Should Maine Lobsters be certified as sustainable? Costs, benefits and opinions of Marine Stewardship Council certification

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ABSTRACT

As worldwide population growth continues to rise, so does demand for seafood by consumers. With this trend interest in sustainably certified seafood is also increasing. The Marine Stewardship Council (MSC) standard for sustainable and well-managed fisheries is considered the gold standard of fisheries certification worldwide. Because of fears that they may lose markets if they do not become certified, many fisheries in the U.S. and Canada, including the Maine lobster fishery, have recently begun to pursue MSC certification.

Although certification provides a market-based incentive to improve sustainable fishing practices, it is a costly and time-consuming process, and often imposes additional requirements on fishing industries in order to meet certification standards. In order to evaluate whether the costs of certification of the Maine lobster fishery are worth the presumed benefits, I interviewed lobster industry members to learn about their knowledge and attitude towards MSC certification; administered an online consumer survey to understand consumers' attitudes and purchasing preferences related to ecolabeled lobster; and consulted with fisheries experts and representatives from other MSC-certified fisheries to compile lessons learned.

The results of my three studies indicate that MSC certification of the Maine lobster fishery could provide some benefits to the industry by helping it to tap new markets in Europe, sell to retailers that have developed corporate sustainable seafood policies, and preserve its current markets with large buyers like Wal-Mart. However, my results also show that most consumers will likely be unwilling to pay a price premium for MSC certified products, especially in this economy, and therefore a price increase for MSC certified lobster should be avoided. Still, more research on the actual market benefits of ecolabeling programs needs to be conducted to determine if they really are providing benefits to fisheries while also promoting the health and sustainability of wild marine species populations and the surrounding ecosystems they depend on.

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INTRODUCTION

As worldwide population continues to grow, so does demand for seafood by consumers. With this trend the market for sustainable seafood in the United States has also grown, particularly in the past decade, mostly driven by retailers.

At the recent International Boston Seafood Show held March 15-17, 2009, the biggest annual seafood show in North America, sustainable seafood was one theme that stood out.[1] More and more buyers are incorporating sustainability into their purchasing criteria each day. But, according to Tobias Aguirre, executive director of FishWise in Santa Cruz, CA[2], in order to give buyers the incentive to develop seafood sourcing policies that ensure their products are harvested or farmed in an environmentally and socially responsible manner, those corporate policies need to make financial sense.[3] In a sustainability panel at the seafood show, Aguirre mentioned that two California seafood companies FishWise is working with have had increased seafood sales since they implemented sustainable seafood purchasing policies.[4] Promoting sustainable seafood therefore is not only a positive step towards decreasing overfishing, but also can give retailers a market advantage.

Some retailers have turned to ecolabels[5] to market their sustainable seafood products to their customers. The Marine Stewardship Council's (MSC) ecolabel, currently used on over 2,000[6] products from 42 certified fisheries[7] that have met the MSC's environmental standard for being sustainable and well-managed, is considered the gold standard of third-party fisheries certification worldwide. All of the fisheries certified by the MSC make up approximately 7% of all wild edible fish catches worldwide including 42% of wild salmon catch and almost 1/3 of global annual whitefish catch.[8] In 2006, Wal-Mart announced its commitment to source 100% of its wild-caught seafood from fisheries certified as sustainable under the MSC standard within three to five years.[9] European retailers are leading the charge to sell only MSC certified products, with Marks & Spencer, one of the leading retailers in the U.K., committed to sourcing all of its seafood from the MSC or other independently certified products by 2012,[10] the Netherlands' entire seafood industry and all Dutch fisheries committing to become 100% MSC certified, Lidl, a German supermarket chain, introducing the MSC into 15 European countries, and Sainsburys'[11] efforts in 2008 to double their MSC labeled products.[12] Other large seafood buyers in the U.S. such as Wegmans, Whole Foods Market, and Ahold[13] have partnered with conservation organizations from the U.S. and Canada to form the Conservation Alliance for Seafood Solutions, a group that works towards creating a comprehensive, corporate policy for supplying sustainable seafood.[14]

Because of the growing movement towards sustainable seafood worldwide, pressure from retailers for fisheries to become certified as sustainable, and fears that fisheries may lose markets if they do not become certified, many fisheries in the U.S. and Canada have recently begun to pursue third-party certification based on the MSC standard. To become certified by the MSC, the fishery must show that it meets three core principles: 1) it supports sustainable fish stocks; 2) it minimizes impact on the surrounding ecosystem; and 3) effective management measures are in place that maintain sustainability and comply with all laws.[15] Fisheries are assessed by third party certifiers, and once certified, they are audited annually and reassessed every five years. At the end of each assessment, conditions that identify improvements to be made based on the core three principles are placed on the fishery. If the final conditions placed on the fishery are not met within five years, the fishery risks losing its certification.

