

Exploring business strategy and assessing the potential for sustainable seafood products in San Francisco Bay Area seafood restaurants

by

Ty Brookhart

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Thesis Committee:
Professor James Diana, Chair
Professor Andrew Hoffman

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Abstract

The environmental costs associated with seafood production are of major concern. Major capture fisheries have been so depleted that recovery is uncertain. Despite this, seafood consumption is increasing. Aquaculture has helped meet this rising demand and is the world's fastest growing source of food, but it can cause significant environmental harm. Restaurants are the largest single consumer group of seafood and as such could play an important role in mitigating the environmental problems surrounding seafood production. I investigated seafood knowledge and current decision strategies regarding use and marketing of seafood within the San Francisco Bay Area (Bay Area), to determine if awareness of seafood-related issues and integration of sustainable practices is higher in one of the most progressive and environmentally conscious cities. I used a combination of surveys and interviews. My goals were to 1) identify seafood decision-makers at targeted restaurants; 2) determine motivating factors driving seafood selection and purchasing of decision-makers; 3) characterize the attitudes and awareness of decision-makers about the marine environment; 4) evaluate decision-maker knowledge and sentiment related to seafood certifications; and 5) determine decision-maker willingness to use sustainable seafood products and to evaluate business strategy regarding seafood.

From 31 completed surveys and 11 interviews I found decision-makers purchased seafood based primarily on quality and taste, while cost, health reasons, and environmental considerations were considered less important. Respondents were significantly better informed about environmental issues related to salmon farming and commercial fishing than with shrimp farming. Decision-makers were familiar with seafood certifications and labels to different extents, depending on the certification. Decision-makers felt positively about including sustainable products in their businesses and devoted time and energy specifically for integrating sustainable seafood and other products into their businesses. Decision-makers in this study had a good overall understanding of seafood related issues and certifications, though there were gaps in their knowledge, particularly with regards to shrimp farming and to some extent seafood certifications. They also had a greater knowledge of seafood related issues and were more willing to integrate sustainable seafood into their businesses than those surveyed in the nation-wide survey conducted by Seafood Choices Alliance (SCA 2003). Since the Bay Area is considered a culinary trend-setter, these results may be a harbinger of national level trends.

Introduction

The rise of the global economy has influenced seafood consumption habits around the world (Issenberg 2007). World-wide human consumption of fish has doubled in the last 30 years (Delgado et al. 2003), but world capture fisheries production has stagnated and concerns about the commercial and ecological sustainability of capture fisheries are widespread (Pauly and Palomares 2005). Increasing demand for seafood has been met by significant increases in aquaculture production. Aquaculture has been the world's fastest growing source of food, with finfish and shellfish production expanding by an annual growth rate of 10.9 % since 1970, four times faster than that of terrestrial meat production (Hishamunda and Ridler 2002). Aquaculture accounts for nearly half of global seafood production, valued at \$70.3 billion (FAO 2006). Overfishing and the rapid growth of aquaculture have resulted in dwindling wild fish stocks, long-term environmental harms, and social conflicts (Boyd and Clay 1998, Naylor et al. 2000, Delgado et al. 2003, Costa-Pierce 2003, Muir 2005, Pauly et al. 2005). However, impacts depend on the context and method of fishing or aquaculture production (Diana 2009). Methods to conduct more sustainable fishing and aquaculture are well under development or already exist in much of the world (Costa-Pierce 2003). The share of aquaculture in the seafood market is increasing and fueling a sustainable¹ seafood movement (FAO 2006).

Restaurants are playing a critical and increasing role in the sustainable seafood movement. Restaurants expose consumers to new species and types of seafood and exhibit substantial influence on the wholesale and retail seafood markets (Issenberg 2007). Consumers report first being exposed to many fish while dining in restaurants and a Stanford Graduate School of Business study concluded that 67 % (by value) of all seafood products in the United States are sold directly to restaurants or their distributors (SCA 2003). Thus, chefs and restaurateurs (the decision-makers) play significant roles in terms of which seafood products enter and succeed in the market.

The U.S. alone imports approximately \$3.6 billion of shrimp, and \$1.2 billion of salmon annually (USDA 2005, USDC 2006), and these species are a primary concern because of their popularity, value, and history of environmental harm. Shrimp is now the most popular seafood in America with annual consumption at 4.4 lbs/person (NMFS 2004, National Fisheries Institute 2006). In 2005, world shrimp production reached 6.0 million tons, of which 2.7 million tons, or 45 %, came from aquaculture (FAO 2006). This compares with only about five percent in the early 1980s (Josupeit 2004). Since 2001, salmon has ranked third among fish species consumed in the United States, after shrimp and canned tuna and accounted for about 14 % of U.S. fish consumption (National Fisheries Institute 2006).

¹ The word sustainable in a strict sense means the ability to endure- with no reference to time constraints. In recent decades sustainable has become a common term applied to commercial products, goods, and practices implying they have low environmental impact, are economically viable, and socially exemplary. The term "sustainable seafood" as used here refers predominately to culture and harvest practices that are deemed more environmentally benign, culturally compatible, and economically robust than many current methods commonly practiced. However, while a seafood product or practice may be referred to as "sustainable," the reality may be it is not energetically, environmentally, culturally, or economically sustainable when subjected to scientific scrutiny. Thus, the use of the word sustainable here is meant to reflect the common parlance- referring to items as sustainable when they exceed the status quo environmentally, socially, and economically; and not to imply that they are flawless to scrutiny or should be used to set standards for which sustainability can be measured.

The production of shrimp and salmon by aquaculture and commercial fishing can cause significant environmental harm. Environmental impacts related to shrimp and salmon farming result from habitat conversion, water-use, effluent disposal, antibiotic and fertilizer use, exotic species escapes, disease transfer to wild stocks, and net protein loss from feed conversion (Naylor et al. 1998, Muir 2005).

Shrimp farms are often located in coastal areas using ponds of fresh or brackish water. Salmon are farmed for most of their lives in open ocean net pens, often near an estuary. The rapid expanse of shrimp farms has also caused social and economic problems in many developing countries including increased poverty, landlessness, food insecurity, displacement of communities, pollution of drinking water, poor working conditions, and impacts on overall health and education (Muir 2005). Farmed shrimp is produced primarily in developing nations for consumption in industrialized nations (FAO 2006).

Bottom trawling is the most common method for capturing wild shrimp. The most significant impacts associated with trawling include disturbance of the seabed and incidental by-catch. Trawling can have effects on the seabed resembling forest clearcutting, and is recognized as a major threat to biological diversity and economic sustainability. Recovery after disturbance is often slow because of poor recruitment and growth rates (Watling and Norse 1998). By-catch from shrimp trawl fisheries is one of the most significant issues affecting fisheries management today. Worldwide, shrimp trawl fisheries account for more than one third of the global bycatch total (Hall et al. 2000). Shrimp trawl bycatch/catch ratios (weight discarded per weight landed) are between 3:1 and 15:1 in the United States (Hall et al. 2000). Incidental mortality of marine mammals, seabirds, sharks, non-target fish species, and sea turtles results from trawl by-catch. Sea turtles are critically endangered and estimates indicate thousands of sea turtles are caught each year in the Gulf of Mexico and the Atlantic (Epperly et al. 2002). By-catch can affect biodiversity and abundance, and is condemned on moral grounds for its needless waste of animal lives (Hall et al. 2000).

Salmon are carnivorous and require large amounts of fishmeal and fish oil in their diet. The European salmon farming industry requires a marine support area for feed estimated at 40,000 to 50,000 times the surface area of cultivation, equivalent to about 90 % of the primary production in the fishing area of the North Sea (Folke and Kautsky 1989, Naylor et al. 1998). Salmon farms depend on ocean currents to remove wastes and cycle nutrients (Naylor et al. 1998). Wild fish can interbreed with escaped farmed fish and may lead to genetic degradation of wild salmon populations (Naylor et al. 2005). Poor water quality and high stocking densities can facilitate outbreaks of salmon diseases and parasites affecting both farmed and wild fish (Krkosek et al. 2009). Salmon farmers often use antibiotics and pesticides to counter these problems, which pollute coastal waters (Naylor et al. 1998).

