especially the shrimp value chain given its economic importance, are the focus of the rest of this report.

3.0. Shrimp Context and Trends

China dominates global seafood production, accounting for 67% of the world's seafood output, producing 34.4 million metric tons (MT) of seafood annually. India is a distant second in terms of seafood production, representing just 6% of the world's seafood output. An increasing proportion of this production globally is farmed, with worldwide aquaculture production having grown 45% since 2000.

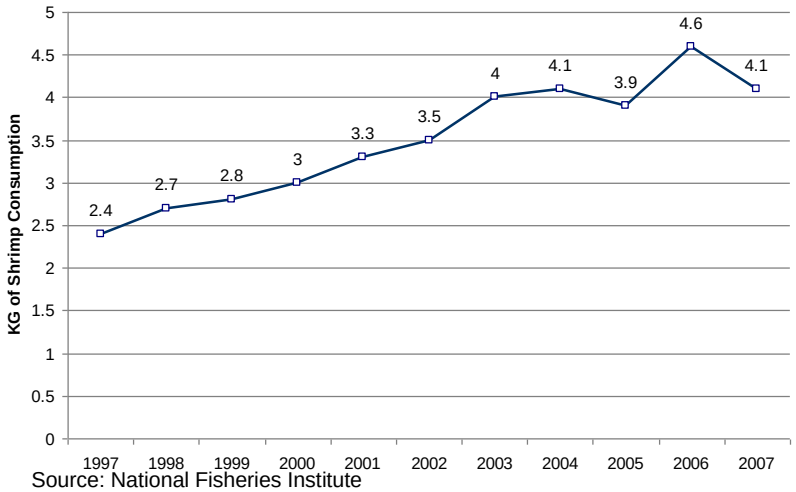
World production of shrimp, both captured and farmed, is around 6 million MT, about 60% of which is traded on the world market. Shrimp is now the most important internationally traded fishery commodity in terms of value. In per capita seafood consumption worldwide, shrimp is ahead of other top seafood items such as tuna, salmon and pollock. Annual

exports of shrimp are currently worth more than US$10 billion, or 16% of all fishery exports. Although over 100 countries export shrimp much of the volume is accounted for by trade flows from a few leading exporters into three areas: the United States, Japan and Europe.

3.1. Export Markets: US Market Outlook and Mexico's Market Share

The US market is the most important export market for Mexican seafood and is by a wide margin the most important market for shrimp from the Upper Gulf. Americans consumed a total of 4.91 billion pounds of seafood in 2007, slightly less than the 4.94 billion pounds in 2006. The US continues to rank as the third largest fish and shellfish consumer, after China and Japan. The US imports about 84% of its seafood, a figure which has steadily increased in recent years. Imports accounted for only 63% of US seafood a decade ago.

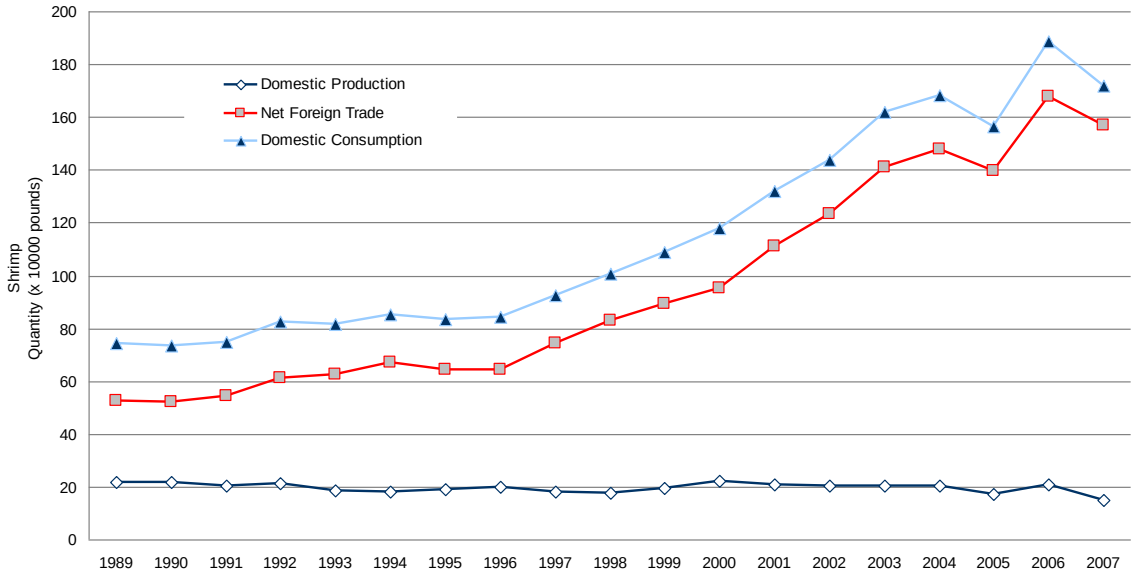
Figure 4 – US Per Capita Shrimp Consumption 1997-2007



Source: National Fisheries Institute

Shrimp remained the top choice for seafood in the United States in 2007 at 4.1 pounds per person, a slight decline from 2006 (Figure 5). Of the total of 16.3 pounds consumed per person, Americans ate 12.1 pounds of fresh and frozen finfish and shellfish, down 0.2 pounds from 2006. Canned seafood, primarily canned tuna, remained at 3.9 pounds per person. Americans consumed five pounds of fillets and steaks. These include Alaskan pollock, salmon, flounder, and cods. The remaining 0.3 pounds is cured seafood such as smoked salmon and dried cod.

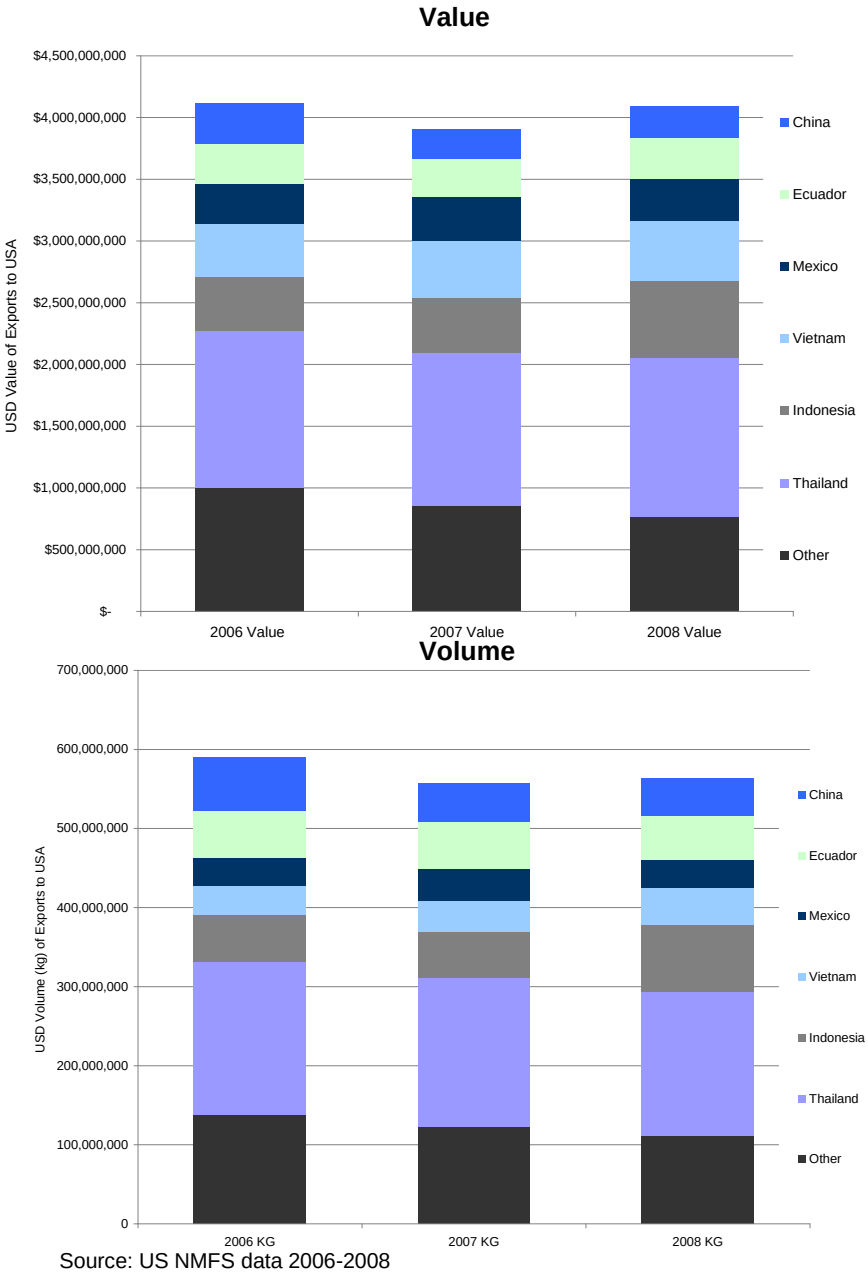
Figure 5 – US Shrimp Consumption, Production, Trade (1997=100)



Source: US NMFS data

Several global factors have affected the shrimp market recently, including volatile oil prices (a major input for fisheries effort), the world economic recession, falling consumer confidence, and health concerns (e.g. mercury levels) with some seafood, among others. As shown in Figure 6, since 1997 US shrimp imports have grown steadily in terms of volume. Trends in imported value of shrimp have been more erratic, in line with changes in international prices and the structure of imports. Although frozen shell-on shrimp (considering all sizes) is still the most imported category, higher value-added products such as peeled frozen shrimp, breaded frozen shrimp, and other frozen preparations (a category that includes cooked shrimp and meals prepared with shrimp, among other products) have substantially increased shares of US imports.

Figure 6 – Value & Volume of Shrimp Exports to the US, 2006-2008



Source: US NMFS data 2006-2008

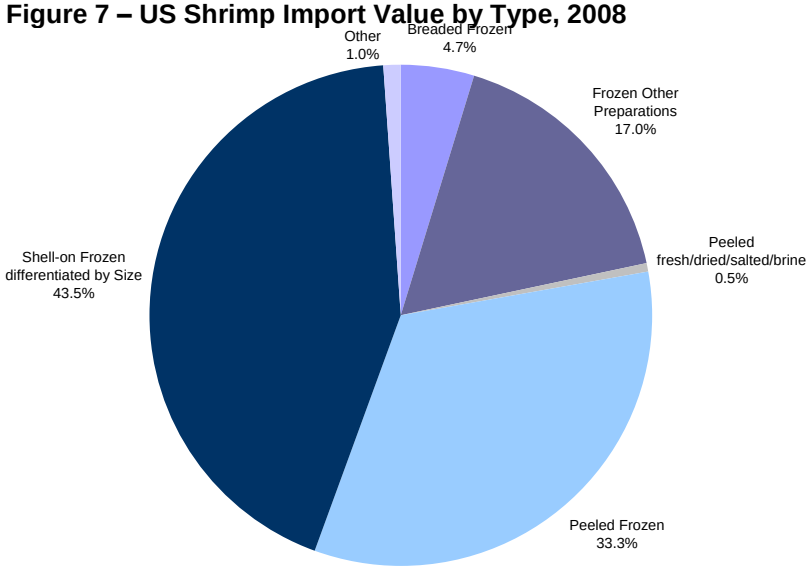
Thailand is the leading exporter of shrimp to the US, with a value of trade of US$ 1.28 billion, which represents 31% of the value of shrimp imports in 2008, followed by Indonesia (15%), Vietnam (12%), Mexico (8%), Ecuador (8%), and China (6%). In recent years, the top six exporters to the US have as a whole accounted for an increasing proportion of the market for imported shrimp, accounting for 81% of the value and 80% of the volume in 2008.

Among these major players, Mexico has shown strong sales in the top categories of shell-on frozen shrimp, which counting all size categories, represented nearly 44% of the value

of US imports in 2008 (Figure 8). A competitive advantage of the Mexican shrimp exports to the US, in addition to proximity, is the focus on large sizes.

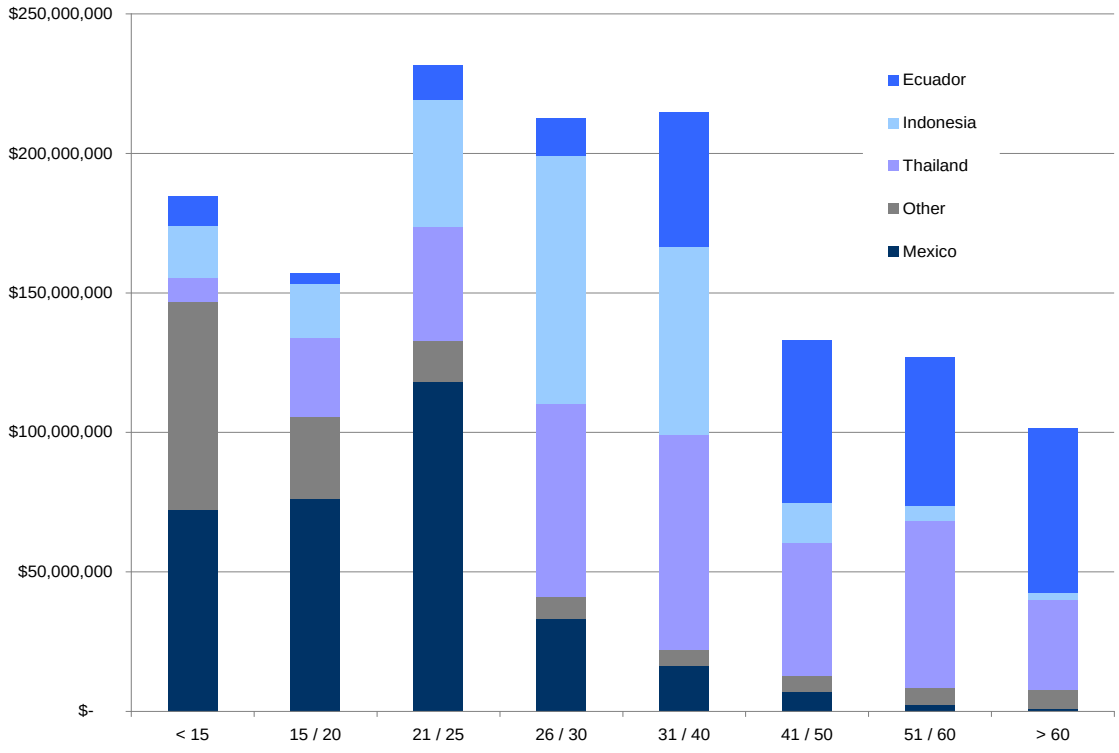
A little over a decade ago, Mexican shrimp exports covered the entire range of sizes including smaller sizes like 51/60s, 61/70s and 70-plus, which totaled about 30% of Mexico's export total in 1997. Today, compared to Asian competitors, Mexico is a not a major provider in the smaller size categories (which tend to stay in the national market). Mexico is the leading exporter to the US for large sizes of shell-on frozen shrimp, accounting for 35% of world exports to the US in the top three size categories (<15s, 16/20s, 21/25s) as illustrated in Figure 9.