In February 2008, the governor of Maine established the Working Group on Maine Lobster Sustainability, made up of four lobster dealers, three harvesters, and the Commissioner of Maine's Department of Marine Resources to explore the possibility of sustainably certifying the Maine lobster fishery according to the MSC standard. In December 2008, the Maine lobster fishery decided to move ahead with the full assessment for MSC certification.[16] Certification might impose new management measures on fishermen that may require them to change some of their fishing practices or increase their level of catch reporting, but it may also benefit fishermen by opening new markets, preserving current ones, and possibly increasing lobsters' market value. The Maine lobster industry could use an improvement in the lobster market, as it has largely been impacted by the current global economic crisis. In 2008, although total landings increased by 1,370 metric tons (approximately 3 million pounds), the total value of lobster decreased by $49.7 million compared to 2007. Most of the decrease in value occurred between October and December, during which time despite a decrease in landings of only 416 metric tons (approximately 918 thousand pounds) compared to the same period in 2007, total Maine lobster value decreased by $44 million ("Preliminary 2008 Maine Lobster Landings" report received via email from Heidi Bray, Marine Resources Scientist- Maine Department of Marine Resources, April 16, 2009). This decline was mainly caused by decreased demand for lobster by consumers and by Canadian processors who don't want to be stuck with more lobsters than they can sell or who cannot get the credit they need to purchase lobster.[17] During that period, lobster prices fell below $3 per pound, compared to an average price of $4.10-$4.60 per pound at the same time the previous year.[18] Since then, the price for lobster has slowly increased and as of the week of April 13th, 2009, it is back to similar prices received at this time last year.[19] Still, demand continues to be light, and there are worries in the industry that the weak market for lobsters will continue as long as the recession persists.

In October 2008, Maine's governor established the Task Force on the Economic Sustainability of Maine's Lobster Industry to explore alternatives for improving the lobster market during this period of economic crisis. The goal of the Task Force is to "develop a comprehensive strategic plan for improved marketing of Maine lobster in order to ensure the economic prosperity and long-term sustainability of the Maine lobster industry." [20]Activities that the Task Force plans to undertake include: identifying ways to expand lobster markets, identifying improvements to infrastructure and processing in Maine, increasing the range of value-added products, identifying possible changes to the structure of the industry in terms of volume, quantity, and timing of lobsters landed, preparing Best Management Practices for industry members to increase lobster quality and profitability, reviewing methods for promoting Maine lobster in the global marketplace including analyzing the value of MSC certification, and identifying alternative business models. [21] The Task Force study results are expected to be released in April 2009, and this report will supplement the study by exploring the overarching question of what benefits and challenges MSC certification will bring to the Maine lobster fishery.

In considering whether a fishery should pursue sustainability certification, two main factors need to be evaluated. First, is the fishery sustainable, and if not, will it be able to meet any conditions imposed on the fishery in order to meet certification requirements? The sustainability status of the Maine lobster fishery is currently unknown, as the results of the most recent stock assessment conducted in 2008 have not yet been released. As of the last stock assessment completed in 2005, the Gulf of Maine lobster fishery was considered sustainable based on measurements of lobster abundance and fishing mortality.[22] The sustainability status of the Maine lobster fishery is outside the scope of this paper, and it is assumed that no matter the state of the lobster fishery, the MSC assessment process will identify any actions that need to be taken to meet sustainability standards. The second question that should be evaluated to determine whether a fishery should pursue certification is, are the costs of certification worth the presumed benefits? This is the question that I will explore more thoroughly in this report.

OBJECTIVES

Through an assessment of the benefits and disadvantages of MSC certification, I will provide recommendations to the Maine Lobster fishery about what issues are most important to address while navigating the certification process, and how best to tackle these issues. To evaluate the costs and benefits of MSC certification, I investigated the following research questions:

1) What is the knowledge and attitude from the Maine lobster industry's perspective towards MSC certification? What concerns do industry members have, and how much support is there for certification among industry members?

2) What are consumers' attitudes towards ecolabeled lobster? What factors do they consider when purchasing lobster, and would they be willing to pay more for ecolabeled lobster?

3) What lessons can be learned from fisheries experts and other representatives from fisheries that have already been MSC certified to inform the Maine Lobster industry and ensure that the certification process goes smoothly?

BACKGROUND

Biophysical Ecology of the American Lobster (Homarus americanus)

The American Lobster, *Homarus americanus,* is a bottom-dwelling crustacean in the Northwest Atlantic Ocean whose range stretches from Labrador in Canada to Cape Hatteras, North Carolina.[23] Lobsters live both in inshore waters (out to 40 meters depth) and in offshore waters (out to depths of 700 meters) [24], and they are more abundant in the northern part of their range, particularly in the Gulf of Maine[25]. Lobsters are solitary and territorial, and inshore they concentrate in rocky areas and muddy bottoms, while offshore lobsters mostly congregate in submarine canyons along the edge of the continental shelf.[26]