The implementation of more sustainable harvest and culture practices is likely to occur only with innovative support from businesses, governments, non-governmental organizations (NGOs), and others operating in the food chain (Kaiser and Edward-Jones 2006). Recently, increasing concern for marine ecosystems has ignited the passions of businesses, NGOs, and consumers who have launched a variety of seafood related social marketing campaigns, from certification to boycotts of seafood products like farmed shrimp and Chilean seabass (Jacquet and Pauly 2007). These campaigns create an opportunity for seafood products that exhibit socially and environmentally responsible production techniques. The result has been an

increased focus on seafood sustainability from existing seafood businesses and has created a cottage industry of seafood suppliers, consultants, and certifying organizations catering to these changes.

Restaurants are in a unique position to capitalize on increased consumer interest in sustainable seafood. Competition in the restaurant industry is fierce and individual venues differentiate themselves based on menu, food quality, atmosphere, and marketing. Offering sustainable seafood and other sustainable food choices enable restaurants to differentiate themselves among their competition. Certifications are one method restaurants use to promote sustainable seafood. In general, certification programs evaluate a production process with regard to established environmental standards set by an independent third party. If the production process meets these standards, the producer or marketer may buy a license for use of a specific label in marketing of that product (Overdevest and Rickenbach 2006). The label conveys to the consumer otherwise unobservable information concerning a product's environmental impact (Teisl et al. 2002). In the case of seafood markets, consumers who prefer sustainably harvested or farmed seafood products provide a market-based signal to maintain sustainable fisheries resources and develop sustainable aquaculture techniques (Teisl et al. 2002, Jacquet and Pauly 2007).

Seafood producers and wholesalers are catering to this demand (CleanFish 2007, Loch Duart 2007). The wide emergence and success of ecolabels is viewed as a method to achieve higher price premiums and gain access to new markets or increase the share of existing markets (Wessels et al. 1999, Clay 2002). Yet some businesses may be adopting them because of peer pressure. Regardless of motivation, businesses adopt such initiatives to make a profit, or at a minimum if they are cost free (Bartley 2005).

Ethical consumption based on product labels constitutes a small, but rapidly growing, share of the market (Holzer 2006, Howard and Allen 2006). The most established and prominent seafood ecolabel is that of the Marine Stewardship Council (MSC). Demand for MSC certified seafood routinely exceeds supplies in Europe, where 2.5 % of the seafood sold is certified (Searle et al. 2004). However, this is in stark contrast to the United States where less than 0.1 % of seafood sold is certified by MSC (Searle et al. 2004).

The organic foods label is one of the oldest and most successful ecolabels, dating back to the 1970s in the United States. Sales of organic food in the US have increased at a rate of 20 % or more since 1990, and seafood producers are vying for a chance to capitalize on this trend (Dimitri and Greene 2002). The United States Department of Agriculture (USDA) has set up a working group to devise standards for organic aquaculture production (USDA 2005). Currently, standards for aquaculture are not finalized, although organic certification of aquaculture is a controversial topic (Progressive Grocer 2007).

Other labels have made their way into the marketplace, including the Global Aquaculture Alliance (GAA). The GAA is an international non-profit trade association representing and supporting aquaculture producers, processors, wholesalers, consultants, and other stakeholders (GAA 2006). The GAA's mission is "to further environmentally responsible aquaculture to meet world food needs" (GAA 2006). Part of this goal includes the Best Aquaculture Practices certification. The certification applies only to shrimp culture and is based on a set of measurable goals intended to address social and environmental issues, as well as food safety and traceability (GAA 2006). In November of 2005 both Wal-Mart and Darden

Restaurants (Red Lobster, Olive Garden) committed to sourcing the majority of their shrimp from GAA certified sources (Mangrove Action Project 2006). Seafood purveyors and brokerage firms have also entered the fray acting as informal independent certifying agencies.

World Wildlife Fund has been a very active participant in steering the dialogue and catalyzing action surrounding aquaculture and certification, starting in 1997 with a position paper on shrimp aquaculture. Since then continued involvement has led to over 140 meetings with more than 8,000 people and the publication of 40 case studies by 120 researchers. The result of this involvement is culminating in WWF initiating 8 roundtables, called Aquaculture Dialogues (WWF 2010).

The goal of each Aquaculture Dialogue is to develop performance-based standards that minimize the key environmental and social impacts associated with aquaculture production (WWF 2010). These standards may be the basis for an aquaculture certification program. When finalized, the standards will be given to a new organization, to be co-founded by WWF, that will be responsible for working with independent, 3rd party entities to certify farms that are in compliance with the standards (WWF 2010). Guidelines for developing credible environmental and social standards through a transparent multi-stakeholder process are outlined in the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance's Code of Good Practice for Setting Social and Environmental Standards (WWF 2008).

Several researchers have assessed consumer preferences for ecolabeled seafood in hypothetical or contingent markets (Wessells et al. 1999; Jaffry et al. 2001, Johnston et al. 2001). Results have indicated that consumers prefer ecolabeled products, as long as price premiums for the ecolabeled products are not large. A Connecticut ecolabel study found that when purchasing fresh fish with an ecolabel, consumers were willing to forego the purchase of their desired species for a similar species marked by an ecolabel indicating it was sustainable produced (Johnston and Roheim 2006).

In 2003, Seafood Choices Alliance (SCA) performed the last major consumer study pertaining to chefs and restaurateurs. The nationwide study examined the general awareness and motivations of a wide array of seafood consumers, and identified restaurant decision-makers as keystones in an effective stewardship program. Results from the study showed decision-makers at restaurants would be willing to look for alternatives to seafood products sourced from environmentally harmful aquaculture and capture fisheries sources. SCA did not, however, closely examine the opportunities available for ecolabeled or certified seafood products, nor did the study examine restaurant strategy related to sustainable seafood (SCA 2003).

My study evaluated business strategies specific to seafood restaurants by investigating seafood knowledge and current decision strategies regarding use and marketing of seafood within the San Francisco Bay Area (Bay Area). This study had five specific objectives. 1) to identify seafood decision-makers at targeted Bay Area restaurants; 2) determine motivating factors driving seafood selection and purchasing of decision-makers; 3) to characterize the attitudes and awareness of decision-makers about the marine environment; 4) to evaluate decision-maker knowledge and sentiment related to seafood certifications; and 5) to determine decision-maker willingness to use sustainable seafood products and to evaluate business strategy regarding seafood.

I expected decision-makers at selected restaurants to be experienced professionals in the restaurant business with a solid knowledge of issues related to sustainable seafood, and thus with a cogent understanding of seafood certifications. Based on this expectation I believed they would be eager and willing to use sustainable seafood products. I expected that decision-makers would be operating under a progressive business strategy that would favor the use of sustainable seafood products and foster understanding of seafood related issues among its staff and clients. I thought that certifications would be the most effective manner for marketing sustainable seafood to seafood decision-makers and restaurants in the Bay Area. I used surveys and interviews to determine if these expectations were accurate.

Methods

The Bay Area was chosen for this study for several reasons. It is home to approximately 6.7 million people who consume and depend on large quantities of imported seafood (Bay Area Census 2006, USDC 2006). The City of San Francisco covers just over 120 square kilometers and contains over 5,300 restaurants, or roughly 44 restaurants per square kilometer (San Francisco Convention and Visitors Bureau 2006). The surrounding Bay Area also supports a high density of restaurants.

The Bay Area represents one of the most progressive and influential markets for seafood products in the United States, and is well known for setting national and world-wide culinary trends (Patterson 2005, Saekel 2005). Restaurants in the Bay Area have long been the haven of chefs and restaurant owners touting sustainability as a fundamental priority in their business decisions (Fletcher 2002). M. Bertram Gordon, a culinary historian wrote "San Francisco historically has not only money, but education and a certain degree of leisure, all of which play parts in creating a gastronomic connoisseurship for innovation and awareness" (Saekel 2005). This atmosphere lends itself to the use of progressive ideas such as certifications for sustainable seafood.

For this study an integrated approach was implemented, utilizing both quantitative (survey) and qualitative (interview) techniques. Both approaches were used to maximize information gathering and to provide a comprehensive assessment of the potential for sustainable and certified seafood products in Bay Area restaurants. The use of multiple research methods in social science can increase the robustness of the findings through cross validation when different sources of data converge, or help to explain irregularities in the finding of one method or the other (Kaplan and Duchon 1988).