Figure 7 – US Shrimp Import Value by Type, 2008



Source: US NFMS data 2008

Figure 8 – US Shell-on Frozen Shrimp Import Values by Size & Origin, 2008

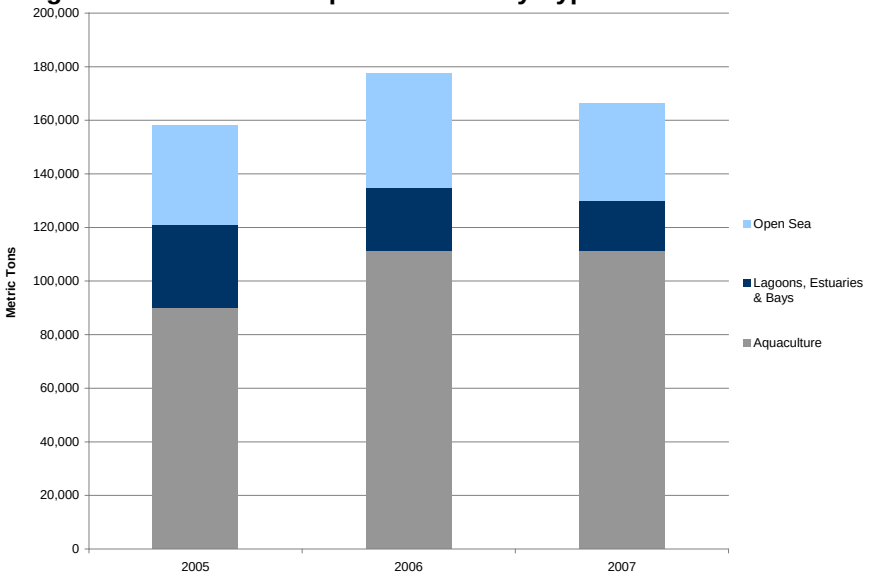


Source: US NMFS Data, 2008

3.2. Mexican Shrimp Production

Shrimp is the most important fishery in Mexico in terms of economic contribution, share of exports, and employment. The shrimp fishery employs an estimated 190,884 fishers while providing indirect employment for another 573,000.[10] According to CONAPESCA statistics, Mexico's shrimp production was 166,318 MT in 2007, 67% from aquaculture which in recent years has consistently increased both in absolute terms and as a percentage of overall production (addressed in Section 3.6), 22% caught in the ocean, and 11% caught in lagoons, estuaries, and bays (Figure 10). The Agriculture Ministry (SAGARPA) announced that shrimp sales generated MXN 6.3 billion (USD 590 million), or 44.4% of Mexico's total fisheries' returns in 2007.

Figure 9 – Mexico Shrimp Production by Type 2005 – 2007



Source: Compiled by authors from CONAPESCA Anuario 2005, 2006, 2007

According to the Mexico chapter of the FAO's Global Study of Shrimp Fisheries 2008, based on the work of D. Aguilar and J. Grande-Vidal, the shrimp catch in the Pacific appears to have reached its upper limits, and overcapacity is a generally recognized problem. CONAPESCA developed a subsidy program for voluntary reduction of the national shrimp fishery effort under the "sustainable use of national resources" component of the Calderon Administration's national development plan.[11]

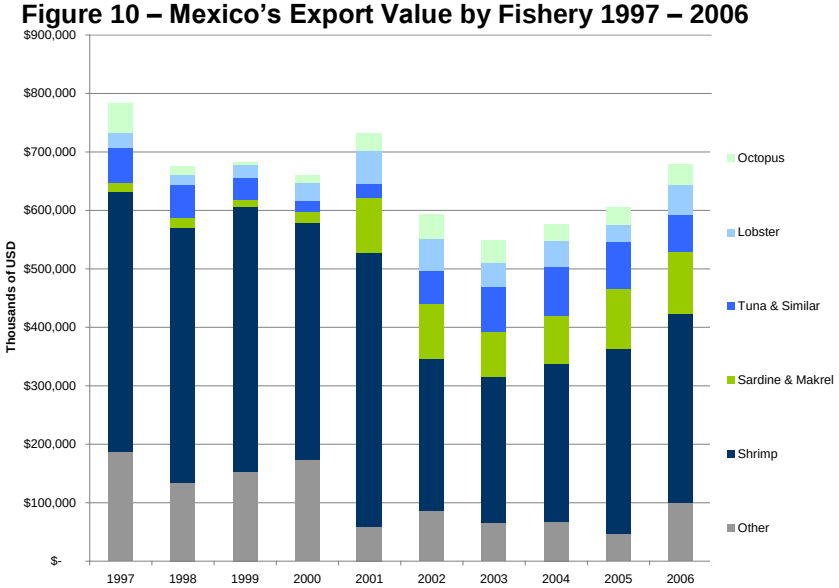
3.3. Mexican Shrimp Exports

The overall climate for trade in Mexico is favorable, without trade barriers for fish and seafood with the main trading partners. Under the North American Free Trade Agreement (NAFTA) duties on fish and seafood products from the three NAFTA countries were zero as of January 1, 2003. Under the Mexico-Chile free trade agreement, Mexican duties on Chilean fish and seafood were eliminated, with the exceptions of lobster, shrimp, and prawn. Imports are sold through importer/distributors, distributors and wholesalers.

[10] "Shrimp Fishing in Mexico" pp 235-245, based on the work of D. Aguilar and J. Grande-Vidal, in *Global study of Shrimp Fisheries*. FAO Fisheries Technical Paper 475, Ed. By R. Gillett, FAO Consultant, 2008.
[11] Comisión Nacional de Acuacultura y Pesca, SAGARPA, Aviso de programa de retiro voluntario, 2 de marzo 2009 – 17 de abril 2009. www.conapesca.gob.mx

As of 2006, shrimp represented 19% of the volume and 47% of the value of all of Mexico's fisheries exports (Figure 10). About 80% of Mexico's fish exports end up in the US, although Europe and Japan are growing in importance. For shrimp, those exporting from Mexico have long found a growing market to the north to feed Americans' appetite for shrimp, where it is the top US fisheries import from Mexico. The export market for Mexican shrimp is considerably more concentrated in the US than fisheries exports overall, with over 95% of the value of exports in 2006 going to the US, followed by China (3.0%) and Spain (0.7%).[12]

Figure 10 – Mexico's Export Value by Fishery 1997 – 2006



Source: CONAPESCA Anuario 2006

According to US National Marine Fisheries Service data, Mexican shrimp of all sizes and forms brought into the US market in 2008 totaled 34,494 MT, 6% of US total gross weight shrimp imports for the year, but 8% of the total value, totaling $340 million. Exports to the US were down substantially in 2008 as compared to one year prior, both in terms of volume which was down 15% and value which declined 5%. According to CONAPESCA statistics on fish and seafood exports from 2006[13], total Mexican shrimp exports to all destinations of $323 million (of which $308 million went to the US) represented 47% of the value of all fish and seafood exports (Figure 10). By comparison, the next most lucrative species exported from Mexico were in the sardine and mackerel category at a 16% share of export value and tuna at 9%.

3.4. Imports

Mexico imports over $300 million worth of fish and seafood products annually. In 2006 this included about $150 worth of fish fillets, $36 million of crustaceans, and $12 million of other seafood.[14] Mexico's imports of fish and seafood are mainly focused on species that either complement an insufficient local production on a seasonal basis (as with shrimp) or are not available in Mexico. The US ranks fourth after Venezuela, China and Belize as a foreign supplier of Crustaceans.

3.5. Regional Shrimp Production in the Upper Gulf of California

[12] Conapesca Anuario 2006.
[13] the most recent available statistics that include data on value are from the CONAPESCA Anuario 2006
[14] USDA Foreign Agricultural Service, GAIN

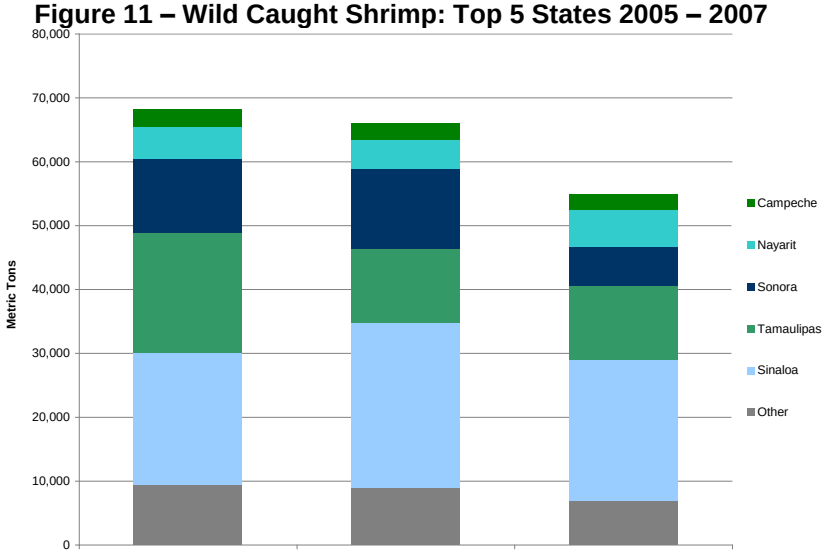
The Pacific coast fleet produces the majority of Mexico's shrimp catch and effort, led by vessels based in the states of Sinaloa and Sonora (Figure 13) along the Gulf of California. The ports of Mazatlan, Sinaloa and Guaymas, Sonora are Mexico's most significant ports in terms of fleet size and catch amounts.

The figures at right show the breakdown of shrimp production from 2005-2007 in Sonora and Baja California, the two states that share waters of the Upper Gulf, the focus of this study. Sonora is now the state with the largest production of shrimp in Mexico, and the majority of the volume of Sonoran shrimp is now farmed. The state of Baja California produces much lower volumes (680 MT compared to the nearly 75,000 MT in Sonora) with wild ocean caught shrimp accounting for the majority of production.

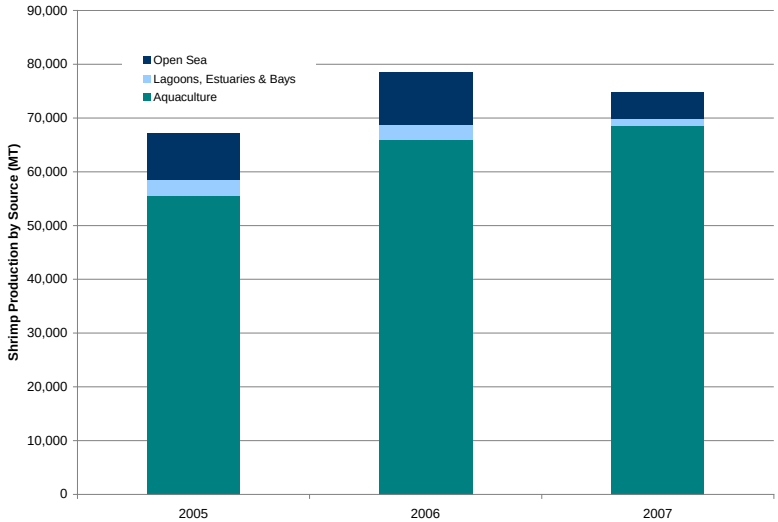
The vast majority of the production from the Upper Gulf is exported frozen to the US and is, according to interviews in *La Nueva Viga* in Mexico City, rarely available in domestic wholesale markets, despite being recognized as a top quality variety.

Among shrimp buyers and connoisseurs, wild caught blue shrimp (*litopenaeus stylirostris*) from the Upper Gulf is among the world's highest quality shrimp available. Although some chefs take shrimp origin and

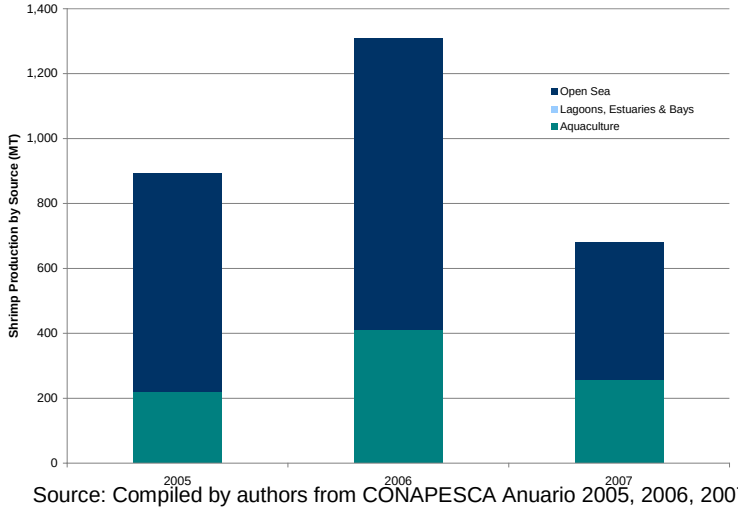
Figure 11 – Wild Caught Shrimp: Top 5 States 2005 – 2007



Sonora Shrimp Production by source 2005-2007



Baja California Shrimp Production by source 2005-2007



Source: Compiled by authors from CONAPESCA Anuario 2005, 2006, 2007

species into consideration, the vast majority of consumers differentiate shrimp on size, not between farmed and wild caught (although farmed shrimp tends to be smaller than the large wild caught shrimp in the Upper Gulf), much less on species variety.

3.6. Shrimp Aquaculture in Mexico

Fish farming is growing in Mexico and accounts for 40% of the country's fish industry, worth 16 billion pesos (US$ 1.49 billion) annually, according to CONAPESCA. Prior to 1994, private interests and companies were prohibited by law from running aquaculture operations to raise shrimp. This activity is growing at annual rates of 5%. Farms now account for the majority of shrimp production overall (as shown previously in Figure 10) and of 40% and 25% of the country's prawn and tilapia production, respectively. Farms also produce between 3,000 and 4,000 tones of tuna per year.

Private interests began building shrimp farms first in the state of Sinaloa. Brood stock for the operations was caught in the wild — a practice that the Mexican Government has since outlawed — and yields from these were low. Many operations, as with shrimp farms elsewhere, struggled with infections and bacteria that killed significant portions of the shrimp before they were big enough to harvest. But the struggles lasted only a few years. In the late 1990s, shrimp farms began migrating north into Sonora, and with this surge came a commitment from the farmers to document and improve upon practices not only for how to raise shrimp, but how to do so using environmentally responsible methods.[15]

Sonora has consolidated its position as the number one farmed seafood producer state in Mexico through improved technology and ability to address common diseases. In 2006 the state recorded a record of 66,000 tones of shrimp production adding more than US$320 million in revenues. Farmed shrimp production has steadily grown in Sonora, reaching 68,545 tones in 2007, now accounting for 91% of the state's volume of shrimp production, up from 84% one year prior. As of 2008, Sonora has 20,849 HA of farmed shrimp.[16]

One notable shrimp farming facility is the now closed *Mar y Tech* operation, owned at the time by US investors, on the Colorado River delta in the Upper Gulf, just outside of Golfo Santa Clara. *Mar y Tech* ran the farm, with over 1,000 HA of functioning shrimp ponds, and according those in Golfo Santa Clara familiar with the operation, had technically sound production but shut down when the company faced financial problems. The basic infrastructure remains (within the protected area) and, with approval from CONANP, CONAPESCA is making an investment of 25 million pesos to revive 200 HA of the facility, including technical assistance to restart and operate the ponds. The beneficiary of the investment will be *Productores en Reconversion del Mar de Cortes (PROREMARCO)* a joint venture with licensed shrimp fishermen from Golfo Santa Clara, who will have an option to buy into the operation in exchange for their fishing licenses. CONAPESCA indicates that the farm will work with international NGOs to "access differentiated markets".[17] According to local estimates, shrimp farms generate 1 full time equivalent job per 4 HA of fully functioning farm.