After females molt they mate and extrude 7,000 to 80,000 eggs under their abdomens which they then carry for a 9 to 11 month incubation period.[27] The eggs hatch from mid-May to mid-June and for the first four molting stages, the larvae remain planktonic, swimming near the ocean's surface.[28] After the fourth molt, the larvae attain adult characteristics and sink to the seabed where they remain for the rest of their lives.[29] Lobsters reach market size after about 20 molts, or five to eight years depending on water temperature.[30] Tagging studies have shown that in inshore waters, large lobsters travel widely, while small lobsters have limited movement.[31] Offshore lobsters have been shown to travel extensively, migrating shoreward in the spring for distances of 80 to 300 km and moving laterally along the continental shelf edge. [32] For assessment and management purposes, based on biology and fishing patterns, three stock areas are recognized in U.S. waters: the Gulf of Maine, George's Bank, and Southern New England.[33]

The American Lobster Fishery: History & Current Status

Historically, fishing for large lobsters has occurred inshore throughout the range of the American Lobster. In the 1880's, increased fishing effort throughout the lobster's range was blamed for decreases in lobster size and catch per trap, and by 1903 the fishery was thought to be commercially extinct.[34] In the early 20th century, the effects of fishing, predation, and habitat destruction on lobster populations were well-understood, and most management measures in place today had been discussed or implemented over 100 years ago.[35]

The principal fishing gear used to catch lobsters is the trap, although in some states lobsters can be taken as bycatch in otter trawls or by diving for them.[36] Lobsters are harvested by fishermen who fish independently or with one hired sternman in small 20 to 50 foot vessels. In the United States, there are approximately 9,000 commercial license holders, with the vast majority of them located in Maine. In 2007, Maine issued over 6,700 permits[37], compared to approximately 1,500 permit holders in Massachusetts[38], the state with the second highest number of licenses. All states also issue recreational lobster licenses, however data is lacking on the number of recreational license holders that exist. In Maine, recreational license holders are only allowed a maximum of 5 traps, so the effects on the lobster stock are considered negligible.

Stock Status

Lobster landings are dependent on three factors: biomass (abundance) of the lobster stock, management measures for the fishery, and fishing effort. According to the last stock assessment conducted in 2005, biomass of the Gulf of Maine lobster stock has increased over the past 10 to 15 years, reflecting a similar increase in lobster biomass throughout its range in the U.S. and Canada. As a result, fishing effort continues to increase, with fishermen expanding into areas that have previously been rarely fished, producing an excess of fishing effort. In most states there also exist several latent licenses (licenses for traps that are not being used by fishermen) which if used, could increase fishing effort even more. The stock assessment concluded that the high level of effort which seems to coincide with high stock abundance would not be able to support the industry if abundance decreases to median levels.[39]

Although the Georges Bank lobster stock is relatively stable, its biomass has also increased slightly, causing an increase in fishing effort. For the George's Bank stock, the assessment recommends that effort be reduced. [40] The Southern New England lobster stock is in the worst shape. When abundance increased from 1982 to 1997, fishing effort increased in response and continued to occur at a high level while abundance and landings declined. As with the Gulf of Maine stock, states have reported high numbers of latent licenses that have the potential to increase fishing effort even more. The assessment concluded that overfishing is occurring in the Southern New England stock, and the stock is depleted. [41]

For all three stock areas, the stock assessment shows that there continues to be an excess of effort. The Southern New England stock has already collapsed, and the George's Bank and Gulf of Maine stocks are in danger of collapsing as well if effort is not reduced. Not only would a collapse to all three stocks have serious economic, social, and environmental implications, but it may also make all areas ineligible for MSC certification, since one of the three core principles of the MSC standard is to maintain a healthy and sustainable species stock[42]. The effects of continued high effort on the health of the lobster stocks should be revealed in the 2008 ASMFC stock assessment results, which are scheduled to be released in early 2009.

<u>Legal mandates and Institutional Ecology of the Fishery</u>

In U.S. state waters (from 0 to 3 miles offshore), American Lobster is managed by the Atlantic States Marine Fisheries Commission (ASMFC or Commission). American Lobster is one of 23 marine species managed by the ASMFC, and is also the Commission's most economically valuable species.[43] Before 1999, American Lobster was managed by federal process through the National Marine Fisheries Service (NMFS) under the New England Fishery Management Council, but NMFS transferred management responsibility to the Commission in 1999 since 80% of the fishing occurs in state waters and it was difficult for the Council to ensure the stocks were not being overfished.[44]

The ASMFC was formed by the fifteen Atlantic coast states[45] through an interstate compact that was approved by Congress in 1942. The goal of the Commission is to improve interstate management and conservation of its shared coastal fishery resources, particularly for marine species that cross political boundaries. The mission of the ASMFC is “To promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of physical waste of the fisheries from any cause.”[46] The Commission also maintains a vision to work towards “Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015.”[47] Member states appoint three representatives as commissioners: the director of the state’s marine fisheries management agency, a state legislator, and an individual appointed by the governor. Each state only gets one vote, however all commissioners participate in decision-making for the Commission’s five main policy arenas: interstate fisheries management, research and statistics, habitat conservation, sport fish restoration, and law enforcement.[48]