Surveys emphasize quantitative analysis, where data are collected for specific questions and then analyzed using statistical techniques (Groves et al. 2004). Surveys are useful when seeking to discover relationships that are common across a large population, and hence can be generalized. They provide a method of study for maximizing external validity. However, the objectivity and testability of surveys sacrifices the potential for garnering a deeper understanding of complex issues (Kaplan and Duchon 1988).

Qualitative interview methods (Kvale 1996) were employed to gain the necessary depth and understanding of the opinions and actions employed by key decision-makers in relation to potential purchase of certified and sustainable seafood. Interviews provide the opportunity to ask penetrating questions and capture the complexities of the issue (Gable 1994). Qualitative techniques provide strong internal validity. Interviews are especially important when a paucity of research exists on the topic (Eisenhardt 1989), as is the case here. Topics potentially sensitive in nature such as business ethics and strategy also favor qualitative techniques (Hedges and Ritchie 1987, Sykes 1990).

Surveys were drafted at the University of Michigan in coordination with faculty and the university's Institutional Research Board (IRB) for Behavioral Studies. The surveys were pre-tested with chefs and restaurant owners in Ann Arbor, Michigan, San Francisco, California, and Boulder, Colorado to improve clarity and accuracy. Surveys (See Appendix I) were directed toward those responsible for decision making in regards to seafood purchasing and included

questions in five categories. *Category one* consisted of questions about the restaurant and the menu, as well as demographic questions about the decision-maker. Questions from *category two* were related to seafood selection and purchasing behavior. *Category three* focused on awareness and attitudes of decision-makers about the marine environment. *Category four* questions addressed knowledge of and exposure to certifications, as well as attitudes toward certifications and their use. *Category five* explored decision-makers willingness to act in regards to certified seafood and sustainable seafood choice. Additionally, an invitation was included in the mailing asking decision-makers to participate in an in-depth interview on the subjects above. Those participating in the interview study were furnished with an informed consent form that had been approved by the IRB (Appendix II).

Restaurant selection was based on several factors and criteria and was not considered a random sample of restaurants in general. First, all restaurants were required to offer, at a minimum, five seafood items. In total, these items were to make up no less than one-quarter of their menu. Restaurant reviews from several sources were consulted to eliminate restaurants not considered excellent or better (two or more stars on a four-star scale). Reviews consulted included those from the *San Francisco Chronicle*, *Zagat Survey* and *San Francisco Food Lover's Guide* (SFGate 2005, Unterman 2005, Zagat 2005). This was done to limit sample size, increase internal validity and target restaurants with the greatest potential to set trends. Because of the nature of dining in the Bay Area, a large number of these restaurants were located within the cities of San Francisco, Oakland, Berkeley and cities on the San Francisco Peninsula. Once all initial criteria were met, the field consisted of 41 restaurants selected for this study. Research was conducted in the Bay Area during July through October 2005. Surveys were mailed to restaurants (five per restaurant) and in-depth interviews of decision-makers were conducted.

Surveys were intended to reach chefs or owners who were integral to the decision-making process (decision-makers), and this request was stated in a letter included with the surveys. The purpose of soliciting primarily decision-makers was to achieve a clearer assessment of the potential for certified aquaculture and seafood products and assess restaurant strategy by sampling those individuals responsible for making purchasing decisions, setting menus, and training staff. Because of this, any returned surveys that had been completed by a chef not directly associated with decision-making was excluded from analysis. Also included in the mailing was a pre-addressed stamped envelope to return completed surveys. Thirty-one surveys meeting all criteria were collected from twenty-one restaurants.

Most questions were a series of Likert scale questions with four or five response options (Appendix I). The remaining questions consisted of multiple choice or open ended response questions. Before data were analyzed, questions from the survey were grouped according to topics and coded based on the category they addressed.

Survey responses were tabulated and descriptive statistics calculated to detect trends and determine anomalies in the data set. SPSS (2005) was used for all statistical analysis. Crosstabs were generated to evaluate trends across the data. The crosstabs procedure creates tables showing the joint distribution of two or more categorical variables (e.g., shrimp source versus knowledge of certifications). When noticeable trends occurred, chi-square goodness of fit tests were administered to test for statistical significance ($P < 0.05$). Observed values were tested against an expected value for each question that assumed equal distribution across all potential answers.

Survey responses were also compared to data collected by Seafood Choices Alliance (2003). Seafood Choices Alliance successfully administered four hundred surveys to primary decision-makers at seafood restaurants nationwide. SCA's survey targeted a broad range of seafood restaurants nationwide with the intent of characterizing chefs' sentiment regarding seafood and environmental issues surrounding it. Many of my survey questions were designed to facilitate direct comparison with the SCA data. Some questions closely resembled or were identical to those asked in the SCA survey. Chi-square tests of association were performed when comparing responses between the two studies. All statistical analyses were considered significant if $P < 0.05$ and only significant results are reported. The chi-squared test of association for this analysis violated one assumption. For several of the tests the expected values (E) were less than five. When $E < 5$ the results can be unreliable, however, the P value for each test considered significant was so small that I considered this violation acceptable.

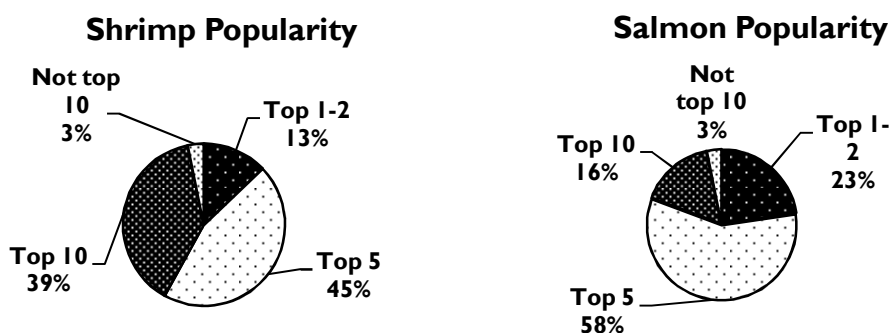
Eleven decision-makers were personally interviewed about aquaculture and seafood related issues, seafood ecolabels, seafood selection and purchasing, and the relationship between seafood purchasing and the restaurant's overall business strategy. In addition to restaurants, one seafood wholesaler from the Bay Area was interviewed about these issues. All interviews were recorded with a digital voice recorder; written notes were kept for reference. Interviews were transcribed and useful quotes were manually coded into one or more of four categories based on content. The four coded categories included; seafood selection and purchasing, seafood awareness, knowledge and exposure to certifications, and overall business strategy (including willingness to purchase more sustainable seafood).

Results

Survey

Thirty-one Bay Area decision-makers completed surveys. Because the study was designed to preserve anonymity, decision-makers responding to the survey were not asked to name the restaurant for which they worked. However, since only a single return envelope was included with the study invitation, it was possible to calculate the number of restaurants based on the number of envelopes that were returned. This sample probably represented 21 restaurants. Complete summary survey results can be found in Appendix I. Decision-makers described their establishments as privately owned and with an atmosphere that was middle of the road- neither formal, nor casual. They primarily represented owner-operated restaurants. Decision-makers were on average 36.5 years old with 15 years of experience as a chef. The average respondent had lived in the San Francisco Bay Area for just under twenty years. All but one of them ate seafood, and none of them were vegetarians. Respondents stated shrimp and salmon were extremely popular at their establishments (Figure 1).

Figure 1: Percent popularity of shrimp and salmon entrees at Bay Area seafood restaurants as reported by study participants in answer to the question “Thinking about the seafood items on your menu, how would you rate the popularity of your shrimp/salmon entrées?”



Decision-makers reported aquaculture was the dominant production method for shrimp at their establishments, however wild caught salmon was favored. Shrimp from aquaculture made up 41.9 %, shrimp caught by trap made up 16.1%, by trawl 19.4 %, and for the remaining 22.6 % the source was either unknown or was a combination of sources. Shrimp sourced from domestic or Asian sources was popular among decision-makers, with few buying shrimp from South or Central America.