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[15] One such effort was coordinated by the Pacific Aquaculture and Coastal Resources Center at the University of Hawaii at Hilo, which has a handful of project partners from Mexican aquaculture groups, government agencies and local universities.

[16] "Diagnostico Pesquero 2000-2008 de Sonora". SNIDRUS / OEIDRUS, State Government of Sonora, 2009.

[17] CONAPESCA, "Impulsa CONAPESCA Retiro de Embarcaciones Menores." Boletin Informativo, March 15, 2009. www.conapesca.sagarpa.gob.mx

Stakeholders report that the farm will be technically managed, but it is unclear whether or not the operations will meet Aquaculture Certification Council or other recognized aquaculture standards that might facilitate access to sustainable market channels.

Finally it is also worth noting that Puerto Peñasco is home to 17 of Sonora's 49 oyster farms, which have good conditions for production of high quality oysters.[18]

4.0. End Market Analysis for Upper Gulf Shrimp

At a macro level, the market for shrimp from the Upper Gulf of California can be divided into the export and domestic markets, with exports to the US generating the majority of value for the Upper Gulf. Within those simple divisions, for which government sources offer good basic data, are specialized segments of various types of *restaurants*, *institutional food service providers*, *supermarkets*, *traditional retailers*, and *specialized retailers,* each of which can be analyzed at both domestic and export levels. The authors focus here on US market segments, which stakeholders in the Upper Gulf shrimp value chain estimate absorb about 80% of the volume of local shrimp production (and presumably even more of the value, considering that the largest shrimp are exported).

Because of emerging trends and the overarching rationale for this report, Section 4.4 presents analysis of the market for sustainable seafood and shrimp as a *potential* niche market. Each of these segments is addressed below, followed by a detailed discussion of the Upper Gulf value chain that delivers shrimp to these market channels.

4.1. Foodservice in the US

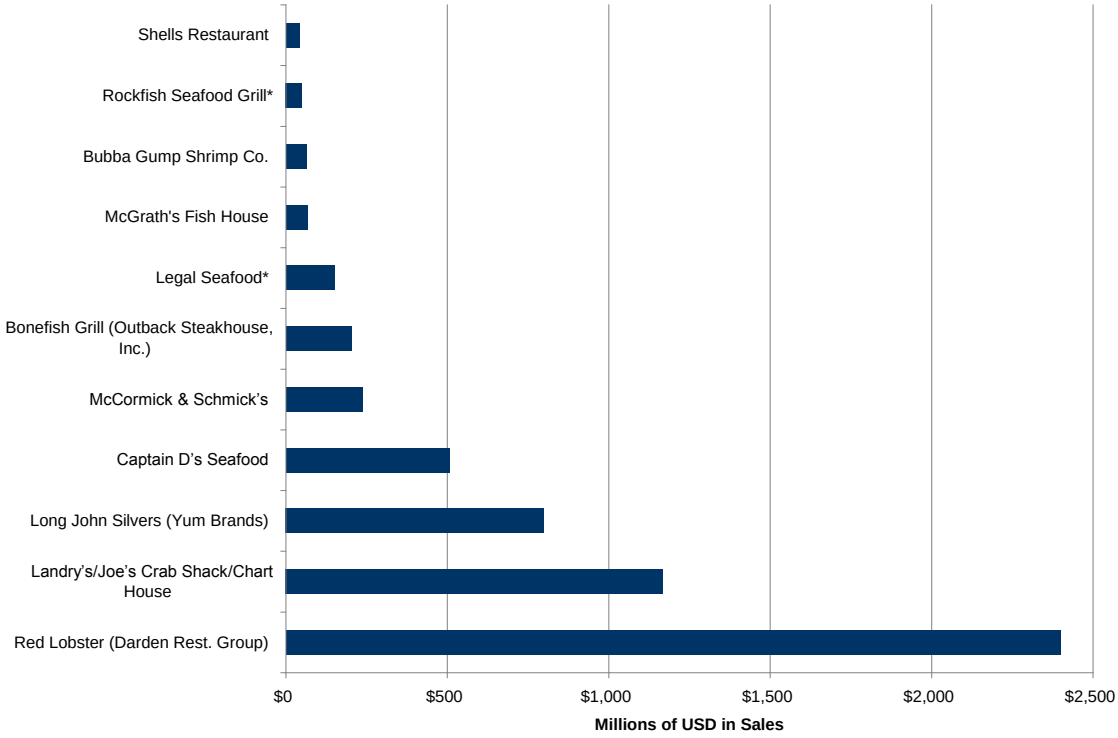
This category can itself be subdivided many ways, including fine dining, casual, family and fast food restaurants, hotel restaurants, and institutional foodservice providers (such as banquet food services, hospitals, etc). According to the Seafood Choices Alliance, in 2006 total seafood foodservice sales the US were $46.5 billion, with a markup on the prices paid for seafood of about 280%.[19]

In the US 60% of all restaurants carry some sort of shrimp meal, and 20% of all seafood meals ordered contain shrimp. The focus here is on US restaurants that tend to procure the large uncooked shrimp in which the Upper Gulf specializes, which tend to be in the fine dining and casual/family restaurants segments.

[18] Diagnostico Pesquero 2000-2008 de Sonora". 2009.
[19] Seafood Choices Alliance, 2008

The **family and casual dining** segment in the US is led by well known restaurant chains that often belong to larger foodservice corporations (see Figure 12). The largest of these chains is Red Lobster, which contributed $2.6 billion in sales to its parent company the Darden Restaurant Group in 2008. Darden, the world's largest full-service dining company, reported slightly slower same-restaurant sales for Red Lobster in early 2009 citing the economic recession as a major factor.[20] Shrimp is a core menu item for Darden, both at its Red Lobster restaurants and the five other restaurant chains in the group (including the Capital Grille, Olive Garden and Bahama Breeze). In 2006, indicating its intentions to reduce the environmental impact of shrimp farming, Darden became the first in this segment to indicate that it would require suppliers of shrimp to commit to Global Aquaculture Alliance standards for shrimp farming.[21]

Figure 12 – Top 10 Seafood Restaurant Chains in the US by Sales



Source: National Fisheries Institute May 2008. Source does not indicate the year of the data, but it appears to be for 2006. Data for Legal Seafood and Rockfish Grill are NFI estimates

The closest direct competitor in terms of sales volume among seafood-focused restaurant chains is Landry's Restaurants Inc. which owns a greater diversity of brands, many of which are focused on fish and seafood, including Joe's Crab Shack, Chart House, Landry's Seafood House. As a group Landry's did $1.1 billion in sales in 2008 according to its financial reports.

[20] Darden Annual report 2008, and first quarter report 2009. www.darden.com
[21] It is also worth noting that McDonald's, in the Fast Food Segment, has made a commitment to purchase only MSC certified pollock for its fish filet sandwiches.

The **fine dining** segment is much less concentrated, and procures lower volumes of higher unit-value shrimp. Data is less readily available, although some basic trends can be gleaned from commentary by chefs and the wholesale industry that serves high-end restaurants. Mexican shrimp from the Upper Gulf appears to fetch premium (30-40% above other major sources, by some estimates) prices based on large sizes, consistency (including better retention of size after cooking), flavor, and technically sound processing operations in the region.

Branding Mexican Shrimp

Source: Mexican Shrimp Council
www.mexicanshrimp.org

Source: Ofi Markesa
www.ofimarkesa.com

A couple of the main brokers operating in the Upper Gulf region, (discussed in Section 5.5 below), have made efforts to position and brand Mexican shrimp at the highest end of the shrimp market, especially in the fine dining segment. Through the Mexico Shrimp Council[22] (*Consejo Mexicano del Camarón*) stakeholders in the Mexican shrimp value chain, in particular Ocean Garden (formerly a Mexican parastatal company, now privately owned and based in San Diego, California) are promoting "Authentic Mexican Shrimp – the World Standard". Another major buyer in the region, Ofi Markesa, has similar branding. The branding in each case targets chefs and restaurant buyers and covers both wild caught and farmed shrimp, although chefs that mention the differentiated qualities of Mexican shrimp in industry publications appear to focus on wild caught.

4.2. Domestic Hotels & Restaurants

The global economic recession and image issues surrounding the H1N1 flu virus and conflict with drug traffickers have combined to form a perfect storm for Mexico's tourism sector. Despite an inevitable contraction in the sector in 2009, in the long term good opportunities appear to exist among resorts, hotels and restaurants that cater to tourists.[23]

Tourism represents 8% of Mexico's GDP and 6% of its total employment. Mexico is ranked as the seventh largest tourist destination in the world, with 4% of all world tourists. Mexico attracts an estimated 120 million foreign visitors annually, who spend close to ten billion dollars. Tourism is Mexico's third foreign exchange earning industry, and there are many investments earmarked to attract more foreign visitors.

Hotels and restaurants purchase either directly at wholesale markets, or at the higher end of the market, have agreements with specialized distributors such as Netmar and La Marinera operating in Mexico City. The Mexican restaurant industry comprises 225,000 registered establishments that generate 525,000 direct positions and 410,000 indirect jobs, representing 2.4% of total employment in Mexico and contributing 3.7% to Mexico's GDP. Mexico City has the largest concentration of restaurants with approximately 31,000 establishments (of which 2,500 are of international tourism quality).

[22] www.mexicanshrimp.org/
[23] For a detailed review of tourism in the Upper Gulf, see Miguel Baca, Ivana Fertziger, "Ecoturismo en Alto Golfo, Evaluacion de la cadena de valor y oportunidades." AFIRMA, Development Alternatives, Inc., May, 2009.

Further domestic end market analysis among Mexico's top seafood restaurants and their providers would be useful to understand buyer criteria and determine whether there is a domestic market for sustainable shrimp and/or for alternative fisheries from the Upper Gulf.

4.3. Supermarkets: Domestic & International

Retail seafood sales in the US and in Mexico are increasingly dominated by supermarkets. Although trends in the growth in market share of supermarkets in Mexico trail those of the US, they increasingly reflect many of the same dynamics. The majority of Mexican retail sales is now dominated by a small group of supermarkets, led by the largest, Wal-Mart de Mexico and it's retail brands within Mexico: Superama (photos below), Bodega Aurrera and Wal-Mart (Wal-Mart de Mexico also has substantial restaurant sales in Mexico, including shrimp and seafood, through the Vips chain, as well as others).

Domestic Mexican and International supermarket trends are converging and are therefore treated together here. Whereas in 1990 supermarkets had a 5% share of retail food sales overall in Mexico, in 2008 that figure was 55%. Over the period from 2002 to 2006 the top 7 chains showed sales up 200%, which is five times faster than GDP growth.[24]

Until recently, supermarkets represented a small outlet for seafood products; however, with the arrival of frozen products, which were well processed and packed, as well as in constant supply and at low price, this sector started gaining share. For the various supermarket chains in Mexico, especially national chains, the addition of major fresh seafood sections is a relatively recent phenomenon.

Globally, a well stocked, managed and presented seafood section conveys a sense of abundance that, beyond seafood sales themselves, is important to the image of modern supermarkets, similar to the way colorful fresh fruits and vegetables have played this role at supermarket entrances. A well run seafood department within supermarkets for which expertise (internally, or among providers) is highly valued. The Progressive Grocer's 2009 Seafood Operations Review, based on interviews with senior seafood retail officials throughout the US indicates that:

***Superama* Seafood & Shrimp Displays, Mexico DF**

Photos: Nathanael Bourns, Superama, Polanco, Mexico City. Prices on the medium to large shrimp shown here range from 108 pesos up to 590 pesos for the largest (U8) size.

[24] Presentation by Thomas Reardon, Michigan State University, March, 2008

> "…aggressive retailers that prioritize and position seafood as a critical destination category, with full-service presentations and well-trained staff, are harvesting profitable rewards and building highly loyal customers in the process…"[25]

The review indicates that despite "ongoing controversy surrounding sustainability, mercury, pesticides and/or chemical levels in some species" that contribute to lower of sales for some, seafood contributes 2.7% of overall supermarket sales, with average gross margins of 29.1% (implying about a 41% markup over prices supermarkets pay), and remains the highest potential growth category for supermarkets. Within the seafood category in US supermarkets, shrimp in its various presentations is the fastest growing[26] and highest value item, accounting for around 30% of retail sales.[27]

Based on market interviews, very little wild caught blue shrimp from the upper gulf appears to enter domestic retail markets outside of local markets in Sonora and Baja California, where the smaller sizes that are less attractive for export markets are consumed locally. For alternative fisheries the domestic market appears to be, at least in the short-term, a considerably more important option than it is for wild caught shrimp.

Supermarket Trends in Mexico

Supermarkets grew slowly in Mexico in the 1980s, began to take off in the 1990s have shown rapid sustained growth since then. The four largest chains in Mexico are: Wal-Mart de Mexico, Soriana, Comercial Mexicana, and Chedraui. These players are growing sales by roughly 20% annually and taking market share from other retailers, through a combination of new openings and sales growth through existing stores. Total sales now amount to about twice the value of Mexico's food exports.*

Supermarket chains are expanding their presence in cities and medium sized towns across Mexico. In addition to differentiated retail formats, supermarket chains also are differentiating supply, quality, and pricing by branch based on local market characteristics.

Although traditional wholesale markets like La Nueva Viga still supply major amounts of seafood, supermarkets are increasingly centralizing procurement, both through their own distribution centers and through direct procurement from large producers and processors.

**Reardon, Berdegué, et al. USAID/Mexico 2007*

4.4. Sustainable Seafood Market Trends

Across the market segments discussed above, there is a growing trend towards sourcing "sustainable seafood". The US seafood industry, by far the Upper Gulf's most important market, is increasingly aware of the environmental impacts of fisheries and aquaculture. The industry shows considerable interest in "sustainability" although this term suffers a lack of common definition and is sometimes self-proclaimed without independent verification nor application of clear standards. Notwithstanding success in specific initiatives such as tuna-safe and dolphin-safe labeling, consumer awareness of broad standards for certifying and eco-labeling seafood is relatively incipient in the US.