In 1993, the Atlantic Coastal Fisheries Cooperative Management Act (ACFCM Act) was passed by Congress, which authorized the ASMFC to develop coastal Fishery Management Plans (FMPs) for its managed species. Under the Act, the member states of the ASMFC are required to implement and enforce the FMPs. American Lobster in state waters is managed under Amendment 3 and Addenda I to XIII to the ASMFC’s Interstate Fishery Management Plan for

American Lobster. In Federal waters (from 3 to 200 miles offshore) NMFS is responsible for managing the American Lobster fishery, and has implemented complementary regulations that are compatible with the ASMFC's Interstate American Lobster FMP and consistent with the national standards established in section 301 of the Magnuson-Stevens Conservation and Management Act, as required by the ACFCM Act[49].

Amendment 3 to the ASMFC's Interstate FMP for American Lobster (Amendment 3) was established in 1997 to provide a framework for implementing future management measures for the lobster fishery through addenda.[50] Amendment 3 took a participatory management approach by establishing seven lobster management areas and creating lobster conservation management teams (LCMTs) for each area that are composed of industry representatives. The LCMTs are tasked with advising the ASMFC Lobster Management Board on area-specific management measures that will help achieve the goals of Amendment 3. The major provisions in Amendment 3 include the following measures: 3 ¼-inch minimum carapace length; prohibition on the possession of lobsters with eggs extruded; prohibition on possession of lobster meat and lobster parts; mandatory escape panels and vents on pots to allow lobsters to escape from old, lost pots; prohibition on spearing lobsters; prohibition on possession of female v-notched lobsters[51]; limits on landings with non-trap gear; maximum trap sizes; and trap limits in some areas (Gulf of Maine trap limit is 800 traps). [52] In addition, as a result of the 2005 stock assessment which stressed the need for a standardized mandatory reporting system for American Lobster, Addendum X established a reporting and data collection program requiring 100% mandatory dealer reporting and at least 10% harvester reporting in all states.[53]

Lobster Management in Maine

The Maine Department of Marine Resources (DMR) is the state agency tasked with managing the lobster fishery in Maine. The Maine State Legislature sets the state laws for lobster management that must comply with Amendment 3, and the DMR is responsible for rule-making to implement and enforce the laws. Maine lobsters are managed under Title 12, Chapter 619 of Maine's revised statutes[54], and through Chapter 25 of the DMR's Marine Resources Regulations[55]. Maine lobster fishing regulations are more restrictive than Amendment 3's measures. In addition to the major provisions of Amendment 3, Maine requires the following measures: a maximum carapace size limit of 5" for lobsters landed in Maine; harvesting is trap only- no trawling or diving is permitted; and new harvesters must apprentice with experienced license-holders for several years before being eligible for full commercial lobster permits. In addition, to facilitate regional management of the lobster fishery and encourage participation from industry members in the policy-making process, the DMR split the waters off of the Maine coast into seven lobster management areas, or zones. Each zone has a Lobster Zone Management Council (Zone Council) comprised of lobstermen elected for one-year terms that represent all harvesters in each zone municipal district. The Zone Councils may propose rules to the DMR Commissioner for a variety of management measures in their zones: setting trap limits in each zone (as long as they are more restrictive than the 800 trap limit); setting the number of traps allowed on a trawl[56]; setting the time of day fishing can occur; and managing the apprenticeship program.[57] One member of each Zone Council is also elected by majority vote to the Lobster Advisory Council, which in addition the zone council members, is comprised of two lobster dealers, one non-lobster license holding member of the public, and three lobster harvesters appointed by the Commissioner who are not members of the zone councils. Each Advisory

Council member serves a term of 3 years.[58] The goals of the Lobster Advisory Council are to 1) advise the DMR commissioner and the DMR Advisory Council[59] on management of the lobster fishery, 2) make recommendations to the commissioner and the DMR Advisory Council about lobster research programs that are or should be conducted, and 3) resolve disputes brought to the council by the Zone Councils.[60]

Other Relevant Legislation: Marine Mammal Protection Act 1972

The Marine Mammal Protection Act of 1972 prohibits the "take"[61] of marine mammals in U.S. waters and by U.S. citizens on the high seas. Section 118 of the Act requires that NMFS develop and implement a take reduction plan to help recover and prevent depletion of marine mammal species that interact with a category I or II[62] fishery.[63] The Northeast/ Mid-Atlantic American Lobster Trap/Pot Fishery is considered a category I fishery and requires a take reduction plan since it has historical incidental bycatch of four large whale species: the North Atlantic Right Whale, the Humpback Whale, the Fin Whale, and the Minke Whale.[64] In 1997, NMFS developed the Atlantic Large Whale Take Reduction Plan (ALWTRP) to reduce the mortality and serious injury of three strategic stocks of North Atlantic Right, Humpback, and Fin Whales, and to benefit Minke Whales. The ALWTRP combines regulatory and non-regulatory programs to reduce the take of whales through gear modifications, time-area closures, disentanglement efforts, outreach, gear research, and right whale monitoring and surveillance.[65] Through the ALWTRP, by April 2009, all lobstermen that fish in federal waters are required to use sinking groundline between their traps when fishing trawls.[66] Unfortunately, this requirement increases the risk of groundlines chafing and breaking, especially in areas such as eastern Maine where the ocean floor is very rocky. Maine fishermen are not happy about complying with this regulation, since it could be costly for them if they lose a lot of gear as a result.