Decision-makers in this study did not rely heavily on aquaculture as a source for salmon. Nearly two thirds (64.5 %) said their salmon was wild caught, 23 % said they purchased farmed salmon most of the time, and 10 % said they combined salmon from both production types to satisfy their needs Only three percent of them were unsure of the method used to produce the salmon they bought. Decision-makers were also asked to identify sources of farmed salmon.

Popular responses included Scotland, Nova Scotia, Chile, and British Columbia. However, no dominant trends were found.

Familiarity of decision-makers with seafood certifications and labels differed among certifications (Table I). Decision-makers were only moderately knowledgeable of aquaculture certification by GAA. They were more knowledgeable of the MSC seafood certification even though MSC has yet to certify any aquaculture products. When questioned about their familiarity with the USDA Organic certification, nearly half of decision-makers stated they had heard a great deal about this certification, and none of them claimed to be unfamiliar with it. Most likely they were referring to familiarity with the USDA Organic certification in general, since organic seafood certifications do not yet exist. In April 2005, the USDA required seafood wholesalers and retailers to provide customers with the country of origin label (COOL) of their fish and shellfish products, as well as seafood production methods (farmed or wild caught). Respondents were moderately familiar with this labeling; about a quarter knew a great deal about country of origin labeling, and only 6.5 % knew nothing about it.

Table I: Respondents reported familiarity with seafood certifications and food labels in answer to the question “ I’m going to list a few types of seafood labels that exist. Please tell me what you have heard about each of them, if anything.”

Label	Response				Significance (Chi-square)
	Great Deal	Some	Not Much	Nothing	
MSC	25.8%	25.8%	16.1%	32.3%	P<0.648
GAA	6.5%	29.0%	32.3%	32.3%	P<0.123
USDA	45.2%	51.6%	3.2%	0%	P<0.001
COOL	25.8%	41.9%	25.8%	6.5%	P<0.049

MSC= Marine Stewardship Council
 GAA= Global Aquaculture Alliance
 USDA= United States Department of Agriculture Organic
 COOL= Country of Origin Label (also USDA)

Survey respondents were generally attracted to the idea of including aquaculture and seafood certifications in their business. The survey included three questions concerning willingness to act in regards to seafood certifications. Overwhelmingly, respondents indicated it would please them to know their establishments carried sustainably certified or ecolabeled seafood (90 % of all respondents). They were also amenable to receiving information about certification that indicated seafood was sustainable (81% of all respondents). Over 80 % of survey participants said they would be very likely to publicize to customers, chefs and the public that their restaurant carried certified products. Respondents were asked a series of questions about marine environmental issues, the benefits and risk associated with eating seafood, and

what they had heard about different types of aquaculture and fisheries issues. When making seafood purchasing decisions several factors were considered. Quality and taste were considered the most important factors, while health reasons and environmental considerations were considered less important. Cost considerations were ranked in the middle, with both consistency and availability considered more important factors. Twice as many survey respondents were well acquainted with the health benefits of eating seafood, than with the risks associated with high levels of mercury, PCBs, or other contaminants in seafood (77 % versus 32 % of respondents).

Decision-makers were better informed about environmental issues related to salmon farming and commercial fishing than with risks associated with shrimp farming. The proportion of respondents that had some or a great deal of knowledge about salmon farming was significantly higher than for shrimp (z-test for difference in proportions; $p = 0.036$). Two-thirds of decision-makers claimed to have heard a great deal about environmental impacts caused by salmon farming and commercial fishing, and none of the respondents were ignorant of the subject. A cross tabulation analysis displayed obvious trends between the two issues, with respondents equally informed about both. However, the sample size was too small to run accurate statistical tests of the association. Just over one-third of those surveyed knew a great deal about the environmental impacts associated with shrimp farming, and no respondents claimed to know nothing about the topic.

Aquaculture's role in the global seafood market was somewhat well understood by decision-makers. Significantly more participants were familiar or somewhat familiar with the role of aquaculture in providing an inexpensive and reliable source of food than were unfamiliar with these topics ($\chi^2 = 36.5$; $df = 3$; $p < 0.001$). More knew a great deal or some about aquaculture's integral role in feeding the world than knew little or nothing ($\chi^2 = 19.4$; $df = 3$; $p < 0.001$). All respondents were interested in receiving information about what types of seafood are farmed in a sustainable manner, are abundant, or are well managed, and more were very interested in receiving more information on this topic than were not interested ($\chi^2 = 177$; $df = 3$; $p < 0.001$).

Results of the surveys were evaluated against nationwide data collected by the SCA and revealed some significance differences between the SCA's sample population and chefs in the Bay Area. First, decision-makers from this study were much more informed regarding the environmental impacts associated with commercial fishing (Figure 2) and aquaculture production (Figure 3) when compared to the SCA sample ($p = 0.001$). Second, the percentage of respondents in my study who were "very interested" in receiving information about which seafood options were sourced from sustainable sources was significantly greater (80 % vs. 17 %, $p = 0.001$) when compared with national data collected from SCA (Figure 4).

Figure 2: The percentage of respondents reporting a given level of knowledge related to the environmental impacts potentially associated with commercial fishing. Respondents are from this study and SCA (2003).

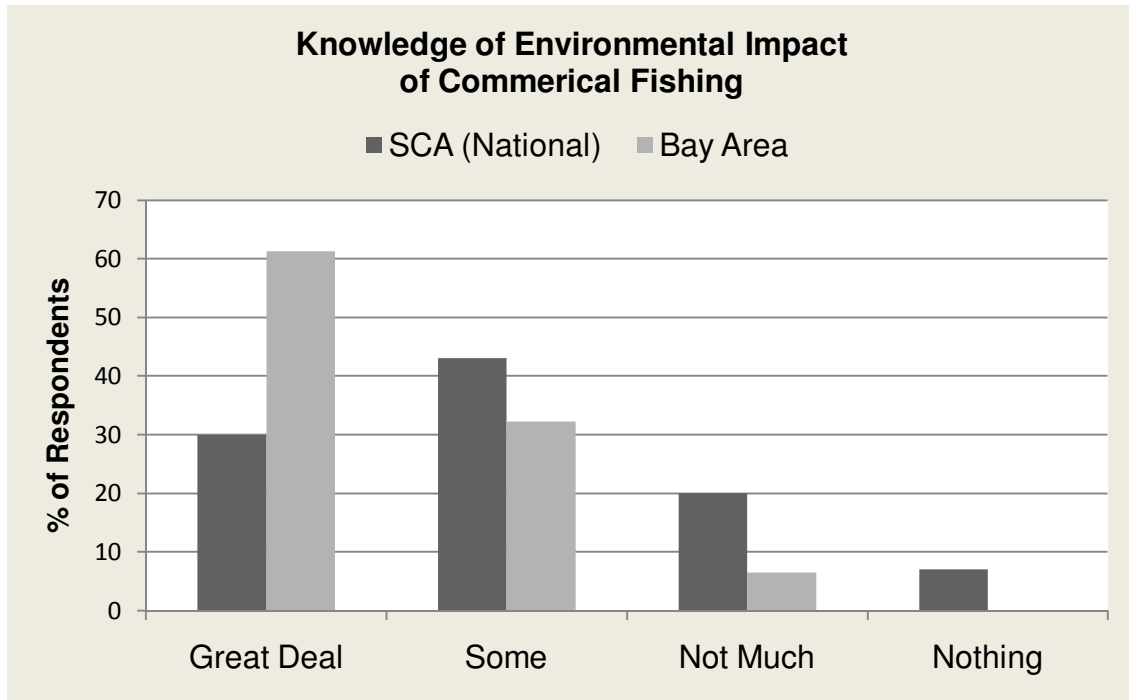


Figure 3: The percentage of respondents reporting a given level of knowledge related to the environmental impacts potentially associated with aquaculture production. Respondents are from this study and SCA (2003).