[25] Debra Chanil and Meg Major. "Rough Seas, 2009 Seafood Operations Review." March 2009, Progressive Grocer www.progressivegrocer.com

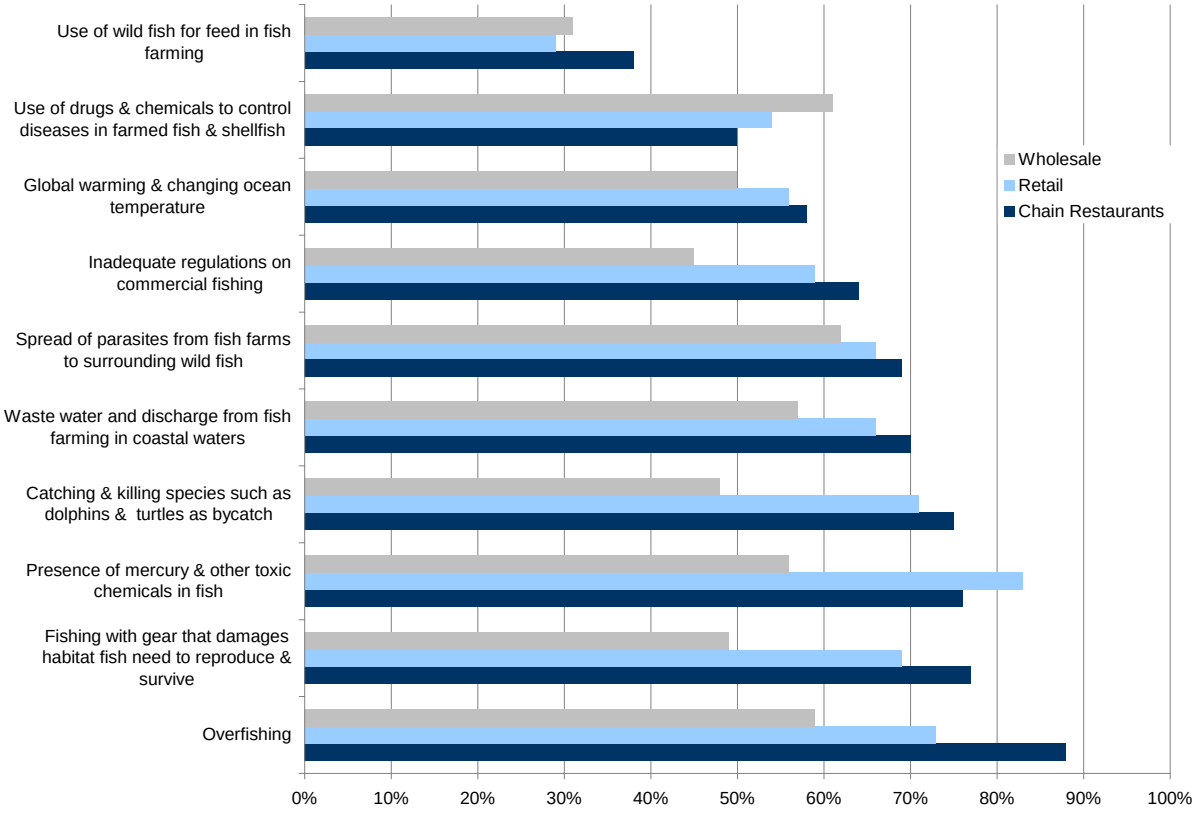
[26] Ibid.

[27] Seafood Choices Alliance "The U.S. Marketplace for Sustainable Seafood: Are We Hooked Yet?" 2008. www.seafoodchoices.com

In 2007 the Seafood Choices Alliance, a partnership-based association that seeks to advance the market for sustainable seafood, did a comprehensive survey of three important segments of US seafood buyers: buyers from chain restaurants, retailers and wholesalers. The survey results show convincingly that sustainable seafood is gaining traction in these three sectors, each of which projects significant growth in the percentage of their seafood that will be sustainable in five years due to growing concern for the health of the world's oceans (especially related to overfishing) and of their businesses. A majority of buyers claim to be open to dialogue and interested in obtaining information to help make responsible choices for themselves, their customers and the ocean.[28]

Figure 13 shows how US buyers responded to a question about the seriousness of various threats to the future supply of seafood. Chain restaurants tended to show the greatest concern for overfishing (88%) and for bycatch such as dolphins and turtles (75%).[29] This response points to a potential niche for "vaquita-free" shrimp or alternative seafood providing livelihoods for fishermen while preserving the vaquita (possibly as an interim step towards a more well recognized certification, given the time that certification can take).

Figure 13 – How serious a threat is each of the following to the future supply of seafood?
Percentage of US buyers responding ""one of the most serious" or "very serious"



Data Source: Seafood Choices Alliance 2007 Survey of US Seafood Buyers.

[28] Seafood Choices Alliance, 2008.
[29] Ibid.

Of the three types of buyer surveyed, chain restaurant buyers are most likely to be influenced by a competitor's move towards sustainable procurement and labeling.[30] It is reasonable to assume that environmentally conscious, high-end restaurant buyers would share similar if not greater concerns than chain restaurant buyers. This market niche also earns high margins on seafood, and might more easily absorb and/or pass on higher prices to end consumers.

For years, **consumer awareness** of sustainable sources and methods of producing seafood has been a major concern of those seeking to protect marine habitats. Over a decade ago the Monterey Bay Aquarium in California, supported by the Packard Foundation, developed the Seafood Watch Program, distributing millions of simplified seafood guides designed to orient consumers in their choices and to fit in a wallet. The Blue Ocean Institute's "Fish Phone" initiative has taken that concept a step further, allowing consumers to check on the sustainability of fish species via SMS text messages.[31] The US National Oceanic and Atmospheric Agency (NOAA) also developed a guide called Fish Watch.[32] Such programs have been effective at informing concerned consumers about seafood options that endanger marine species and habitats.

Certification schemes have less recognition among consumers than among buyers, although MSC and others are making strides to improve eco-label recognition. For instance, MSC is working with top marketing firm Sachi & Sachi to improve awareness of the MSC label. The MSC also claims to be working on streamlining certification for "data deficient" fisheries.

Ultimately any market premium or preferred access to attractive channels for those in a position to serve as stewards of diverse marine habitats like the Upper Gulf depends on the willingness of buyers at one or more levels to absorb the additional, real cost of producing sustainable seafood. While this cost can be shared, ultimately there has to be demand among retailers and consumers for these approaches to scale effectively.

4.5. Sustainable Shrimp

Buying guides generally give low sustainability ratings to tropical wild caught shrimp due to very high bycatch ratios and the impact that shrimp trawlers have on the seafloor. Sustainable shrimp is often associated with ecologically managed farmed shrimp under the Aquaculture Certification Council (ACC) or other such guidelines[33], but general farmed shrimp is sometimes marketed as "sustainable" despite potential environmental problems, due to the fact that it doesn't have bycatch. Environmental problems are presumably lower in desert areas such as the farms in Sonora, where they have not displaced mangroves, but are not without environmental challenges.

New trawl technologies such as the one discussed above, are demonstrating significantly reduced bycatch and reportedly are having lower impact on the ocean floor. It is also worth noting that the MSC certified its first shrimp fishery, the Oregon pink shrimp fishery, in late 2007, and certified a trawl-caught prawn fishery in Scotland in April 2009.[34]

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[30] Ibid.
[31] http://www.blueocean.org/fishphone/index.html
[32] http://www.nmfs.noaa.gov/fishwatch/
[33] www.aquaculturecertification.org
[34] www.msc.org

Experience with independently verified sustainable shrimp is limited in Mexico. **Ocean Garden** has supported the off-season bans which contribute to sustainability of the shrimp population itself and has helped form a local NGO, Alto Golfo Sustentable (AGS). According to most stakeholders interviewed, AGS played an important role in bringing together various stakeholders, including fishermen, government, and local and international conservation NGOs, around the issue of sustainability and preservation of the vaquita marina.

Ocean Garden markets both its wild caught and farmed shrimp as sustainable.[35] Fishing practices are reviewed by AGS. A portion of the shrimp that Ocean Garden markets is purchased from the artisanal gillnet fishery, which is fully understandable given Ocean Garden's origins in the region, but the gear used is the main threat to vaquita marina so an independent eco-certifier would not likely consider such shrimp sustainable. According to Ocean Garden publications, bar code technology allows the company to trace 100% of the shrimp to the processing plant, which implies that although some purchases may be traceable to the source (in the case of farmed shrimp or some trawlers) neither Ocean Garden, nor any other buyer currently traces artisanal caught shrimp to the source.

The US-based **Clean Fish**[36], a social venture that acts as a market intermediary for sustainable seafood, has worked with a group in Guaymas, Sonora to get access to markets based on improved trawling gear and standards, processing, accompanied by traceability of the entire chain of custody back to the trawler.

Anecdotal evidence based on the authors' interviews suggests that sustainable wild caught shrimp from Mexico can attain the best US market prices for top quality shrimp, such as the large blue shrimp produced in the Upper Gulf, assuming buyer specifications and food safety standards are met. However the authors have not yet found clear evidence of price *premiums* paid to producers or intermediaries for shrimp marketed as sustainable (as there is, for instance, with organic produce). Further end-market research is necessary to determine whether there are viable buyers willing to pay a premium for verified sustainable seafood and shrimp sourced from the Upper Gulf.

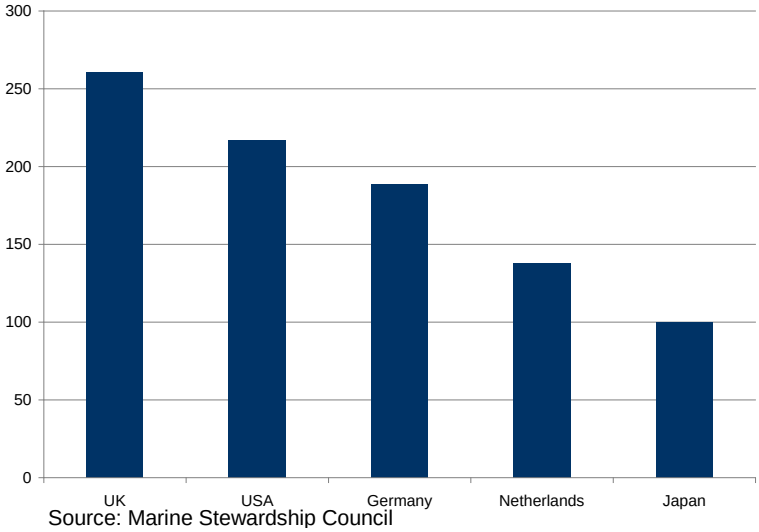
4.6. Market Channel Access & Sustainability

Sustainable sources of seafood and shrimp based on independently verified, recognized standards may begin to gain preferential access to market channels discussed above, while non-sustainable seafood is displaced and/or gradually excluded. The Seafood Choices Alliance's survey of buyers showed that 37% of retailers and 28% of wholesalers have decided not to sell certain seafood due to environmental impacts. Wholesalers who dropped seafood on such grounds dropped shark most often (14% of the time) followed by shrimp (11%).

[35] See for instance the company's industry publication, Shrimp Business, 2008/2009 Season, which focuses on sustainability. www.oceangarden.com/SB6Flip/index.html
[36] www.cleanfish.com

Although premium pricing for sustainable seafood may not be a driving factor in the US market (at least not yet) it does appear that *access* to some important restaurant and supermarket channels will increasingly involve environmental considerations and certifications (in addition to traditional quality, volume, health and food safety standards). A growing number of large supermarket chains, including Wal-Mart, Whole Foods, Metro, Migros, Coop, Carrefour, Auchan, Sainsbury's, Wegmans, Ahold are making commitments to procure sustainable seafood, representing initial signals towards greater demand for sustainable seafood.

Figure 14 – Countries with > 100 MSC-labeled Products



Source: Marine Stewardship Council

Whole Foods is particularly noteworthy among US Supermarkets. Based in Austin, Texas, the world's largest organics retailer has been highlighted by the MSC in its 2007-2008 annual report for leadership on certified sustainable seafood. The retailer committed to sell MSC certified seafood, carrying seven MSC-certified species, and more than 20 MSC-labeled "Whole Catch" products. Whole Foods also has published standards for other fish and seafood procurement, including for farmed shrimp.[37]

4.7. Sustainability Trends Outside the US

Although much of the focus here is on the US market, as the most important market for Upper Gulf Fisheries, the trend towards sustainable seafood is strongest in Europe. Research showed that over 40% of consumers in Europe would pay more for seafood that is labeled as environmentally responsible. Many European consumers want to know where their food comes from, how it was harvested and the impact of the harvest method on the surrounding environment. Yet despite a seafood labeling law implemented in January 2002 by the European Commission stating that consumers must be informed how and where the fish was caught, a lack of information still hinders consumers from making smart seafood choices. Consumers want retailers and fishmongers to offer sustainable seafood and help them become informed about better seafood.[38]

Japan, the world's largest importer of seafood, is increasingly embracing global sustainability standards. The MSC recently opened offices in Tokyo and highlights two partners that are pushing their standard forward, the retailer Aeon and the Japanese Consumers' Co-operative Union. MSC-labeled products in Japan now number around 100.