Landings and Market Value

American Lobster landings declined throughout the United States between 1889 and 1915 and remained low for another 50 years[67], but then began to increase again in the 1970s until they reached historic highs in 2006[68] (see Appendix 1). Landings have especially seen a rapid increase in the last 20 years, rising from 28,297 metric tons and a market value of $154.8 million in 1990 to 42,010 metric tons and a value of $395 million in 2006.[69] Eighty percent of the landings are from inshore state waters[70], with the majority coming from the Gulf of Maine[71].

At a value of $415 million in 2005 and $395 million in 2006 nationwide, lobster ranks as the third most valuable commercial fishery United States, after shrimp and crabs.[72] American Lobster made up 94% of total U.S. lobster production in 2004, and 81% of the catch was landed in Maine. [73] Comparatively, in Canada, American Lobster landings vary from 40,000 to 50,000 metric tons annually, valued at US$440 million to US$520 million[74].

In Maine alone, lobster contributes greatly to the state's economy. It is the state's number one fishery, and supports livelihoods for approximately 6,000 fishermen (email from Heidi Bray, Marine Resources Scientist- Maine Department of Marine Resources, April 16, 2009), as well as businesses such as processors, dealers, marine outfitters, boat builders, and restaurants. Hundreds of small, coastal villages in Maine rely on the lobster fishery as one of its major sources of income. [75] In 2008, Maine's catch exceeded 30,500 metric tons (up from 20,200 metric tons in 2007) with a total value of $235.6 million (down from $285.3 million in 2007) ("Preliminary 2008 Maine Lobster Landings" report received via email from Heidi Bray, Marine Resources Scientist- Maine Department of Marine Resources, April 16, 2009). Approximately 5-6% of all live and processed lobster in Maine is exported to Europe and 50% is exported to Canada for reshipment or processing. Canada then exports 80% of its harvests and U.S. imports back into the United States market (Dane Somers, Executive Director of Maine Lobster Promotion Council, personal communication, March 11, 2009).

ECOLABELING AND CERTIFICATION

Why use ecolabels?

The incentive of selling products with ecolabels is to give sellers a market advantage over those sellers that provide non-ecolabeled products. By differentiating a product with an ecolabel as coming from an environmentally-sustainable source, sellers may be able to increase their markets, and possibly gain a higher price for their products if consumers who are concerned about the environment are willing to pay more for ecolabeled products.[76] Eventually, the value of non-ecolabeled products could be reduced, and the increased value of ecolabeled products could provide an incentive for fisheries to adopt more ecologically sustainable practices in order to be able to use the ecolabel.[77] To use an ecolabel, fisheries usually need to go through a certification process to show that they are in compliance with the criteria set by an ecolabeling program.

As an alternative to producing ecolabels that are displayed on products at the point of sale, some environmental organizations such as Monterey Bay Aquarium's Seafood Watch[78] and the Blue Ocean Institute[79] produce seafood buying guides in the form of wallet cards, websites, or brochures, also intended to influence consumer-purchasing decisions and provide a market incentive for fisheries to become more sustainable. These organizations rank fisheries according to their sustainability status based on criteria that they have developed. Although the guides are useful, there are so many different guides available using different ranking criteria and providing conflicting guidance at times that they may cause confusion for consumers. Still, these buying guide programs are another tool for creating market incentives to encourage wild fisheries to adopt more sustainable practices.

Ecolabeling programs, in contrast to the seafood buying guides, are voluntary, in that the fishery or industry itself can decide whether to go through a certification process to use an ecolabel. Certification can be conducted in several ways. Some fisheries may choose to go through a third-party certification program in which third-party auditors evaluate the fishery's practices based on standards set by the certifying organization (such as the MSC). Other fisheries may choose to do their own industry self-assessment, in which they evaluate their fishery against their own sustainability standards. Each of these methods has its advantages and disadvantages. Industry self-assessments are less rigorous than third-party assessments, but they may not have as much validity in the market-place as third-party assessments, since they lack third-party review. Undergoing third-party certification, however, can be a costly and time-consuming process. The costs of certifying a fishery through a third-party certification program include the cost of the auditor conducting the assessment (which can take anywhere from one to five years or more depending on the size and complexity of the fishery), the cost of gathering the data needed for the assessment, the costs of meeting the conditions imposed on the fishery as a result of certification, and the costs of recertification and future audits to ensure compliance.[80] These costs need to be taken into account when a fishery considers becoming third-party certified.