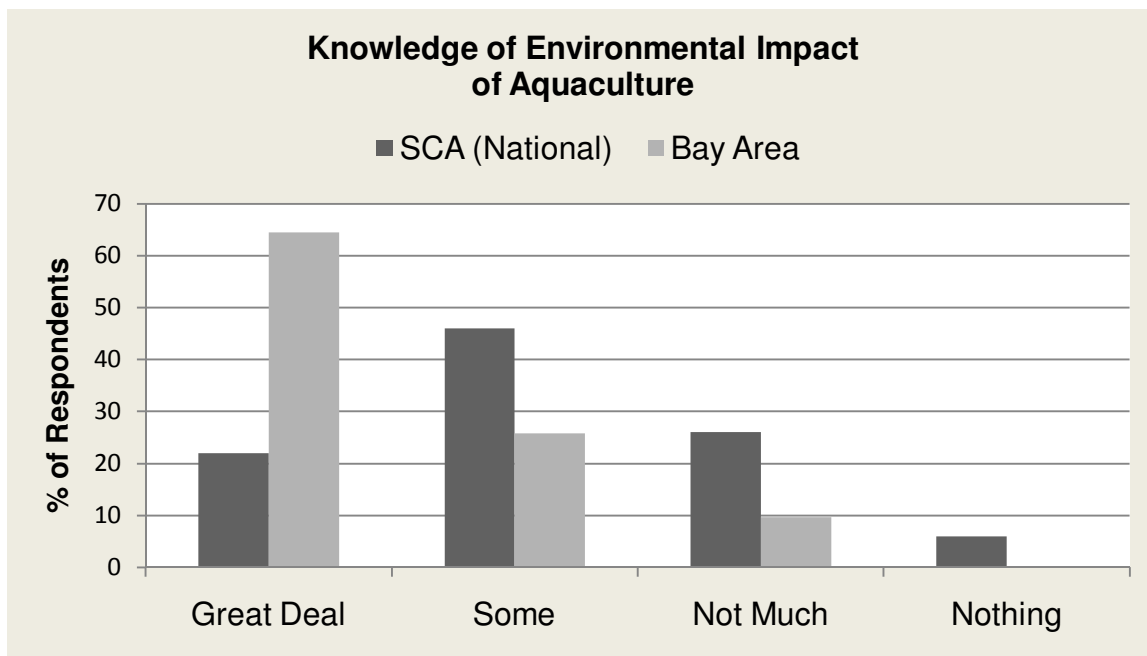
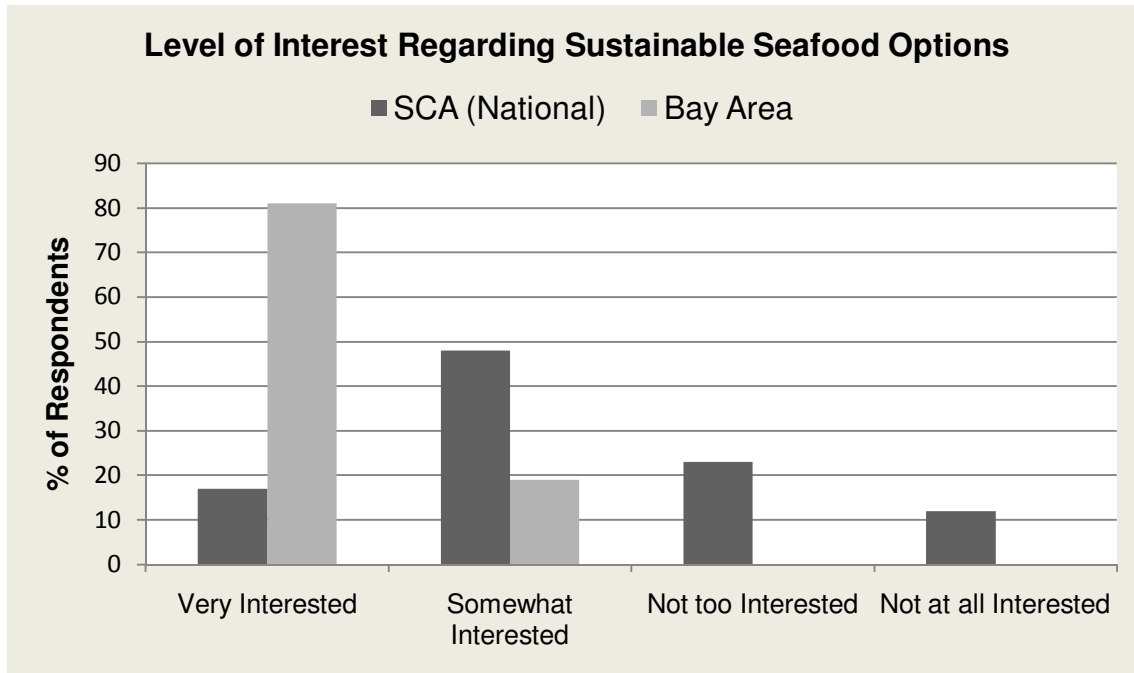


Figure 4: The percentage of respondents reporting a given level of interest regarding sustainable seafood options. Respondents are from this study and SCA (2003).



Interviews

The information garnered from interviews mirrored the statistical trends apparent in survey results. Decision-makers who were interviewed had, for the most part, a thorough understanding of aquaculture and seafood related issues and all expressed concern for the long-term outlook of seafood products. This is consistent with the survey results, which indicate that a significantly higher number of decision-makers had some knowledge about these issues. One restaurant buyer and owner said “I look at each (aquaculture) company individually, and I ask what are your standards?” She was referring to the amount and quality of a farm’s effluent and its policies for the use of pesticides and antibiotics. One chef and part owner of a large restaurant in the South of Market District of San Francisco stated “I think honestly that within my lifetime there will be certain fish stocks, seafood products and other important ingredients that will no longer be available, especially in the quantity that is available today. And that will be because they’re overfished or we’ve degraded the environment so significantly that they can’t recover or they won’t recover. That’s where we’re moving and we’re already headed way down the road toward that.” The owner and head chef of a seafood restaurant near Civic Center reiterated that sentiment, “I’ve been doing this for twenty years and I’m absolutely petrified.”

Chefs acknowledged that sustainability played an important role in the marketing and strategy of Bay Area restaurants, and most devoted more than lip service to the issue, often stating that they dedicated considerable time to researching the subject and devising a business strategy to account for it. The survey results indicate that they believed their research had paid off, as over 61% of decision-makers claimed to have a great deal of knowledge about the

negative environmental impacts of commercial fishing. As one executive chef stated, “The circles of chefs I know all pay attention to sustainability,” and another executive chef and co-owner explained his restaurant’s business strategy by saying “Part of the core when we started the restaurant was that whatever we decided to utilize on the menu we had to put through several different washings of protocol about where it came from, how it was produced and are those things sustainable? And that drives the ideology of what we put on the menu. It’s something that’s been floating out there for some time, and we wanted to incorporate that into our menu and our business.” The executive chef from a restaurant in the Financial District explained the motivation for such strategy, “It’s a good thing to have, because San Francisco diners like that. You need to be doing it.”

The consensus among interviewees was that their clientele was well educated about seafood and sustainability issues and that knowledge often influenced their decisions about what to consume and where to dine. Indeed, 58 % of all survey respondents rated the environmental impacts of seafood production important in their reasons for choosing a particular item to serve. One owner reiterated that, “A lot of clientele come in here because we are so sustainable. I’m seeing more and more restaurants wanting to be more sustainable and seeing the benefit in the marketing of being sustainable, it’s good marketing.” Most respondents suggested that much of that awareness was the result of substantial media attention that was devoted to the subject, and also attributed the Monterey Bay Aquarium’s Seafood Watch Program and other organizations for educating the public.

The Monterey Bay Aquarium is only one of many organizations influencing consumers and restaurant decision-makers. “The San Francisco Chronicle keeps kind of aggressive on exposés about seafood, sustainability levels and mercury levels in fish,...there was a recent article about mercury and a big article about shrimp. I buy with an eye to what’s in the media about this stuff” stated the owner of a restaurant near Civic Center. Interviewees stated they had seen a “huge change in chef’s awareness” in relation to seafood issues over the past five to seven years and interviewees felt it was reflected in their overall business strategy, but not always in their actual seafood purchasing and selection. A restaurant owner, chef, and food writer said, “I have seen a marked change by chefs to purchase sustainably, but they’ll do what they have to do to keep going. They may pay lip service to sustainable seafood, but they won’t always purchase it.” The difficulty of consistently using sustainable seafood was echoed by many interviewees. “It’s not always an option because you run out of fish,” said one chef at an establishment that regularly uses more sustainable food for its menu. Others said maintaining a sustainable seafood menu was periodically frustrating and routinely limited their options and creativity.