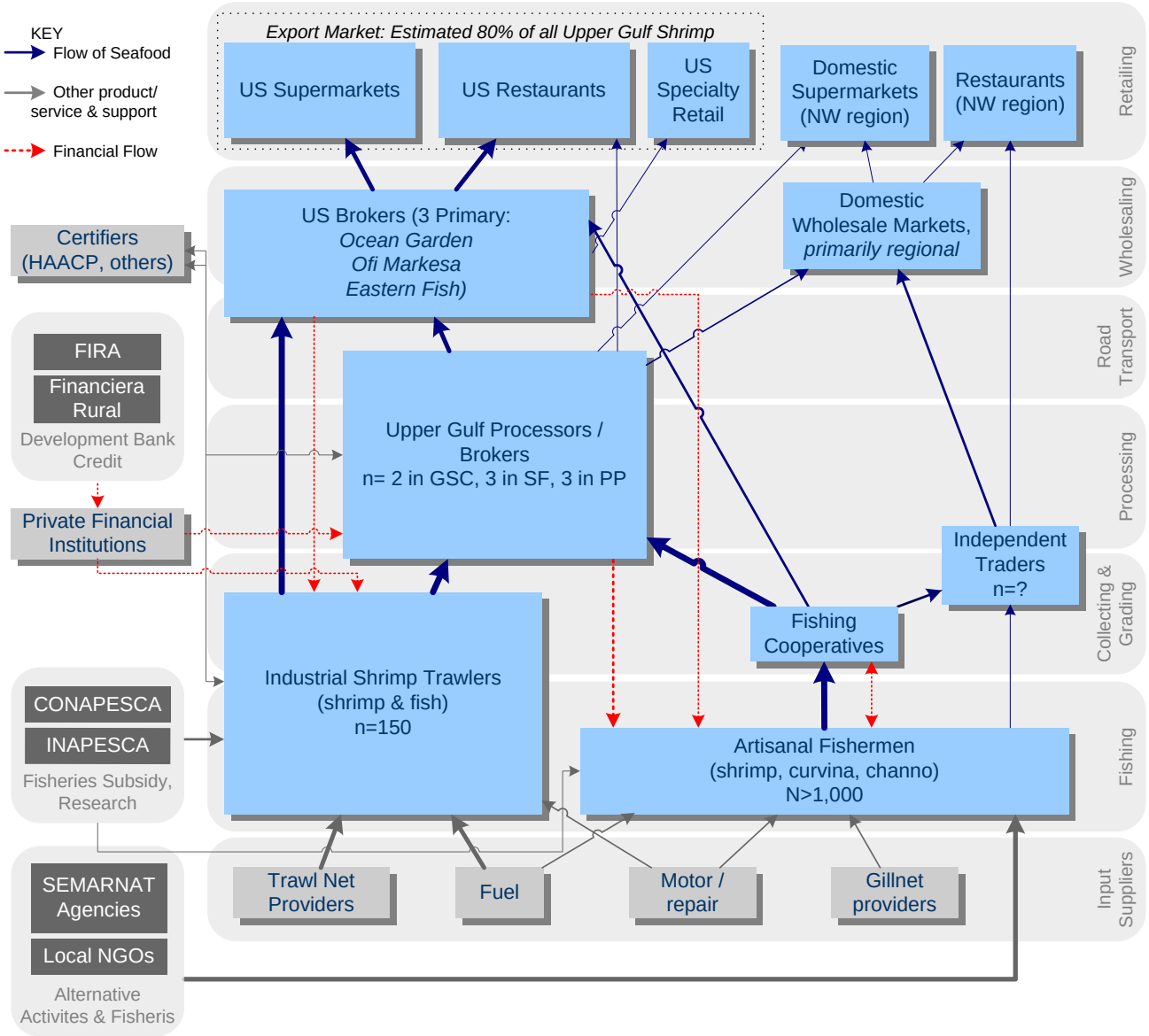
[37] An overview of the standards is available on the company's website, at http://www.wholefoodsmarket.com/values/seafood.php and detailed standards for aquaculture are available at http://www.wholefoodsmarket.com/pdfs/WholeFoodsMarket_FarmStandardsFinfishShrimp.pdf

[38] A good example is in 2007 over 4,500 stores in the Netherlands committed to this transformation, including well-known chains such as Albert Heijn, Laurus, C1000, Super Unie and Super de Boer. It was considered a big step when the entire supermarket sector of a major European nation was committing to source 100% of its wild seafood supplies from MSC-certified fisheries.

Currently only one supplier from Mexico is listed on the MSC website: the Rock Lobster fishery on the Pacific coast of Baja California[39] but no trend towards sustainable seafood is apparent domestically. There is currently no eco-labeling of seafood in Mexican supermarkets or supermarkets. However, considering its market share, if Wal-Mart were to extend its commitment to purchase MSC and ACC certified fish and seafood to its Mexican stores, and begin to market eco-labeled seafood, that could have a major impact on the Mexican market overall, even before considering any potential replication effects at other supermarket chains.

5.0. Value Chain Actors

Figure 15 – Upper Gulf Shrimp Value Chain



[39] http://www.msc.org/where-to-buy/find-a-supplier/mexico

5.1. Shrimp Trawlers

Shrimp Trawler, Puerto Peñasco, Sonora

Photo: Ingrid Ardjosoediro

The offshore portion of the Sonoran shrimp fishery began in Guaymas in 1933 with 17 modified sardine boats from California. Later that decade, a Japanese trawling fleet established the primary trawl areas in the Gulf from the port of Guaymas. Today, shrimp trawler boats characterize the industrialized offshore Gulf of California fishery; these are boats from 18-23 meters long that can remain at sea over 15 days, trawling from 3-60 fathoms with 220-620 horse power engines. They are also equipped with navigational instruments, satellite, radar, compass and sonar. Trawlers can hold as much as 100 MT of shrimp chilled in on-board refrigeration systems. Two large wooden trawl boards provide the weight and the spreading action that holds the funnel-like nets open. These boards facilitate the trawling function of the nets. A chain runs between the trawl boards and is dragged across the sea floor to disturb the shrimp into the sack-like net. The first nets used were solitary and 80–120 ft across. In the 1950s, boats switched to twin nets that are 40–45 ft wide across (Fig. 3). During the late 1960s and early 1970s, the mesh size of the nets was reduced, until in 1977 when mesh size was regulated to 2.25 in mesh for the body and wings, and 1.75 in for the sack-like end net.

The past 30 years saw little change in these boats and their nets, until recently with the introduction of the new technology developed at INAPESCA with support from WWF and the Walton Foundation. INAPESCA officials indicate that the new modified trawler is designed to significantly reduce bycatch through turtle and fish exclusion devices and other techniques, and drag on the ocean floor through rollers and lighter drag chains instead of the traditional heavy chains. This has been met with good acceptance because it produces yields comparable to traditional technology, allows for crew to separate shrimp from bycatch more quickly and efficiently, and because of improved fuel efficiency due to the lighter equipment.

Since the establishment of the protected area in the Upper Gulf, trawlers without an up-to-date third-party environmental impact assessment have been prohibited from fishing north of San Felipe on the Baja California side of the gulf and Puerto Peñasco on the Sonora side, leaving the area available exclusively to artisanal fishermen. About 100 trawlers are authorized to fish in the reserve during a shorter season (October-December) than artisanal fishermen and neither group is allowed in the core (*zona nucleo*). The restriction of shrimp trawlers from the protected areas has likely increased fish and shrimp populations for artisanal fisheries. The current buy-out program managed and implemented by the Mexican Government will eventually result in fewer licensed *pangas* in the area, but could also lead to increased proportion of illegal fishing.

5.2. Artisanal Shrimp Fishery

Nationwide, a large number of small fishing vessels (*pangas*) use many types of gear to catch shrimp, depending on the fishing seasons and local conditions, such as the cast net, the *suripera*, the *chinchorro de línea*, (gillnet made of thin nylon threads, previously outlawed in the nineties). Both the *suripera* and the cast net are less efficient and selective than gillnets, and by all accounts, the *suripera* net which is effective in estuaries in Sinaloa and elsewhere yet does not work well in the wind and tide conditions of the Upper Gulf. Artisanal shrimp fishermen in the Upper Gulf therefore use gillnets, although in 2009 SEMARNAT will fund a trial for those interested to use a *chango modificado* trawl technology that has proven effective for trawlers, recently adapted for pangas.

Shrimp Panga & Gillnet, Golfo Santa Clara, Sonora

Photo: Ingrid Ardjosoediro

Pangas are run by 2-3 fishermen, who usually are employees of licensed fishermen, not boat owners, nor license holders. The boats generally are not equipped with ice or cooling equipment on the boat for post catch handling of shrimp or any other species.

CONAPESCA data indicated that in 2003 as much as 21% of Mexico's total shrimp production came from artisanal fisheries, with 28% coming from industrial fisheries and a little over half from aquaculture, although as discussed above in more recent years, aquaculture has accounted for ever greater proportion of supply. Despite Sonora's leading role in aquaculture (now Mexico's primary source of shrimp), shrimp production in the Upper Gulf region is primarily artisanal wild caught, as aquaculture has greatly decreased since Mar y Tech shut down operations in Golfo Santa Clara and trawlers have been removed from the region north of Puerto Peñasco and San Felipe (which helps explain the decline in shrimp catches shown in Figure 17).

Although it is a moving target given the recent CONAPESCA and CONANP buy-out efforts mentioned above, CONAPESCA data from 2006[40] indicates a total of 521 registered larger shrimp boats in Sonora and another 41 in Baja California. Meanwhile, the artisanal fleet (*pesca ribereña*) for all fisheries (shrimp being the most important) in Sonora is 7,234 registered boats and 1,609 in Baja California (much of which is on the Pacific side). It is not clear to the authors whether these numbers account for the fact that most artisanal fishermen have licenses for shrimp as well as for various other fisheries such as curvina, sierra, and channo, and therefore may be counted multiple times. What is clear is that the number of licenses is declining in 2008-2009 as a result of the buy-outs.

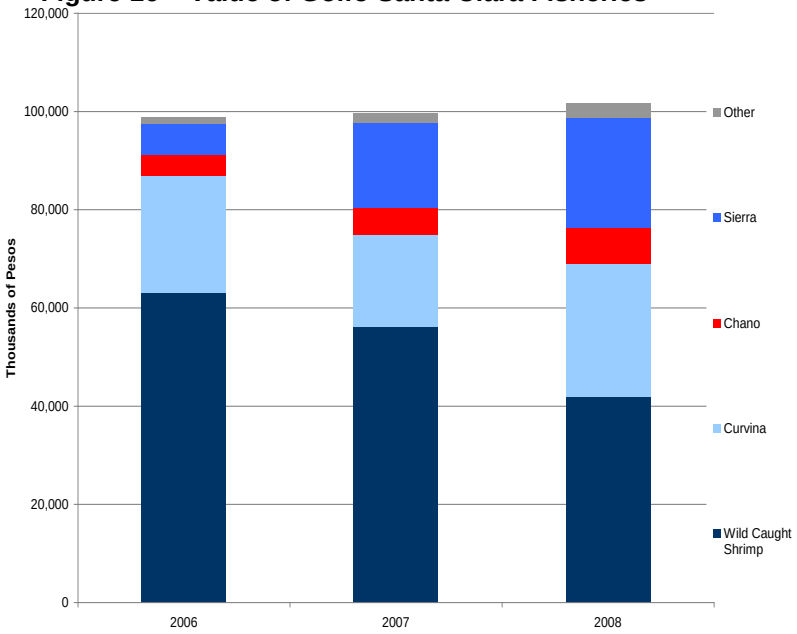
Separating Shrimp at Landing, Golfo Santa Clara

Photo: Ivana Fertziger

However, buy-out initiatives do not affect unlicensed fishermen other than to limit competition for resources. In Golfo Santa Clara, where regional stakeholders affirm that the fishing effort is less well organized than in Puerto Peñasco or San Felipe illegal fishing is very common. Although regulations are enforced now more than in years past, local estimates are that unlicensed fishermen outnumber licensed fishermen by about 3-to-1.

The State Government of Sonora and CONAPESCA keep record of licensed fishermen and fisheries production in terms of volumes and values by community, including for Puerto Peñasco and Golfo Santa Clara. Data for Golfo Santa Clara, shown in Figure 16 gives a sense of dynamics in the community over the last 3 years, which is driven by artisanal fishermen and the shrimp, curvina, and sierra fisheries. Shrimp is the most important fishery although declining in relative importance according to official statistics (likely due more to the removal of trawlers than to declines in artisanal production). Production from the two other major fisheries in

Figure 16 – Value of Golfo Santa Clara Fisheries



Source: OEDIRUS Sonora / SAGARPA data Jan-Dec, 2006 - 2008

[40] Anuario CONAPESCA 2006, which is the most recent available.

Santa Clara, curvina golfina and sierra, accounted for 93% and 64% of Sonora's total value in those fisheries, respectively (see box below on curvina).

Shrimp remains by far the most important fishery for Puerto Peñasco accounting for 74% of the value of all of the community's fisheries in 2008, followed by crab (*jaiba*), sole (*lenguado*), and shark.

Licensed artisanal shrimp fishermen in the Upper Gulf are members of **cooperatives** whose primary role has to do with providing documentation to permit legal commercialization of shrimp and fish (for which CONAPESCA grants separate licenses).

Curvina Season in Golfo Santa Clara: Brief, Intense, Poorly Organized

The curvina golfina run in the Upper Gulf is a moment of major abundance of a high quality fish that promptly looses much of its value through post-catch handling. The curvina season is short and condensed around Golfo Santa Clara (where by volume it is the community's biggest fishery) lasting about a month (March - April) as vast schools of fish swim up near the mouth of the Colorado River to spawn. In 2008 Golfo Santa Clara produced 93% of Sonora's value in this fishery.

The opening days of curvina season are so abundant that fishermen regularly have to cut their gillnets to complete a haul, often giving the end of the net full of fish to a nearby panga with space, a practice known as *"dar cola"*. In a single morning, a panga can haul in as much as 2 tons of curvina. The fish is brought to fishermen's houses or a dedicated gutting area (sometimes, but not always, in the shade) to be torn from the nets and gutted and then thrown into the back of a pickup to be carted to a local processing plant. At the plant, fish are rinsed, weighed and (for the first time, hours after being caught) put on ice for transport to domestic wholesale markets, in Guadalajara and Mexico City.

Days after the curvina season opens, the town is full of fish and prices which may start at around 17 pesos/kg, and fall steadily down to around 6 pesos/kg over a couple of weeks as the fish pile up.

A major broker in Golfo Santa Clara told the authors that despite being high quality fish, with multiple potential national and export markets, local curvina can't be exported or sold domestically at higher prices because each fish "takes six blows before it gets packed and on ice". Upgrading and commensurate higher prices for fishing cooperatives would require coordination, getting ice in the boats, and fish to processors prior to being pulled from nets or gutted. Such management, coupled with investment in processing equipment could double the value of a curvina, producing multiple products:

- fillet for export to the US or for direct sale to supermarkets in Mexico
- head & tail for soup in Mexico
- fish roe for export to Asia
- galls for export to Asia
- entrails for fertilizer (a positive externality of which would be to help manage waste from entrails that allegedly causes sickness during curvina season).

By producing a series of differentiated products, the overall fishing effort could be better managed for overall value and reduced to more sustainable levels possibly via use of alternative techniques, although this would require a well managed communication strategy, serious enforcement of rules, and widespread perceptions of the potential for mutual benefit and fairness.

Cooperatives have splintered over the years and in many cases (especially in Golfo Santa Clara) now represent groupings of a single extended family of fishermen, or in some cases a couple of families joined together. Some cooperatives have offered loans to their members in the past, although this appears increasingly limited, and less relevant given the family nature of the cooperatives. Cooperatives sell to traders or, more commonly, to export processor/brokers.

5.3. Traders

The fishing communities in Santa Clara, San Felipe, and Puerto Peñasco have ready access to traders, brokers and exporters within a short distance from landing sites. Fishing cooperatives can deal directly with processors, local buyers or international brokers, the largest of which have local representation. Although access to these channels is fairly open to licensed and established fishing cooperatives (and presumably to some unlicensed fishermen, given the apparent volume) traders tend to provide liquidity to fishermen in exchange for commitments of sales via the trader. Traders, the largest of which may also have privileged access to (or partial ownership of) processing facilities, sort shrimp by size, selling the largest via the three main US buyers (detailed below) and smaller shrimp into regional markets.

Prior to the shrimp season, some of the larger, more established local traders extend between $1,000-$2,000 (USD) credit per boat (panga) to trusted fishing cooperatives and fishermen for preparation of nets, purchase or repair of motors, fuel purchase, or other needs. One of the largest intermediaries in Golfo Santa Clara, who buys about 60% of the volume of shrimp commercialized by local fishermen (from 45% of the fishermen) had a loan portfolio of 8 million pesos during the 2008-2009 shrimp season. Other intermediaries buy without having extended trade credit, sometimes buying from those who received credit from another source. When such "side-selling" occurs, the intermediary may have to write off the loan, and is likely to cut the fishermen off from future loans.