<u>The MSC Certification Process</u>

The Marine Stewardship Council (MSC) is a non-profit organization based in London that was established in 1997 by the World Wildlife Fund[81] and Unilever PLC[82] to certify wild capture fisheries as sustainable, in order to give fisheries an economic incentive to work towards developing more ecologically sustainable fishing practices. The MSC program is fully compliant with the United Nations Food and Agriculture Organization's (FAO) Voluntary Guidelines for the Ecolabeling of Fish, which requires: 1) third-party fishery assessments based on science; 2) a transparent process with stakeholder participation; and 3) standards based on sustainability of the species, ecosystems, and management practices. [83]

To enter the MSC program, a fishery must first establish a client group that acts as the main point of contact with the MSC and manages the certification process. Through the client, the fishery then voluntarily applies to be assessed by an independent, third-party organization against the standards set by the MSC for sustainable fishing. Before launching into a full assessment, the fishery must hire an independent certification body to conduct a confidential pre-assessment (which usually takes approximately 6 months to complete) that assesses the likelihood that the fishery will meet the MSC standard. This process lets the fishery know if there are any issues that may prevent the fishery from passing the full assessment, and gives it time to make improvements before pursuing the full assessment.

As mentioned earlier, the MSC standard consists of three main principles: 1) the health of the fish stock; 2) the ecosystem effects of the fishery; and 3) the management measures in place.[84] Under each of these principles, the certification body measures 23 criteria through specific performance indicators that are then graded. The certification body then produces a draft report that undergoes peer review and stakeholder consultation, and after making any changes based on comments received, the certification body publishes the final report which states whether the fishery meets the MSC standard.[85] If a fishery passes the assessment and becomes certified, it can then apply to use the MSC ecolabel (Figure 1) on its seafood products. To retain the MSC certification, a fishery is subject to annual audits and full assessments every five years.[86]

Figure 1. The MSC ecolabel

All members of the supply chain that wish to use the MSC ecolabel need to complete a chain of custody audit in which they are required to separately label the MSC product in order to ensure that it can be traced back to a certified fishery. With the growing concern about illegal, unreported, and unregulated fishing, fraud, and mislabeling, traceability of seafood products is becoming more desirable by consumers and distributors, and is therefore an important component of the MSC process.

The costs of certification can be prohibitive for fisheries, and critics often cite costs as the biggest barrier to pursuing MSC certification. The assessments themselves can cost anywhere from $20,000 for small community-based fisheries to $300,000 for large industrial fisheries.[87] Fisheries also incur expenses to conduct the pre-assessment and the annual audits, management of the assessment process, and the implementation of improvements to address the conditions placed on the fishery during the certification process. In order to use the MSC logo, sellers need to pay a fixed annual license fee plus 0.1% of sales of MSC labeled seafood to the MSC, which is used to run and administer the certification program.[88]

In the case of the Maine Lobster Fishery, costs are estimated to be quite substantial for MSC certification because it is such a large and widespread fishery. Initial estimates of the projected costs related to MSC certification are listed in Table 1 below.

Table 1. Estimated costs related to MSC certification of the Maine Lobster Fishery*

Activity	Approximate Cost (US$)
Pre - Assessment	$6,500
Full Assessment	$150,000
Annual audits (amount per year for 5 year term of certification)	$25,000 - $30,000
Estimated Annual costs of complying with conditions (Data collection, additional reporting and enforcement, staff time, etc.)	$500,000 - $1,000,000

*Data from email s received March 11, 2009, from Dane Somers, Executive Director of Maine Lobster Promotion Council, and John Hathaway, Chair of the Fund for Sustainable Maine Lobster.

Status of the Maine Lobster Fishery MSC Certification

In the summer of 2008, the Working Group on Maine Lobster Sustainability hired Moody Marine Ltd., an independent certifier, to conduct a pre-assessment of the fishery. Results of the pre-assessment were compiled in October 2008 and three public meetings in different parts of the state were convened to discuss the pre-assessment results, hear questions and concerns, and gauge industry members' opinions about moving forward with the full assessment. After feedback from the meetings the Working Group on Maine Lobster Sustainability decided to pursue full certification. It established the Fund for Sustainable Maine lobster as the client group, which then applied to the MSC to begin the full assessment in December 2008. The assessment is currently being conducted by Moody Marine Ltd. and is expected to take 12-14 months to complete.

METHODS

To evaluate the MSC certification of the Maine lobster fishery, I used a mix of qualitative and quantitative research methods including conducting interviews, observing lobster fishing and management in action, implementing an online consumer survey, and performing a literature review.