I assumed that decision-makers would have a cogent understanding of seafood related issues and a progressive outlook toward sustainable certifications being offered for seafood products, primarily shrimp and salmon. However, this was not the case. The survey results showed that only 50 % of respondents claimed to know a great deal or some about MSC, and only 35 % of respondents claimed to know a great deal or some about GAA certification. In general, those interviewed were either unfamiliar with most seafood certifications or skeptical of how reputable they were. One executive chef stated. “I have heard nothing about MSC or certifications for farmed shrimp or salmon.” One executive chef elaborated on the obstacles of adopting certifications into a restaurant’s purchasing practices. “Certifications can often be

really confusing and a little overwhelming, because when you start to scratch away at the surface, since I'm not an expert in any of those fields (certification, fishery and aquaculture science, etc), ultimately one has to rely on certain government bodies or certain groups (NGOs and seafood businesses) to give you the information that you want to use. I've experienced that there are certain groups that offer certifications for certain products; for how they're grown, or how they're handled, and there are people that dispute that level of certification. Then you're left sort of hanging, wondering if you use that certification or do you use someone else's?"

Most seemed interested in certifications and supported the idea of certifications indicating sustainable farming practices for aquaculture products "I think that certifications are important....the real challenge is for people to come up with a useful, effective way to communicate the information to the general public. They want to be told something is ok, or it's not ok. They don't want to have to think about it, and I can understand that." All survey respondents stated that they would be pleased to be the ones to communicate this information to their customers and the general public. This reflected survey results showing 80 % of decision-makers would share that they offer sustainable seafood with their clients.

Decision-makers felt that successful certifications are crucial for the long-term sustainability of the seafood industry. Aquaculture certifications seemed to get a warmer response than certifications for wild fisheries, as many believed the future of seafood would be in aquaculture, and also felt a certification for aquaculture systems would be easier to enforce and monitor, thus making it more reputable. They did not say specifically they would pay more for certified products, but did say that cost was often not an issue if the product was of a high quality and could be differentiated from similar products. One executive chef and co-owner stated "You can charge whatever you want to charge in many respects if the ingredient has a pedigree, and you have convinced the public that it has a pedigree that they are willing to pay for. If you've told them that its diver scallops and they believe that people are actually diving for these scallops, then they will pay more for it. Same goes for aquaculture."

The difficulty and cost of procuring more sustainable seafood items through the typical procurement channels was circumvented by several chefs who declared they had established direct links with fishermen/aquaculturists to provide seafood for their business. They described these arrangements as especially effective, and believed the links played an important, if not crucial, role in their ability to get seafood products they believed were sustainable, of the highest quality, and easily differentiated. They also conceded that these arrangements would become increasingly critical in the future, and thus, they value them greatly. They also said that from a public perception standpoint, arrangements with small producers could be used to market the restaurant as socially and environmentally sustainable.

The one purveyor who was interviewed echoed many of the same opinions restaurant chefs and owners voiced about the benefits of using more sustainable seafood and the ecological risks associated with the current status quo. Most salient to him were issues of sustainability and seasonality that had become more prevalent and were acting as driving factors in the Bay Area seafood business. He said he routinely supplies about 120-130 clients with seafood products in the Bay Area, and of those, about one-third demand sustainably sourced seafood for their menus. He did say that while not all clients were aware of the environmental benefits that would result from their purchases, all were demanding of the products because of

higher quality. His opinion was that those producers who supply more sustainable products also take better care in handling and production and ultimately provide higher quality seafood products. When asked about certifications that exist in the aquaculture industry, he replied that he did not hold them in high regard. He cited the inability for smaller artisanal producers and fishermen to pay the cost of a third party evaluation. The application and evaluation fee for MSC's wild capture fishery certification can be an enormous and prohibitive cost for a single fisherman, averaging about \$100,000 for a five-year term (RLIAC 2002). However, certification by the Global Aquaculture Alliance cost only \$500 (GAA 2006). Despite his skepticism, he stated that for the industry to become sustainable, certifications would be a crucial part of the process.

Discussion

This study produced four major findings. First, decision-makers in San Francisco's premier seafood restaurants were well informed of seafood related issues. Second, business strategy at these establishments included and promoted the use of sustainable seafood products. Third, knowledge of certifications existed among decision-makers, however certifications were not a critical component in seafood selection and some skepticism existed regarding their utility and reputability. Finally, potential existed for certified products provided the certifications exemplified reputability and represented high quality seafood products. I will detail each of these findings below.

Seafood Awareness

Decision-makers at the Bay Area's premier seafood restaurants reported in surveys to have a good understanding of seafood related issues. They typically understood issues related to various aquaculture practices, overfishing, seafloor dredging, and by-catch. This study focused on a small group of trend setting restaurants whose ideals and practices are likely unique within the larger pool of US restaurants. The high level of knowledge of Bay Area restaurant decision-makers may be the result of a unique, sustainability-focused restaurant culture in the Bay Area and the efforts of local organizations to highlight seafood sustainability and educate decision-makers. Howard and Allen (2006) reported consumers in Central California were concerned with the environmental consequences of their food and decision-makers must cater to these patrons, and in doing so, must educate themselves in the process. Several organizations and businesses promoting sustainable seafood are located in the Bay Area. Two of the most influential NGOs conducting campaigns to educate and influence business, citizens, and seafood consumers, the Monterey Bay Aquarium and the David and Lucile Packard Foundation, are located in the Bay Area. Staff writers at the San Francisco Chronicle and other local publications have focused on seafood sustainability in their writing for years (Phillips et al. 2003). This has likely had a regional effect on both decision-makers and restaurant patrons.

Prior to this study, information about the level of understanding held by decision-makers regarding the sustainability of seafood products came in the form of a nation-wide survey conducted by Seafood Choices Alliance (SCA 2003). Results from the SCA study suggest that knowledge of environmental impacts of seafood production is minimal among decision-makers at restaurants nationwide. The understanding of seafood related issues exhibited by Bay Area chefs was significantly greater than the national average reported from the SCA survey and this high level of knowledge was displayed during survey and interviews.

I believe the difference between the respondents in my study and those from SCA nationwide work results from the many regional, cultural, economic, and geographic reasons listed above, as well as temporal factors that may have played a role in the variance between the two groups. The time period between when SCA conducted their survey and this survey saw many ongoing efforts, as well as benchmark reports and campaigns conducted to raise awareness in regards to seafood sustainability. These include Environmental Working Group's report on the levels of PCB in farmed salmon (Environmental Working Group 2003a, 2003b) and the Monterey Bay Aquarium, Blue Ocean Institute, and Audobon's maintained efforts at raising seafood awareness (Iles 2006). Finally, The survey demographic may also have been an

influential factor in the disparity. Only top-tier seafood restaurants were surveyed for this study. Because the restaurants catered to a more educated and affluent clientele than the average national level seafood restaurant, menu prices were higher, giving them the flexibility at the point of purchase (often sustainable and sustainably marketed seafood is more expensive). A common result is that these restaurants attract individuals to decision-making positions that are by default more aware of seafood related sustainability issues, thus catering to their discerning clientele.

Sustainable Seafood and Business Strategy

Business strategy in Bay Area restaurants included purchasing, marketing and educating staff and restaurant patrons about sustainable seafood options. These results are consistent with my expectations that decision-makers in Bay Area restaurants use and market sustainable seafood to give them an advantage in their highly competitive market, especially those competing for excellence and the patronage of discerning customers.

Before this study, little was known about how decision-makers were incorporating sustainable seafood into their business decisions. This research makes it clear that select decision-makers take the environmental impacts of seafood products into account for business reasons when deciding what to offer, supporting work done by Howard and Allen (2006) in Central California that shows consumers prefer and are willing to pay for more sustainable and healthier food choices. Decision-makers at these establishments routinely commented during interviews on the amount of time devoted to seafood and other product sourcing. This included due-diligence confirming products they buy are of the highest quality and are more sustainable than available alternatives. The integral role of sustainable seafood in Bay Area restaurants was reflected in their salmon sourcing, in which survey respondents reported procuring 64.5 % of their salmon from wild caught fisheries because of its sustainability and to avoid the negative perception of farmed salmon harbored by their clientele. Peer pressure may also be an important factor in adopting environmentally friendly seafood practices.