5.4. Processors

There is substantial processing capacity in the Upper Gulf region: 3 processors in Golfo Santa Clara (2 freeze and pack shrimp), 5 in Puerto Peñasco: 5 (3 freeze and pack shrimp), and 3 in San Felipe (all freeze and pack shrimp). These processors usually focus on shrimp processing during the shrimp season and fish (especially curvina golfina and chano) during the off-shrimp season. For other chains, such as curvina, processing plants tend to act as fish buyers and processors.[41]

The role of local processors varies in the shrimp chain from buyer to packaging service provider, although Upper Gulf shrimp processors tend to provide a service, as opposed to functioning as buyers of shrimp. In most cases they flash freeze and pack shrimp that is moving between the fishing cooperative and an international broker that has purchased the shrimp directly from the fishermen/cooperative. The fishing cooperative is generally charged a per-pound fee for processing and packaging.

In San Felipe, for instance, most of the processors do not trade shrimp, they process it for Ocean Garden or Eastern Fish. The international buyer makes the purchase from the fishermen/cooperative, directs them to the processor, provides the packaging material and has its 18-wheeler truck ready at the end of the processing line. In Puerto Peñasco, a group of nine industrial trawl fisherman interviewed came together to set up a processing plant that processes 600 tones of shrimp in a 6 month period (September to March).

[41] One fish processor in Santa Clara indicated that the economic crisis has rendered the US market less attractive and that better prices (albeit at much lower volumes) could be had in the EU. However, entry to the EU requires investment in meeting Global Gap requirements, and he is examining possible credit schemes with his EU buyer.

Eighty percent of the shrimp processed is for the 9 original partners, but they jointly pay the plant just the processing fee of 57 cents on the dollar for each pound of shrimp processed. The shrimp is owned by the boat owners, and collectively sold to a preferred buyer, in this case OFI Markesa. The owners claimed to have tried with higher value added processing, beyond just frozen whole shrimp in standard trays, such as butterfly-open frozen and peeled, de-veined, but found the cost of labor to be prohibitive.

5.5. Brokers & Exporters

US demand for shrimp and the few companies that serve this demand via the Upper Gulf have predominant influence over the governance of the Upper Gulf shrimp value chain. The economic factors of foreign demand, fishery financing, pricing and buyer–seller relationships determine pricing and conditions, and influence capital availability, political climate and social structure within the shrimp fishery. The shrimp market is a global commodity market with weekly, even daily price fluctuations based upon supply and demand of different sizes and varieties, buyer-supplier relationships, marketing techniques, and consumer perceptions. The availability of certain shrimp species or sizes and international currency movements can cause significant price fluctuation.

Three exporters of shrimp that operate in the Upper Gulf buy the bulk of the large shrimp that are frozen, packaged and exported to the US: Ocean Garden Inc., Ofi Markesa, and Eastern Fish Ltd. Each is described briefly below.

- **Ocean Garden**, formerly a Mexican Government-owned company that is now private and based in San Diego, California, once dominated the export supply from the Upper Gulf.[42] Ocean Garden has offices in both San Felipe and Puerto Peñasco from which the company coordinates local buying and shipping. As mentioned previously, the company markets Mexican shrimp as a high-end product for top retailers and restaurants in the US. The company remains a major player in the region but it appears, based on interviews in San Felipe and Golfo Santa Clara, to be reducing its purchase of wild caught shrimp from the Upper Gulf, possibly moving more towards farmed shrimp and/or to wild shrimp from other Mexican sources. The Mexican Shrimp Council (described in section 4.1 above) was set up partly by Ocean Garden to educate U.S. retail and foodservice buyers on the quality of Mexican shrimp compared with some of the shrimp produced by high-volume Asian sources. Although Ocean Garden continues to provide some trade credit for shrimp fishermen, interviews in the Upper Gulf suggest that the company is more selective with its lending, having significantly increased lending requirements which now involve formal contracts and collateral such as invoices for *pangas* and motors.

- **Ofi Markesa** is part of the Red Chamber Group, a seafood broker and wholesaler based in Vernon, California, south of Los Angeles.[43] The company is the second major buyer and exporter in the region and has, in recent years, been sourcing increasing volumes of wild caught shrimp from the Upper Gulf, especially on the Sonora side. Ofi Markesa sources both farmed and wild caught shrimp from Mexico and markets headless shell-on or peeled and de-veined shrimp from the region. The company's marketing material highlights Mexican shrimp as a

[42] www.oceangarden.com
[43] www.ofimarkesa.com

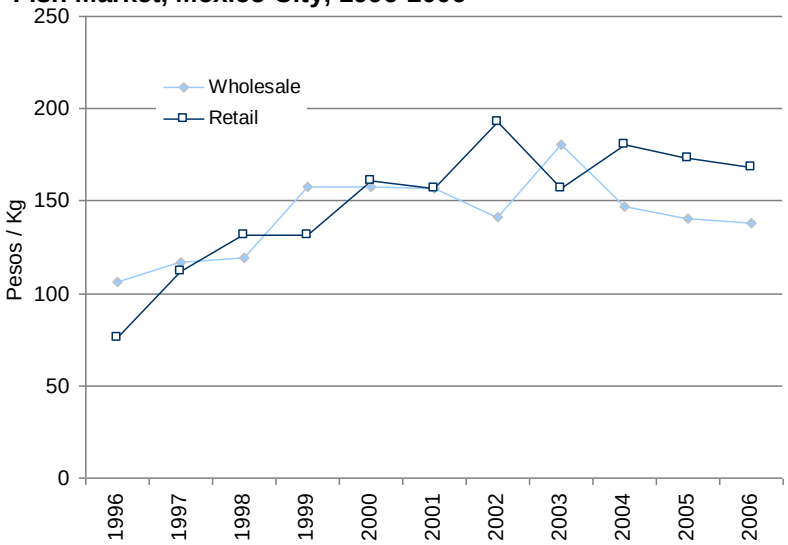
premium product, differentiated from shrimp of Asian sources based on consistency and firmness of texture after it's cooked.

- **Eastern Fish**, a seafood broker based in New Jersey appears to have less experience sourcing shrimp in the region, but has globally diversified sources of both farmed and wild caught shrimp.[44] Eastern Fish has offices in Guaymas, Sonora, but does purchasing both in Sonora and across the gulf in Baja California. Fishermen interviewed indicate that Eastern Fish can make loans for motors and nets around the start of the shrimp season with relatively simple loan requirements, based on an agreement to sell shrimp to the company. The company offers a wide variety of preparations to retailers and restaurants under the "Sail" brand, and offers to package shrimp based on retailer specifications, and branded under retailers' private labels.

Each of these companies uses local third-party processing capacity to freeze and package shrimp for export to the US. Exporters require fishermen and cooperatives to cover the costs of processing, effectively buying shrimp only after it is packaged to their specifications. Shipments of the plate frozen (sometimes glazed) shrimp packaged in branded material generally are transported via 18-wheeler cooler trucks crossing the border at Nogales, Tijuana, or Mexicali.

Interviews with processors and cooperatives suggest that as recently as a few years ago Ocean Garden purchased about 80% of the Upper Gulf's wild caught shrimp, but may now be purchasing closer to half. Now with other options, fishermen tend to use the Ocean Garden offer price as a baseline for negotiation.

Figure 17 –Prices for Whole Large Shrimp, *La Nueva Viga* Fish Market, Mexico City, 1996-2006



Source: Data from CONAPESCA Anuario 2006

5.6. Domestic Wholesale Markets

The Mexican market of fish and seafood targets the final consumer through wholesale markets, supermarkets, traditional markets for fresh produce that handle fish and seafood (which generally source from wholesale markets) and, to a lesser extent, specialty retail outlets. Direct sales by the fisheries themselves are uncommon.

La Nueva Viga, in Mexico City is the country's largest wholesale fish and seafood market, comprised of around 200 warehouses that buy and distribute fish and seafood. It provides fish and seafood mostly to central and southern Mexico, although products are also sent to northern Mexico. The distribution of fish and seafood in Mexico is no longer as

[44] www.easternfish.com

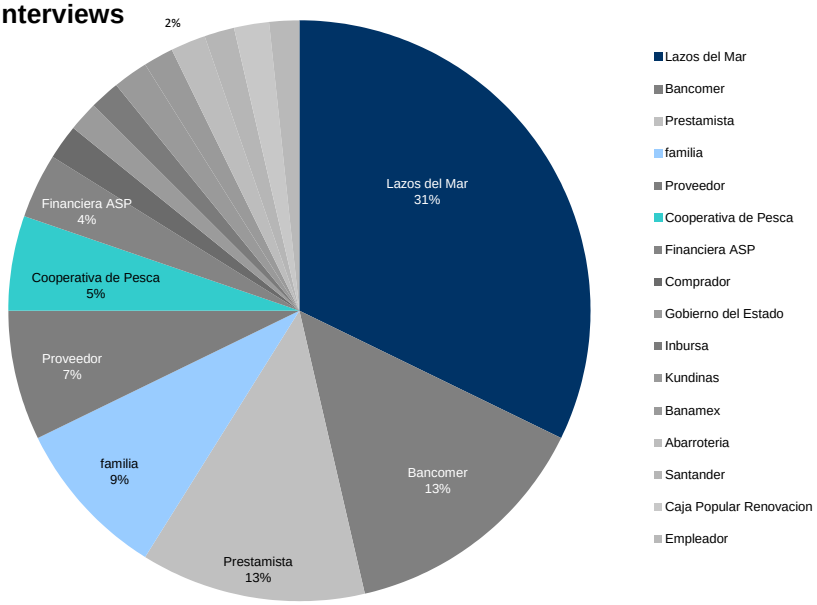
concentrated in Mexico City as it used to be, and Guadalajara and Tijuana are playing important roles in seafood distribution in the western and northern parts of the country.

Employees and owners of market stalls at La Nueva Viga and of specialty wholesalers interviewed indicated that Upper Gulf shrimp is uncommon in the Mexico City wholesale market, but gets the highest prices when available. Overall, domestic wholesale markets are a much less important channel for wild caught Upper Gulf shrimp than they are for other fisheries.

5.7. Financial Service Providers

As shown in the Value Chain map (Figure 15) at the beginning of this section most of the credit available to producers in the chain (represented by dashed red lines) is informal or semi-formal trade credit. International and national traders and brokers extend interest-free trade credit to fishermen prior to the shrimp season in return for commitments to sell them shrimp during the season, as described above. In addition to this traditional trade credit, there are formal and informal sources of financial services in the region. Unfortunately, outreach of such services (especially access to safe savings accounts) is less than socially desirable.

Figure 18 – Sources of Credit in the Upper Gulf, based on local interviews



Source: AFIRMA Upper Gulf market analysis January, 2009

Since late 2008 AFIRMA has studied the current and potential market for financial services in San Felipe, Golfo Santa Clara, and Puerto Peñasco, through interviews with over 100 fishermen and non-fishermen in the region.[45] Dynamics vary significantly from one community to another (and even from one family or cooperative to another) but discernable trends related to overall access to financial services include the following:

- While fishing is a major activity in the three communities analyzed (especially in Golfo Santa Clara where tourism has been slower to take hold than in the other two communities) financial services are demanded to meet a wide variety of needs.

- Access to safe savings accounts is nearly as frequently demanded as all forms of credit combined.

[45] Financial services market study designed by AFIRMA/DAI and conducted along with Lazos del Mar, A.C., January 2009.

- About half of those interviewed do not have access to credit. Those that do, access a variety of formal and informal sources (Figure 18)

- It is interesting to note that while fishing cooperatives have generally gotten out of the business of providing loans, 5% of those with access to loans obtained them from their cooperatives

- Loan amounts range from 1,500 to 130,000 pesos, with loan terms ranging between a week (for credit from local moneylenders) to three years (from specialized credit unions) and payment frequency ranging from daily (moneylenders) to weekly and monthly (formal financial institutions) and according to other agreed upon frequency (moneylenders, fisheries trade credit)

- Interest rates range from 2-5% (flat monthly interest on the initial capital) from credit unions, to around 80% annual interest (on a declining balance) from commercial bank, and 20-25% (flat monthly interest on initial capital) from local moneylenders,

- Collateral required includes mortgages and personal guarantees, and in the case of cooperatives and NGOs, savings accounts held either at a credit union making a loan or in an account that a lender can access if loans are not paid.

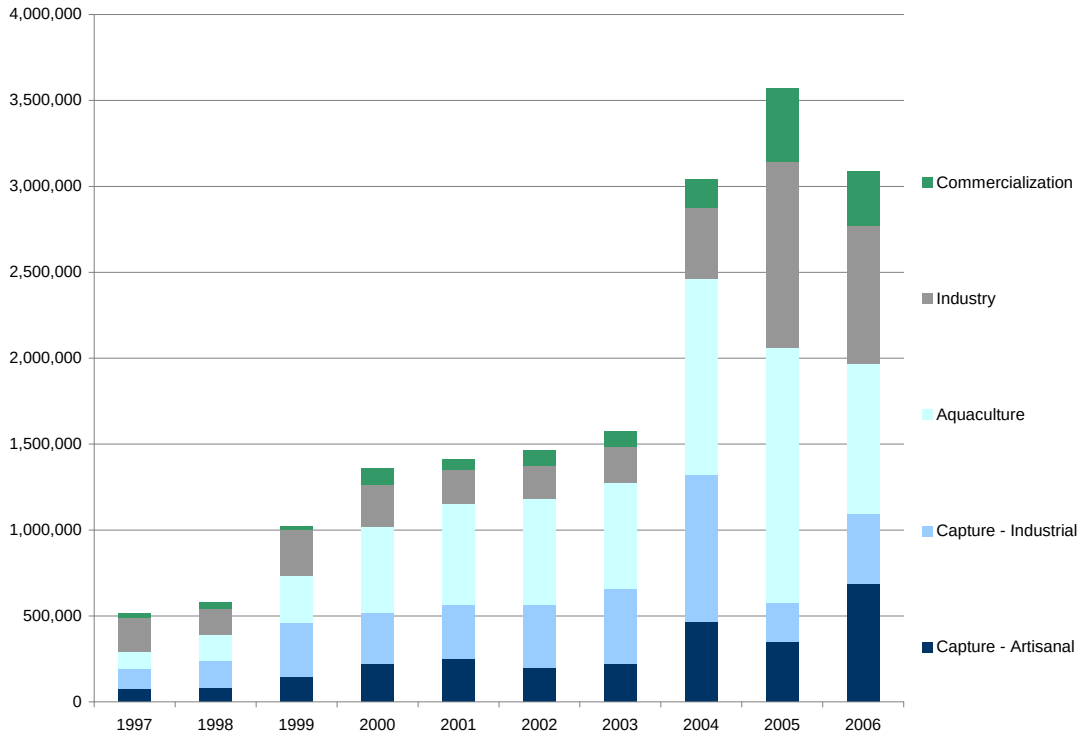
The marked seasonality of the economic activities that drive the local economies in each community represents a clear challenge or, depending on how it is handled, opportunity for current and potential financial service providers in the region. Seasonality tends to lead to moments of illiquidity among local fishermen, businesses and families, followed by abundance of resources, especially during the shrimp season and during US holidays when tourism picks up (particularly in San Felipe and Puerto Peñasco).