Industry member interviews, June – July 2008, Maine

Interview design and sampling method

First, in order to assess Maine lobster industry members' knowledge and opinions of MSC certification, I conducted a single case study of the industry during the summer of 2008. As an intern at the Gulf of Maine Research Institute (GMRI),[89] I interviewed as many industry representatives as possible over a two month period to learn their opinions about what benefits MSC certification could bring to the fishery and what challenges could prohibit the lobster industry from achieving certification. I prepared different sets of interview questions for harvesters and buyers, and developed additional questions for managers, scientists, and retailers. I conducted semi-structured interviews in person and over the phone with 59 harvesters, 17 buyers, and 20 "others" (scientists, regulators, managers, and retailers) (see Appendix 3 for sample interview questions). I used snowball sampling as my sampling method: each time I talked to one person, I asked him/her to provide names of additional contacts in the industry that would be worthwhile for me to interview. To identify initial contacts, I asked colleagues at GMRI to identify industry leaders that I should talk to. I found most of my interviewees by attending zone council and zone community meetings, at which I explained my project and then asked attendees to sign a sheet with their contact information if they were willing to talk with me at a later time about their thoughts on MSC certification. In addition, I conducted 10-15 minute focus group discussions with the meeting attendees. I also visited three separate wharfs and interviewed fishermen as they came in from fishing. I interviewed harvesters from every lobster zone in Maine (see Appendix 2 for a map of my interview locations), and based the number of interviewees in each zone on the percentage of license-holders in each zone. In addition to the interviews, I observed fishermen at the buying station wharfs as they and the dock workers loaded and unloaded bait and catch into their boats. I also went fishing for lobsters with three harvesters in two different lobster zone management areas to observe and learn how lobster fishing works in practice.

In all cases, I recorded the interviews by hand and did not use a sound recorder. The reason for this was that many of the interviewees did not wish to be voice recorded when asked, and it was difficult logistically to record telephone interviews. Although I made a concerted effort to take very detailed notes, it is important to note that my interview data may not be quite as accurate as it would have been if I had voice recorded the interviewees and then transcribed the interviews. However, without the recorder, the interviewees may have been less intimidated and more truthful and direct with their responses, so I feel that the benefits of not using a recorder outweigh the risks.

Data Analysis

I used Microsoft excel to compile and analyze my interview comments from all interviewees. Based on my interpretation of their comments and responses to my questions, I divided interviewees up into the following groups: a) definitely in support of MSC certification of the lobster fishery; b) in support of MSC certification but qualified: as long as they didn't have to give up something in particular (i.e. as long as no new regulations were imposed on the fishery as a result); c) do not support MSC certification; d) do not know if they support MSC certification; e) do not care. I then tallied the results for each category by zone for the harvesters and as totals for the buyers. For the "others" interviewed, I did not tally results on their opinions about MSC certification, since I was interested primarily in the industry perspective for purposes of my study. However, I did take into account their comments when attempting to understand the general feeling and attitude in Maine towards MSC certification.

Nationwide Online Consumer Survey

To address my second research question concerning consumers' lobster purchasing preferences, I conducted a nationwide online consumer survey. In order to understand whether consumers would be willing to purchase lobster with an MSC label, it is useful to evaluate consumers' lobster purchasing preferences. If, for example, consumers rate sustainability issues as less important factors that influence their seafood purchasing decisions, then they may not be willing to purchase ecolabeled seafood over non-ecolabeled seafood. This result, of course, would suggest that it might not be advantageous for the Maine lobster industry to pursue the MSC ecolabel if it did not gain a market advantage as a result of certification. This survey therefore evaluates from the consumer perspective whether there is a potential for MSC certified lobster to gain a market advantage based on consumer purchasing preferences.

Based on the results of a consumer seafood survey that I conducted in Spring 2008 along with a team of five other Nicholas School of the Environment Master's students for a Social Surveys Methods class[90], as well as a survey conducted in 2001 by the Seafood Choices Alliance to measure U.S. consumers' attitudes on seafood sustainability[91], I developed several hypotheses:

1) Consumers know less about the environmental impacts of seafood consumption than they do about human health effects of seafood consumption.
2) Consumers consider environmental impacts of lobster consumption less important than human health effects of lobster consumption when deciding whether or not to purchase lobster.

3) The most important factors that consumers consider when purchasing lobster are freshness and taste.
4) Due to the current economic downturn and because of most consumers' limited understanding of environmental impacts of seafood consumption, only a small percentage of consumers are willing to pay more for ecolabeled lobster.

Sample Population and Sampling Method

I used an online market research firm, Greenfield Online[92], to gather a sample population of 305 U.S. residents who are seafood eaters. Greenfield Online recruits individuals in the online community to become members for free, and in return for taking the surveys that Greenfield Online presents to them, they receive incentives, awards, and cash payments. The sample population therefore was not random, but was representative of seafood-eating consumers with internet access nationwide. I created the online survey using Duke University's online Viewsflash software, and then sent the survey link to Greenfield Online to share with its members. I received 305 completed survey responses in less than 24 hours after the survey was posted on Greenfield Online's website. Because the survey was open until at least 300 completed responses were received, it is difficult to calculate a response rate. However, in the time that the survey was open, of the 331 surveys that were initiated, 10 were from respondents who never ate lobster so they were ineligible for the survey, and 16 were incomplete. Therefore, the response rate can be estimated as 305 complete surveys out of 331 total surveys, or 92%.