Interviewees routinely discussed the significant time and energy the restaurant devoted to making informed decisions about their seafood purchases. This investment was then reinvested as environmental social marketing, reflecting recent changes in environmental business strategy (Hoffman 2000). Since environmental social marketing relies on a valuation process that appoints higher values to more sustainable goods and services (Rothschild 1999), this time and energy could be recaptured by increased menu prices and customer satisfaction according to those interviewed- a fact not missed by the San Francisco Chronicle (Fletcher 2002).

Certifications- perception and potential

This study revealed that there was a relatively low level of knowledge about certifications among restaurant decision-makers in the Bay Area. Their level of familiarity with seafood certifications was lower than I expected. This was surprising because the majority of decision-makers in my study were cognizant of both the environmental impacts surrounding seafood and had integrated more sustainable seafood into their marketing and overall business strategy. Since certifications are generally considered a de facto means for assessing and

conveying a product's sustainability (Kaiser and Edward-Jones 2006), it would seem that the use and knowledge of such certifications would exist concomitantly with higher levels of seafood knowledge and sustainable seafood marketing. However, this was not the case. Further confounding this overall lack of knowledge related to certifications is my finding that most of these decision-makers sourced their salmon from wild caught, mostly Alaskan sources, where the entire fishery was certified by MSC (MSC 2006). Thus they purchased from sources certified by MSC as sustainable without specific knowledge of that certification. Therefore MSC certification as a marketing tool or means for assessing a seafood product's sustainability carried little or no recognizable value to these decision-makers, even though they purchased MSC certified seafood.

The concept of certifications was generally met with both skepticism and hope; skepticism that current certifications provide the needed reputability, quality, and consistency needed, and hope that a high quality and easily marketable certification will emerge that can provide a greater selection of quality seafood. Decision-makers stated a certification would be successful only if it could limit the amount of internal due diligence that decision-makers must perform to source seafood sustainably and of the highest quality- an issue of primary importance for other certification schemes (Overdevest and Rickenback 2006).

Decision-makers were most familiar with the USDA organic certification, which as of yet, does not exist for seafood of any type. Because of the need for reputability and marketability in certifications (Lockeretz and Merrigan 2005, Alastair 2006), USDA organically certified aquaculture will no doubt succeed if standards are ever agreed upon. Wild capture fisheries already have a reputable certifier in the MSC and this was the most recognized certification next to the USDA label. My results suggest that as certifications become more widespread and better understood, they will be welcomed by the Bay Area restaurant community.

Research shows consumers on the west coast are more likely to choose certified salmon than households anywhere else in the United States, and model results also indicate that those with larger seafood budgets are more likely to choose certified seafood of any species (Wessells et al. 1999). The restaurant market in the Bay Area, and likely other urban areas on the west coast (Los Angeles, Seattle, Portland, and San Diego) provide a huge potential market for sustainably certified seafood.

Assumptions, biases, and limitations

Based on review of work related to sustainable seafood (Environmental Defense 2002, SCA 2003, Stickney et al. 2004) and seafood social marketing and certifications (Wessells et al. 1999; Johnston et al. 2001, and Jaffrey et al. 2001, Gardiner and Viswanathan 2004, Searle et al. 2004, Bartley 2005, Jacquet and Pauly 2007), as well as study of Bay Area dining trends (Fletcher 2002), I assumed decision-makers of premier Bay Area seafood restaurants would be well educated about seafood related issues. Given this assumption I believed they would not only be willing participants in seafood related social marketing trends, but may be using current awareness of seafood related issues to capitalize on the growing demand for sustainable seafood. This proved to be largely true.

Response rate is often considered a critical factor in considering whether or not research can be generalized to a larger group. Small response rates also present certain statistical problems (Baruch 1999). In this study survey response rate and sample size do limit somewhat the scale at which these results can be generalized. In the case of statistics the response rate does not present any large problems for drawing larger conclusions about the difference between the Bay Area samples and the SCA nationwide data. In comparing the two the differences were so great that violations caused by small sample size were considered acceptable.

Additionally, while the survey response rate does not appear to be particularly high, it is important to view the response rate with regards to restaurant participation. Over 50 % of restaurants provided a response through the surveys, a considerable response rate representative of the sample. Another consideration is that in the restaurant industry, a professional transience is somewhat pervasive, especially for chefs, where a breadth of culinary experience is highly valued. Thus, while each survey may not represent a unique restaurant sample, the responses may carry greater validity now or in the future as chefs and other decision-makers have high fidelity to the restaurant and service industry.

Restaurant selection presents a potential bias and may cause limitations for generalizing the conclusions of the study to more restaurants and broader markets. The sample was specifically meant to include somewhat prestigious restaurants in the Bay Area with numerous seafood options and often a seafood centric focus. Because the selection process was subjective, there are arguably other restaurants in the Bay Area that could have been included in the study. The lack of inclusion of these restaurants may mean a lack of overall external validity.

The selection process and potential lack of external validity may be somewhat compounded by the fact that decision-makers agreeing to be interviewed for this study may have agreed to an interview because (1) they found the subject interesting, (2) they felt it was a laudable cause, (3) they knew a great deal about the subject and wanted to share their knowledge, and/or (4) they felt it was an opportunity to market the sustainability of their restaurant.

Conclusion

Bay Area seafood restaurants and decision-makers are on the upward trend of seafood awareness and the competitive atmosphere in which they operate catalyzes innovation and progressiveness. Many restaurants in my study had well defined business protocols in place to ensure they are procuring the most sustainable seafood products possible, and have incorporated sustainable purchasing practices into their business strategy. Because of this, the Bay Area presents a warm climate for purveyors and suppliers marketing sustainable seafood options and certifications have the potential to succeed in the Bay Area Restaurant market provided they are scientifically reputable and certified seafood is consistent, reliable, and of considerable quality. The potential for success was very evident in the responses regarding the use of wild salmon, much of which comes from sustainable sources (certified by the MSC) and the willingness of decision-makers to both receive information about which products are sustainable, their efforts to include internal instruments for evaluating seafood sustainability, and their use of sustainable marketing in their business model.

Although little was known about how sustainability was being used as a marketing tool in restaurants, my results, which suggest that it is important in the trend-setting Bay Area, may be a harbinger of a larger nationwide trend in which a greater number, perhaps a majority of seafood restaurants, begin to source seafood from more sustainable sources. To do this, a simpler and streamlined method for evaluating seafood's sustainability will have to become an integral part of the mainstream seafood market. A broad reputable certification makes the most sense. This certification need to be simple to understand, well regarded scientifically, consistent in its evaluation metrics, easily recognizable to consumers and decision-makers alike, and, above all, easily applied to the burgeoning aquaculture industry.

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Appendix I: Survey Results

BAY AREA SEAFOOD RESTAURANTS SURVEY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Subject identities will be kept confidential.

Your participation is voluntary. Your decision whether or not to participate will not affect your relationship with the University of Michigan. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

If you have any questions, please feel free to contact Ty Brookhart at 707.889.0426 or Tybrook@umich.edu. If you have questions regarding your rights as a research subject, contact the University of Michigan's Institutional Research Board (734-764-1185; UMresearch@umich.edu). You will be offered a copy of this form to keep if desired.

Your signature indicates that you have read and understand the information provided above and that you willingly agree to participate and that you are not waiving any legal claims.

Signature

Date

1) In terms of your role in the decision making process regarding seafood purchasing, which statement best describes your position?

- a. Primary decision-maker.....**35.5%**
- b. One of several decision-makers.....**64.5%**

* Other replies were rejected and not included in the survey analysis.

2) Indicate the percentage of your menu that is seafood.

- a. ~25%.....**9.7%**
- b. 25%-49%.....**19.3%**
- c. 50%+.....**71.0%**

3) What is the average portion size, in ounces, of your seafood entrées?

- a. 1-7 oz.....**90.3%**
- b. 8 oz.....**9.7%**
- c. 9 oz.+.....**0%**

4) Is your restaurant:

- a. Independently owner operated.....**64.5%**
- b. Part of an independent/
corporate owned chain.....**25.8%**
- c. Part of a regional chain.....**6.5%**
- d. Part of a national chain.....**3.2%**

5) How would you describe the restaurant's atmosphere?