Access to formal third-party loans made specifically for economic activities related to regional fisheries (those that inject capital into fisheries value chains) appears highly constrained among artisanal fishermen, whose primary source of working capital is trade credit from buyers of shrimp and, less often, finfish. Noteworthy formal financial service providers in the region that lend to, or could lend to (directly and/or indirectly) fishing families and/or cooperatives, include:

- **Lazos del Mar**, an NGO based in Golfo Santa Clara that promotes savings and provides loans to the families of fishermen so that they can diversify their activities and plan family financial flows. Lazos del mar has around 800 active savings and loan clients, primarily in Golfo Santa Clara, but also in Puerto Peñasco. Currently their mission is to lend to non fisheries-related activities, as they were founded by conservationist NGOs as a strategy for mitigating risk to the *vaquita marina*. They are open to lending only to fisheries activities that do not harm the *vaquita*.

- **ASP Financiera** is a longstanding partner of the Government Trust Fund for Agriculture, FIRA, with good experience in financing agriculture and rural economic activity northwest Mexico. ASP is a well respected institution with ready access to ample FIRA lending capital, and could presumably expand its lending in fishing communities and directly to fishermen.

Figure 19 – Lending to Fisheries using FIRA as a Funding Source



Source: CONAPESCA Anuario 2006

- **Root Capital**, the US-based non-profit lender with support from the Packard Foundation to work in fisheries in the region also has shown significant interest in lending to fishermen via fishing cooperatives, based on its model of leveraging commercial relationships within the value chain, especially with buyers in the US. Root Capital has good experience in Chiapas in the coffee chain, and can offer working capital and investment loans to producer associations and cooperatives at very competitive rates.

CONAPESCA statistics[46] indicate that FIRA, undoubtedly the largest source of funds for the sector, through the FOPESCA program in coordination with SAGARPA/CONAPESCA lent 3 billion pesos (nearly US$300 million) to the fishing sector in 2006. About 90% of the total was for working capital (*avio*) and the other 10% for investment. Figure 19 shows the breakdown of lending between capture, aquaculture, industry and commercialization, with the latter of these accounting for major portions of the increases from 2004-2006.

The vast majority of FIRA backed lending for the sector has been made along the pacific coast, and in the last 2 years of the period shown, the majority of loans were made in Sonora, which in 2006 accounted for 63% of the lending (Baja California accounted for just under 1%). FIRA therefore has represented a major source of funds for financial institutions looking to lend to the fisheries sector in Sonora, especially in aquaculture, industry and commercialization.

[46]Anuario Conapesca 2006 is the most recent source for which data on financial services related to fisheries is available.

5.8. Inputs and Business Service Providers

The inputs and gear necessary for the predominant Upper Gulf fisheries, such as fuel, motors for *pangas* (including "ecological" motors that make less noise and use less fuel than standard motors) and gillnets are readily available. As mentioned above, these inputs are commonly financed by traders.

Specialized, modified trawl nets designed to reduce overall bycatch (compared to a traditional trawler) and eliminate vaquita bycatch are not yet commercially available in the Upper Gulf. The nets, developed by INAPESCA, are complex to produce and operate (compared to a gillnet), they require specialized, imported thread for the netting, and are currently produced only by 2 providers in Mexico, both of which are in Mazatlan, Sinaloa. This could become a bottleneck if uptake of these nets is greater than expected.

While initial purchase and use of these nets will be fully subsidized by the government in the "try-out" program, investment and maintenance costs are likely to become an issue at some point. The nets cost approximately 10 times more expensive than a traditional gillnet, however they are made of a much more resistant material that lasts nearly 10 times longer than the gillnet.[47] It will therefore be important during the "try-out" to evaluate such cost and investment elements, including the point at which such nets pay for themselves, implications for financing purchase or maintenance of the nets, etc.

6.0. Recommended Upgrading Strategies

The need to protect endangered species and preserve marine sanctuaries in the Upper Gulf must be balanced with, and ideally strengthened by, a range of local economic activity that includes both alternative livelihoods (e.g. tourism) and traditional ones (e.g. fishing). The recommendations outlined here are intended to complement and support ongoing initiatives, emphasizing improved market information, market linkages that could promote alternative technologies, production techniques and fisheries, while recognizing that these are just part of an integrated and meaningful response. Education, communication, scientific and conservation efforts, although not addressed here given this report's scope, must continue if the vaquita is to have a chance at survival.

6.1. Sustainable Fisheries Market Linkages for the SEMARNAT "Try-Out"

Although sustainable seafood standards and eco-labels are not yet widely recognized or valued, consumers are increasingly interested in knowing where their food comes from and what its environmental impacts may have been. As part of creating incentives for fishermen to adopt sustainable techniques, positive market forces should be actively sought out in parallel with conversion efforts.

Because it is entirely unclear what volumes will be produced through the trial of INAPESCA's modified trawl gear, linkages should be sought with a small number of high-profile buyers with exacting quality standards, but which are willing to tolerate some flexibility on certification type and volumes in the 2009-2010 shrimp season. Ideally, one possible end market might be found among one or more top chefs (where markups are highest and premium prices might prove feasible) who are willing, with the help of Upper

[47] Interview with Daniel Aguilar, INAPESCA, Mazatlan, Sinaloa, April 2009.

Gulf stakeholders to tell the story of the vaquita marina and the new standards and alternatives working towards its conservation.

Such linkages require delivery of shrimp of the highest quality, clearly distinguishable from farm raised shrimp, for instance, and managed to the market's required specifications. Fortunately, wild caught Upper Gulf shrimp is among the best shrimp available on the market and although it is often treated as an undifferentiated commodity, the efforts of brokers and exporters are contributing to improved market recognition.

An approach of initially targeting leaders in the fine dining segment might also produce a "top chef effect" with others following highly visible restaurants and chefs, tracked through sites like Ocean Friendly Chefs[48] and the "Restaurant Program" under the Monterey Bay Aquarium's Seafood Watch Program.[49]

The authors estimate that, considering the overall demand and the existing value chain, the most promising market consists of top end restaurants in California. But a medium term approach should look to other US destinations where eco-labeling is taking hold (e.g. Whole Foods or other supermarkets). Also, because nearly all of the exported shrimp is frozen, shelf-life is not an issue in terms of gaining access to European or Japanese markets for sustainable shrimp. These should be explored gradually since the supply chain would have to be built largely from scratch. However, if well marketed, the authors estimate that Mexican sustainable shrimp could be positioned to compete in certain segments with shrimp from Asian sources.

The goal of initial market linkages efforts would be to test the hypothesis that trends in sustainable seafood could lead to attractive market channels for sustainable shrimp and for alternative fisheries (more below) that are contributing to preservation of the vaquita marina while providing viable livelihoods for Upper Gulf fishermen.

An important aspect that may be missing in new channels may be access to working capital that is commonly extended through traditional channels, so efforts should be made to link to affordable, timely financial service providers.

6.2. Develop and Promote Interim Standards for "Vaquita-free" Shrimp

Related to the previous point, it will be necessary to develop and ensure compliance with interim sustainability standards. The authors are not generally in favor of further proliferation of certification standards since this can ultimately confuse consumers, and consumer recognition and trust in certification schemes is fundamental to any potential differentiated price stability (based for instance on preferential access to major supermarket channels) or price premium.

Nevertheless, given the circumstances, there is good rationale for interim "vaquita-free" or "vaquita-safe" standards that INE is considering. These might be designed to ultimately feed into more recognized certification standards in the long-term. But considering the time and extensively detailed data requirements of such standards, and the fact that it is necessary to move quickly, which essentially rules out most well recognized comprehensive certification schemes in the short-term. However such schemes,

[48] http://oceanfriendlychefs.org/
[49] http://www.montereybayaquarium.org/cr/cr_seafoodwatch/sfw_restaurant_program.aspx

especially those for which there is increasing brand recognition, should be considered for the medium to long term.

6.3. Promote Aquaculture Standards Compliance for Re-activated Farms

International experience with shrimp farming has shown that with management and technological improvements, shrimp aquaculture can be transformed to a vibrant industry that can be managed for both economic and environmental sustainability. The CONAPESCA and PROREMARCO plans described in section 3.6 for converting shrimp fishing licenses to shares in a professionally managed shrimp farm should account carefully for national and global trends in aquaculture, and access to markets.

To avoid the problems experienced in Thailand and Ecuador, the initiative in Golfo Santa Clara should take this opportunity to introduce "Best Aquaculture Practices" and start the preparation of the Aquaculture Certification Council certification process. Wal-Mart pledged that it will only buy ACC certified farmed shrimp in 2011, and other supermarkets are likely to follow suit. Such trends suggest that if the initiative is well managed and coordinated with the market, PROREMARCO and CONAPESCA could have an opportunity to start with privileged access to such market channels.

6.4. Support Market Linkages for Alternatives to the Shrimp Fishery

For fishermen and cooperatives that want to remain in the fishing business but are considering turning in gillnets and gillnet licenses for alternative gear and licenses, there is no better incentive to do so than the success of a peer who has done so. Success depends on proper application of proven technologies and, to a large extent, on market connections and approaches to commercialization. Commercialization in an alternative fishery involves an entirely different set of actors and dynamics from the traditional shrimp fishery in the region.

The authors recommend further assistance to fishermen participating in the switch-out program with market linkages, especially in cases where the alternative fisheries to which the fishermen and cooperatives have switched might be managed sustainably and certified as such. Promising examples witnessed in the Upper Gulf include:

- ***Geoduck Clam*** (*panopea abrupta*) known locally as *"almeja generosa"* is a large very high value clam variety that divers collect in Puerto Peñasco and sell to a single buyer in Ensenada, Baja California, who exports to Asia. Official collection in Puerto Peñasco is limited, as it is technically still in research stage, although some local fishermen are concerned that divers are collecting the clams without sufficient replacement. Currently about 100 MT, or 80,600 clams, are collected per year, processed by a single plant. Once the lifecycle of this species is better understood, and a sustainable management plan is established, there may be important opportunities for local fisherman to commercialize this high value species. One possibility is to consider looking into catch shares, in which the fishery is managed for overall sustainability and long-term business viability and stakeholders own shares of the returns. This would obviously require greater organization and coordination, which can be complicated in a high value/low volume fishery such as this one.

- ***Crab fishery*** (Puerto Peñasco) – With recent declines in blue crab production, especially in Maryland in the US, there may be a significant opportunity for crab fisheries in Puerto Peñasco to fill the gap. Phillips Foods, a distributor of Maryland-style seafood and owners of Phillips seafood restaurants, is reputed to be looking for new sourcing opportunities. One possibility is to facilitate contact and communication between Puerto Peñasco crab cooperatives and Phillips Foods.

- ***Pescado extranjero***, trapped, may be relatively more easily certified a sustainable fishery since this technique does not carry with it any major bycatch and could be one alternative to gillnet fishing, potentially for live fish markets (although this would require new investments and techniques in handling of live fish). One cooperative, *Cooperative La Guera* in San Felipe has taken up this technique and gear with good early results in terms of yields but with under-explored market prospects. Such initiatives should be supported and encouraged by looking into potential domestic and export markets in the short-term and in the long term considering different certification schemes, depending on the needs of the end markets found willing to buy the fish.

- Upgrading the ***curvina golfina*** fishery in Golfo Santa Clara for increased long-term value to produce a range of products beyond third-tier, undifferentiated, whole gutted fish (as highlighted in the box on page 33 above). This would require investment at the level of 1-2 processors in Golfo Santa Clara (where there is interest to do so) and coordination with fishing cooperatives to focus more on value and post-catch handling than on mass quantities of fish (*"pesos, no peces"* as one fisherman put it).

6.5. Maintain Agility in Support Programs

The fluid and urgent situation in the Upper Gulf will require flexibility in continuing to refine and adjust subsidy programs, as the Government of Mexico has done, ensuring that they keep pace with changes in the environment, changes in the market, and changes among those they're meant to benefit. For instance, if over time fishermen acquire better market information and linkages, and further diversify their income sources, subsidy might shift from direct support of individuals to greater emphasis on sector-wide efforts related to certification, diversification of fisheries, and more organized and integral management of fish stocks.

One such option might be to examine options under the new Marine Stewardship Council (MSC) initiative designed to simplify compliance for "data deficient fisheries" that lack the substantial information basis upon which MSC certification is based. SEMARNAT and CONAPESCA might thereby help build and make available the necessary data on fish stocks, bycatch and other necessary information to help improve the potential for access to certification schemes.

Annex A: Illustrative Vaquita Marina Stakeholders

This annex gives brief background on some of the public and NGO stakeholders working to save the vaquita marina, that the authors came across in their research and field work. It is meant more as an illustrative list than as a comprehensive directory.

Government Stakeholders

The Commission for Environmental Cooperation's (CEC) Vaquita North American Conservation Action Plan (NACA) is intended to provide a tri-national (Mexico, USA, Canada) outlook on the species. It gives an updated account of the species and its current situation, identifies the main risk factors for the species, and summarizes the current management and actions taken in each country, as well as public and commercial perception of the species and the threats it faces. It recommends key tri-national collaborative conservation actions, priorities and targets for the three countries to consider adopting along the following lines:

- threats prevention, control and mitigation;
- use of innovative approaches to developing sustainable livelihoods in the communities;
- research, monitoring and evaluation on the state of the vaquita population; and
- increasing awareness of the vaquita, its plight, and importance within its ecosystem.

The CEC website (www.cec.org) has information on its Vaquita program. In late 2008, The CEC published an excellent trilingual guide on the Vaquita titled:
"Phocoena sinus, North American Conservation Action Plan", Trilateral Commission on Environmental Cooperation (CEC) report on the Vaquita, Montreal, Quebec, Canada, 2008. The guide can be downloaded at:
http://www.cec.org/files/pdf/BIODIVERSITY/Vaquita-NACAP.pdf

International Committee for the Recovery of the Vaquita (CIRVA) – During the 48th annual meeting of the IWC in June 1996, Mexico presented a strategy for preventing the vaquita's extinction. The main element was the creation of the International Committee for the Recovery of the Vaquita (CIRVA). The mandate of the committee was to produce a plan for species recovery based on the best scientific information available. Distinguished researchers from Europe, Canada, the United States and Mexico were asked to participate on the committee. CIRVA was expected to develop a recovery plan and consider the socioeconomic implications of proposed regulatory measures for local human communities. Key conclusions of the first CIRVA meeting (January 1997) included:

- The reduction in the Colorado River flow does not represent a risk for the vaquita in the short and medium term.
- The long-term effects of this river flow reduction should be investigated.
- In the immediate and short term, bycatch in fishing nets is the primary threat to the survival of the vaquita.

Biosphere Reserve Program, Action Program for the Conservation of the Species: Vaquita (PACE Vaquita), CONANP – Led by Director of the Upper Gulf Protected Area, José Campoy Favela, with support from other parts of the Environment Ministry (SEMARNAT) and coordinated with the Fisheries Commission (CONAPESCA) manages

the buyout program funded by the Mexican Government. In 2007, the buyout consisted of two programs the alternative livelihoods and alternative fishing gear program, in 2008 they expanded with the switch-out program. The main elements are:

- Alternative livelihoods (Buy-out) – Fishermen turn in one or several permits and gear (e.g. shrimp fishing license, gillnet, engine) and set up a new business. There are three categories in this option depending on the number of permits turned. In 2008, 1 permit and gear was paid out at $400,000 pesos, 2 at $500,000 pesos, and 3 or more at $600,000 pesos.

- Alternative gear (Rent-out) also known as "Biodiversity Conservation Activities:") Fishermen are paid to not go into the Refuge and use gillnets. They are not required to turn in permits since they are only required to respect the refuge and other no-take areas from the biosphere reserve. Payments varied on where the boat is based. In 2008: $45,000 pesos for boats based in San Felipe, Baja California, $35,000 pesos in Golfo de Santa Clara and Puerto Peñasco, Sonora.

- Alternative fishing gears – (switch-out) Turn in gillnets and begin using "vaquita safe" gear (pots, hook and line, long lines, etc.). This option does not require fishermen to give up their permits; however they do have to turn them in so they are modified to specifically say the type of gear they are allowed to use. Anyone who chose this option received $300,000 pesos.

The 'buyout' required fishermen to turn in their fishing permits if they wanted to set up a new business. Another characteristic of this first program was that alternative livelihoods were restricted to tourism related activities and other fishing related activities (working in refrigerated rooms, aquaculture, etc). The 2008 buy-out program was designed differently and included modifications that reflected a more realistic way of meeting the needs of fishermen and the communities. It allowed fishermen to establish any type of business they wanted to. The second buy-out program also offered a third option. The 'rent out' option was the result of the urgency to get gillnets out of vaquita habitat in order to guarantee zero incidental catch mortality.

Fishing Village	Type	2007 applications	2008 applications	2008 (pesos)
San Felipe	Buy Out	12	50	$39,000,000
	Rent Out	10	157	$7,065,000
	Switch-Out	NA	38	$23,100,000
	Total permits eliminated:	21 finfish 3 shrimp		
Golfo Santa Clara:	Buy Out	22	71	$41,300,000
	Rent Out	NA	384	$13,440,000
	Switch-Out	NA	9	$2,700,000
	Total permits eliminated finfish	25		
Puerto Peñasco	Buy Out	17	32	$24,500,000
	Rent Out	19 finfish	1	$35,000
	Switch-Out	NA	4	$2,700,000

Further up-to-date information is available at www.conanp.gob.mx and CONANP Guidelines for Vaquita subsidy program (PACE): http://www.conanp.gob.mx/pdf_vaquitamarina/Lineamientos%20Vaquita%2004-06-2008%20DEFINITIVA.pdf

The **Instituto Nacional de Ecologia (INE)**, under SEMARNAT has the mission of generating "scientific and technical information on environmental issues and the training of human resources, in order to inform society, support decision making, encourage the protection of the environment, promote the sustainable use of natural resources, and support the Secretary of the Environment and Natural Resources in reading its goals." INE leads research efforts related to saving the vaquita, such as the 2008 Vaquita expedition, and is playing a key role in the buy-out and "try-out" programs for Upper Gulf fisheries. Website: www.ine.gob.mx

Regional Fisheries Research Centers (*Centro Regional de Investigación Pesquera, CRIP*) in Guaymas, Ensenada and Mazatlan have implemented research programs to test alternative fishing gear addressing the need to eliminate Vaquita by-catch. The Mexican government and CEC, Walton Foundation, and the World Wildlife Fund have sponsored experiments with alternative gear for shrimp fishing. Such nets have been based on technologies developed for other regions, such as the *suripera* net used in Sinaloa's coastal lagoons, and thus tests have required adaptation to Upper Gulf of California. Initial results reported in November 2006 gave reason for some optimism concerning their potential for use in the Gulf. Two *suripera* nets were tested over a 9-day period: 12 8.5-hour hauls were completed and 17 kg of shrimp were caught (INP 2006). Experiments also have been conducted with shrimp traps; however, the results so far have not been promising (INP 2006; Walsh et al. 2004). Experiments with *suripera* nets are continuing, with support from fishing cooperatives in Golfo Santa Clara, San Felipe and Puerto Peñasco. Given low yields, trials during the 2009-2010 shrimp season will be run with the *chango modificado* trawl nets adapted for the smaller boats of artisanal fishermen. Local fishermen have rejected the *suripera* and are skeptical about the *chango modificado* net because the yields are unproven for smaller boats and because of the higher fuel costs it will involve.

National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center – The Vaquita Expedition 2008 was a joint US-Mexican effort to provide the best scientific data possible to aid the government of Mexico in conservation decisions for the vaquita. The Instituto Nacional de Ecología (INE), SEMARNAT, is the Mexican partner in the Vaquita Expedition 2008. The US Chief Scientist: Barbara L. Taylor, PhD and Mexico Chief Scientist: Lorenzo Rojas-Bracho led this operation. The primary goal was to use passive acoustics to see whether conservation actions to reduce the level and area of gillnetting are allowing vaquita numbers to increase. Acoustic methods have been identified as the best monitoring strategy because vaquita are difficult to detect visually (group size is small, they avoid ships, they spend little time at the surface). Three vessels were used: the Koipai Yú-Xá, which has been the primary acoustics research vessel for Mexico and lead the work on stationary acoustic research, the Vaquita Express, a 24 foot (9m) sailing vessel that towed an acoustic array, and United States NOAA Ship David Starr Jordan, which deployed research buoys for autonomous acoustic recorders, conducted oceanographic work to better understand vaquita habitat and carried out visual surveys.

They discovered that the Upper Gulf of California was very noisy in the high frequencies used by vaquita to echolocate. Despite the challenges, all three types of vaquita detectors successfully detected vaquita. They also detected vaquitas in very shallow water close to one of the main fishing villages. The acoustic detections confirm the good news also seen by the visual team using high powered binoculars: vaquita are not extinct and their distribution is roughly the same as it was ten years ago. However, data from the research buoys show great differences in vaquita densities within their known range. Some buoys detected no vaquitas in the two month research period, while other buoys detected vaquitas almost daily. Scientists will use these data to design an acoustic monitoring program which will determine whether the current conservation actions to reduce gillnet mortality are being successful. NOAA has recently developed a consumer guide for fish purchasing, available at: http://www.nmfs.noaa.gov/fishwatch/

Non-Governmental / Non-Profit Organizations

Interest in the vaquita marina has steadily increased over the years, at the local, national and international levels. An indicator of such growing interest is the creation of at least two organized groups with a goal of protecting the vaquita: The National Technical Consultative Subcommittee for the Protection, Conservation and Recovery of the Vaquita, and Alto Golfo Sustentable.

The National Technical Consultative Subcommittee for the Protection, Conservation and Recovery of the Vaquita – This social participation organization was formally constituted on 28 February 2002, by members of the scientific community, representatives of the civil society and other stakeholders whose mission was to develop a national strategy for the protection, conservation and recovery of the species, while promoting the joint participation of other sectors. The Subcommittee developed a project draft entitled Recovery Project (Proyecto de Recuperación - PREP) which later served as the baseline for the Action Program for the Conservation of the Species: Vaquita (PACE Vaquita). Some of its members are also constituents of the group, Alto Golfo Sustentable.

Alto Golfo Sustentable (AGS) – created in July 2005 as a monitoring program to eradicate illegal shrimp fishing during the off-season, eliminate vaquita marina incidental catch, and improve the efficiency of shrimp fishing in the Upper Gulf fishing communities of San Felipe, Puerto Peñasco and Golfo Santa Clara. AGS was an important player in brining together public and private sector stakeholder around sustainability efforts in the region. The AGS Executive Committee includes; Ocean Garden Products, the fishery sector, Mexican government representatives, and NGO's. AGS is a multi-stakeholder group, which includes representatives of the industrial and artisanal fishing sectors, the principal shrimp marketing company in the region, as well as national and international NGOs devoted to biodiversity conservation. During its first meeting held in Puerto Peñasco, AGS members agreed upon the following main objectives:

- to eliminate incidental vaquita bycatch;
- to eliminate illegal fishing and
- to improve shrimp fishing practices.

These objectives are equally dealt with by a number of multi-stakeholder working groups within AGS. AGS meets regularly to review advances in meeting their objectives and participated actively in the development of the vaquita refuge management plan published by the Mexican government in 2005. In 2006 AGS launched a community inspection and

surveillance program during the shrimp fishing off season, with the prime objective of preventing illegal fishing. Because of its cross-sectoral beginnings, AGS has served as a channel of communication between the various actors and sectors as they try to develop and implement vaquita recovery measures.

World Wildlife Fund – This global Conservation NGO has worked with local organizations and stakeholders and funded several research projects in improving knowledge of the Vaquita and currently works with SEMARNAT and INAPESCA in developing improved fishing gear.

Intercultural Center for the Study of Deserts and Oceans (CEDO) is a research center, founded in 1980, that offers facilities, courses and expeditions to explore the creatures, habitats and cultures of the Sonoran Desert and Sea of Cortez. CEDO conducted a set of awareness programs to work with the fishermen to better understand their fisheries. With funding from the David and Lucile Packard Foundation, CEDO published comprehensive resources on small-scale fisheries in the northern Gulf of California. Pescando Entre Mareas del Alto Golfo: Una Guia sobre la Pesca Artesanal, Su Gente y sus Propuestas de Manejo (Cudney and Turk Boyer 1998). CEDO's work and additional studies by the Centro Regional de Investigación Pesquera (CRIP, Guaymas and Ensenada) and Conservation International provide the foundation for are meaningful fisheries management regime using available data on vaquita and fishing activities and zones. CEDO Website: www.cedointercultural.org

The ***David & Lucile Packard Foundation*** has been very active in conservation in the Upper Gulf of California for many years, recently with an increased focus on market linkages in their grant-making approach. The Packard Foundation's Marine Fisheries subprogram supports grantees' work in two broad categories: market interventions and policy reforms. The subprogram has as goal to induce change by facilitation of demand, supply, and policy strategies working together. The Foundation has been a strong supporter of market and design work to support a regulatory and management agenda and a founding supporter of the Monterey Bay Aquarium's Seafood Watch Program. http://www.montereybayaquarium.org/cr/seafoodwatch.aspx

The Marine Fisheries Subprogram is further described at: http://www.packard.org/categoryDetails.aspx?RootCatID=3&CategoryID=66

The ***Walton Foundation*** has of late increased its grant support for environment programming, and one of the major sectors the foundation is supporting is improving fisheries management practices. The Foundation supports urgently needed fisheries management reform, with an emphasis on fisheries in the Gulfs of Mexico and California. Our grants focus on four critical areas: Preventing Overfishing, Encouraging the Creation of Dedicated Access Privileges –and Creating Marine Managed Areas. Using markets to encourage sustainable fishing – The Foundation supports the development of mechanisms, such as fisheries certification, that enable consumers and seafood buyers to distinguish fish that are harvested sustainably so their purchasing power can encourage prudent fisheries management. The Walton Foundation is one of the supporting donors of the Alternative Shrimp Gear Research managed by SEMARNAT (Director, Jose Aguilar)

Annex B – Key Elements of the Legal Framework

Mexican legislation for the conservation of marine mammals and the protection of their habitats provides a solid framework for implementing actions aimed at saving the vaquita. The following list is a synthesis of this legislation, including the Mexican National Constitution and the corresponding Mexican Official Standards (NOMs):

- the General Act on Ecological Equilibrium and Environmental Protection (Ley General del Equilibrio Ecológico y Protección al Ambiente—LGEEPA) was enacted and published in the Official Gazette of the Federation (Diario Oficial de la Federación—DOF) on 28 January 1988. Major and profound modifications to LGEEPA were made in 1996 (DOF, 13 December 1996) and more recently in July 2000 (DOF, 3 July 2000) with its bylaw on 30 November 2006. Article 79, third section, of the LGEEPA, in the chapter on wildlife, establishes the criteria for conservation of species that are endemic, threatened, in danger of extinction and subject to special protection. Article 80 specifies the criteria for granting permits, concessions and licenses.

- La Ley General de Vida Silvestre (Mexico's General Wildlife Law), published on 3 July 2000, in the Official Gazette, establishes the provisions to list species under a specific risk category and regulates their sustainable use. Furthermore, it includes—under section VI—a chapter dedicated to the process for implementing refuge areas for the protection of marine species. Article 50 of the law was reviewed in 2002, introducing provisions that prohibit the extraction of marine mammals for subsistence or commercial purpose, while only allowing their capture for scientific research.

- The Fisheries Law, fifth section of Article 3, grants environmental authorities the power to establish protection measures for marine mammals and other marine organisms. Intentional capture, disturbance or hunting of any marine mammal is categorized as an infraction, pursuant to Article 24 of this law. On 22 October 2007, the new Fisheries Law (Ley General de Pesca y Acuacultura Sustentable-LGPAS) came into force (DOF, 24 July 2007), which incorporates the concept of sustainable use of marine resources and provides a coordination framework between for environmental and fisheries authorities in establishing protection measures for marine mammals and other endangered species.

- The first section of Article 420 of the Federal Penal Code imposes a sentence of between six months and six years of prison plus fines for anyone who captures or kills any marine mammal illegally, and for anyone who commercializes any product or by-product of a marine mammal without the necessary authorization. Totoaba fishing is totally prohibited, and so is the use of totoaba fishing nets (with 12-inch stretched mesh or larger), in the order published on 9 August 1975 in the Official Gazette of the Federation.

- The creation of the Upper Gulf of California and Colorado River Delta Biosphere Reserve was enacted (Official Gazette of the Federation, 10 June 1993). Mexican Official Standard NOM-012-PESC-1993 protects the vaquita and the totoaba in the Gulf of California. Mexican Official Standard NOM-059-ECOL, enacted in 1994, and recently reviewed, establishes a catalogue of species, subspecies and

populations considered to be extinct, in danger of extinction, threatened, vulnerable or subject to special attention. The vaquita is listed as a species that is in danger of extinction.

- On 8 September 2005, SEMARNAT established a vaquita refuge, consisting of an area in the shape of a polygon and containing approximately 80 percent of all the locations of confirmed vaquita sightings. On 29 December 2005, the Protection Program for vaquita within the refuge was published. Along with this decree, the Sonora and Baja California governments (the two states bordering the vaquita's area of distribution) were awarded US$1 million to be used to compensate fishermen who were negatively affected by establishment of the refuge.

- The National Aquaculture and Fishing Commission (CONAPESCA) set 23 March as the starting date for the shrimp ban on the high seas, estuary and bay areas. The fishing prohibition is aimed at safeguarding shrimp stocks, which are now breeding.

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