- a. Very formal.....0%
- b. Somewhat formal.....25.8%
- c. In between.....45.2%
- d. Somewhat casual.....29.0%
- e. Very casual.....0%

6) Thinking about the seafood items on your menu, how would you rate the popularity of your shrimp entrées?

- a. Most popular 1 or 2 items.....12.9%
- b. Within the top 5 items.....45.2%
- c. Top 6-10.....38.7%
- d. Not within the top 10 most popular.....3.2%

7) Thinking about the seafood items on your menu, how would you rate the popularity of your salmon entrées?

- a. Most popular 1 or 2 items.....22.6%
- b. Within the top 5 items.....58.1%
- c. Top 6-10.....16.1%
- d. Not within the top 10 most popular.....3.2%

8) You may be aware that shrimp is produced by aquaculture- a method of farming or raising shrimp in ponds, lagoons or enclosed tanks. Shrimp is also fished by various methods, the most common being bottom-trawl and trap. Where does most of the shrimp on your menu come from, or are you not sure?

- a. Trawl.....16.1%
- b. Trap.....19.4%
- c. Aquaculture.....41.9%
- d. Not sure.....19.4%
- * Combination.....3.2%

9) You may also be aware that salmon is produced by aquaculture- a method of farming or raising salmon in ocean net pens. Salmon is also fished by various methods, such as seine and troll. Where does the most of the salmon on your menu come from, or are you not sure?

- a. Farmed.....22.6%
- b. Wild caught.....64.5%
- c. Not sure.....3.2%
- * Combination.....9.7%

10) I'm going to list several different things you may have heard about seafood, fishing and aquaculture. Please indicate what you have heard.

	Great deal	Some	Not much	Nothing
a. Health benefits reaped from eating seafood	77.4%	22.6%	0%	0%
b. The negative health risk associated with eating contaminated seafood	32.3%	45.2%	22.6%	0%
c. Aquaculture's integral role in feeding the world	32.3%	32.3%	29.0%	6.5%
d. The need for aquaculture to provide cheap reliable sources of seafood	38.7%	38.7%	19.4%	3.2%
e. Environmental damage caused by certain types of commercial fishing	61.3%	32.3%	6.5%	0%
f. Environmental impacts associated with shrimp farming	38.7%	45.2%	16.1%	0%
g. Environmental impacts associated with salmon farming	64.5%	25.6%	9.7%	0%

11) I'm going to list a few types of seafood labels that exist. Please tell me what you have heard about each of them, if anything.

	Great deal	Some	Not much	Nothing
a. Marine Stewardship Council-certified sustainable label for wild capture fisheries	25.8%	25.8%	16.1%	32.3%
b. Global Aquaculture Alliance-certified best management practices	6.5%	29.0%	32.3%	32.3%
c. USDA Organic certified	45.2%	51.6%	3.2%	0%
d. Country of Origin labeling	25.8%	41.9%	25.8%	6.5%

12) As you may know, all packaged seafood is required to have the country of origin printed on the package. Do you know where the shrimp on your menu comes from?

- a. The United States.....45.2%
- b. Asia.....41.9%
- c. South America.....3.2%
- d. Don't know.....6.5%
- *Combination.....3.2%

13) Additionally, farmed salmon comes from several different countries. If you know of one (or more than one) would you write it in the space provided below.

14) Listed below are several items related to seafood. Please tell me what you believe is their level importance for chefs choosing seafood.

	Very important	Somewhat important	Somewhat important	Not Important	
a. Quality	100%	0%	0%	0%	0%
b. Health reasons	41.9%	19.4%	22.6%	9.7 %	6.5%
c. Knowledge of preparation	67.7%	12.9%	12.9%	0%	6.5%
d. Environmental considerations	54.8%	19.4%	12.9%	6.5%	6.5%
e. Availability	80.6%	16.1%	3.2%	3.2%	0%
f. Consistency	87.1%	6.5%	6.5%	0%	0%
g. Value	74.2%	9.7%	16.1%	0%	0%
h. Customer demand	58.1%	25.8%	16.1%	0%	0%
i. Taste	96.8%	3.2%	0%	0%	0%

15) How interested are you in getting more information about what types of seafood are abundant, well-managed and caught or farmed in a way that is friendly to the ocean environment? Are you:

Very interested	Somewhat interested	Not too interested	Not at all interested
80.6%	19.4%	0%	0%

16) How interested are you in getting more information about certifications that indicate seafood products that have been harvested, managed or farmed in a sustainable manner or are friendly to the ocean environment? Are you:

Very interested	Somewhat interested	Not too interested	Not at all interested
77.4%	22.6%	0%	0%

17) Would it please you to know your restaurant carried certified seafood that came from a sustainable fishery or was produced in an ecologically friendly aquaculture system?

Absolutely	Somewhat	Not really	No, not at all
90.3%	9.7%	0%	0%

18) If your restaurant carried certified seafood, how likely would you be to share that information with other people, including customers, other chefs or the public?

Very likely	Somewhat likely	Not likely	Not sure
80.6%	19.4%	0%	0%

Please give us some background information about yourself to assist us in our study.

18) How long have you been a chef? 14.8 yrs 19) How old are you? 36.5 yrs

20) Do you eat meat? Yes.....100% No.....0%

21) Do you eat fish? Yes.....96.8% No.....3.2%

22) How long have you lived in the Bay Area (SF, Monterey, Marin, East Bay, South Bay all inclusive)?

Mean.....19.2 yrs Max.....48 Min.....1 Std Dev.....15.2

Appendix II: Informed Consent Form

SAN FRANCISCO BAY AREA RESTAURANT INTERVIEW AND SURVEY INFORMED CONSENT FORM

You are invited to participate in a research study conducted by Ty Brookhart from the University of Michigan’s School of Natural Resources and Environment. The study seeks to investigate the potential for sustainably certified aquaculture products in the San Francisco Bay Area restaurant industry, while concurrently researching chef education, environmental awareness, business strategy and seafood quality. Answers to these questions will help the seafood and restaurant industries, as well as several active seafood stewardship organizations design programs that conserve our oceans’ resources while providing sustainable and quality products to consumers. Your restaurant was selected as a possible participant in this study for several reasons: you serve several seafood dishes, your clientele is most likely to embrace such products, your restaurant and its chefs are key players in the restaurant industry and the sustainable seafood movement in the San Francisco Bay Area.

If you decide to participate, the study will include: a detailed interview of your owner, head chef, fish buyer or other decision maker responsible for seafood selection for the restaurant, distribution of surveys to kitchen staff, or any one of the two. The interview will take approximately thirty (30) minutes and completion of surveys will take roughly fifteen (15) minutes and can be done at the restaurant and chef(s)’s leisure. The interviews will be recorded and surveys can be mailed or may be administered at the time of the interview. Interviews can take place in house at the participants’ requested location, or by phone if necessary.

Participation in the study will require a small time obligation. It is understood that many in the restaurant business are not blessed with an abundance of time, but I will work with participants to schedule times and locations that will facilitate the process. It is my genuine belief that the study will provide qualitative data that will benefit both the seafood and the restaurant industry, as well as provide information that will further current efforts to protect our natural resources for generations.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Subject identities will be kept confidential.

Your participation is voluntary. Your decision whether or not to participate will not affect your relationship with the University of Michigan. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

Risks associated with this study, though rare, do exist. It is possible that answers to certain questions, if released in association with a particular restaurant, could be detrimental to a restaurant’s reputation. Another rare risk for participating restaurants is that by providing the time to complete surveys and interviews restaurants may sacrifice valuable professional time that could, under unique and rare circumstances, be harmful to the restaurant's business.

If you have any questions, please feel free to contact Ty Brookhart at 707.889.0426 or Tybrook@umich.edu. If you have questions regarding your rights as a research subject contact the University of Michigan’s Institutional Review Board, Kate Keever, 540 E. Liberty Street, Suite 202, Ann Arbor, MI 48104-2210, (734) 936-0933, email: irbhsbs@umich.edu. You will be offered a copy of this form to keep.

Your signature indicates that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time and discontinue participation without penalty, that if you agree to an interview it will be recorded and that you will receive a copy of this form.

Signature

Date