Survey Design

The survey design was based on the 2008 consumer seafood survey that I conducted with a team at the Nicholas School of Environment.[93] In that study, we created an intercept survey to evaluate consumers' knowledge and purchasing decisions related to sustainable seafood in the

Durham and Chapel Hill area of North Carolina. Many of the questions in the online consumer lobster survey were copied from the Durham-Chapel Hill survey with changes in the language to refer to lobster rather than seafood in order to compare results between surveys. Additional questions were developed to address other topics not included in the Durham-Chapel Hill survey.

A focus group was not conducted prior to developing the survey. Because a focus group had been conducted for the Durham-Chapel Hill survey that this questionnaire was based on, most of the questions had already been tested and refined. The survey was pretested with a few respondents to make sure any glitches were fixed and the questions were clear and understandable. For the willingness to pay question, the values to be tested were determined based on discussions with experts in the industry.

The survey questionnaire consisted of 30 open-ended and closed-ended questions (see Appendix 4), with ordinal, nominal, and five-point Likert scale responses. In order to ensure that all respondents were lobster eaters, the first question in the survey was a filter question, asking respondents how often they ate lobster. Those who answered "never" were directed to the end of the survey, and were not included in the final count of survey respondents. The questions covered the following topics:

A. Lobster eating and buying preferences
B. Knowledge of health and environmental effects of seafood consumption
C. Importance of Factors in Influencing Consumers' Lobster Purchasing Preferences
D. Willingness to pay for ecolabeled lobster
E. Preference in origin of lobster purchased
F. Evaluation of other product labels sought by consumers
G. Demographics

Data Analysis

Data were analyzed primarily using measures of central tendency and frequency to compare the distribution of responses in various questions to each other. In addition, t-tests were run to assess statistically significant differences among mean responses for questions, and multiple regression analyses were run to model relationships between questions and to understand better how people tend to respond to particular questions based on other responses. A statistical significance threshold of 0.05 (at a 95% confidence interval) was used for all statistical tests. I also conducted a literature review to compare my results with those found in past studies.

Error Structure

Although data collection was rapid and convenient and I was able to target a specialized population of seafood-eaters nationwide fairly easily because the survey was internet- based, certain disadvantages of web-based surveys exist. The biggest disadvantage was that the survey was limited to populations that had access to a computer and the internet, and assumed a minimal level of computer literacy by respondents in order to complete and submit the questionnaire. The survey also excluded the population of internet users who are not members of Greenfield Online's market research database. In addition, there are potential issues of credibility and lack of accountability with web-based surveys since there is no personal involvement by an interviewer with the respondents as there is with telephone or in-person surveys, and respondents may feel that they can answer responses untruthfully without any repercussions.[94] On the other hand, people who take web-based surveys may also be more honest with their answers, since they don't feel pressured by an interviewer to answer one way or the other. Finally, in web-based surveys unclear questions cannot be explained, so there is a greater chance than in other survey methods that questions are misinterpreted, thereby causing greater risk of compromising the scientific reliability of the survey. [95]

Interviews with fisheries experts and representatives of MSC certified fisheries

To compile lessons learned about past experiences with MSC certification, I conducted telephone interviews with fishery experts and representatives of fisheries that have already been certified by the MSC, gathered additional data via email from some industry representatives, and conducted a literature review. I interviewed representatives from the Alaska Salmon Fishery and the Western Australian Rock Lobster fishery, which were the first two fisheries to become MSC certified and have had almost ten years of experience with MSC. I chose the Alaska Salmon Fishery because of its large size, scope, and number of fishermen involved, which is similar to the Maine lobster fishery. The Western Australian Rock Lobster fishery is smaller in scope and landings than the Maine lobster fishery, but as it is a lobster trap fishery, it likely has had to address management issues specific to lobster that may be useful to the Maine lobster industry. . I also looked at a case study of the Baja California Spiny Lobster Fishery, which was certified in 2004, as another example of an MSC certified lobster fishery.

For my interviews, I was referred to contacts in each fishery through colleagues, and I then used snowball sampling to find additional contacts. I conducted semi-structured interviews with three representatives from the Alaska fishery (one economist, one fishery manager, and one industry representative), one fishery manager from the Australian fishery, and one fisheries economist. (see Appendix 3 for sample interview questions) In addition, I received email communications from an industry representative in the Australian fishery.

My data analysis involved using a mix of methods. For the five interviews that I conducted, I followed the first step that Richards (2005) named “Reading and enriching the record".[96] In this step, I typed up my handwritten notes from the interviews and while doing so, I read the interviewees' responses and added observer comments and my own thoughts or reactions to the statements made. In this way, I was able to pull out some of the main themes in the responses in order to compare them in the different interviews. I continued analyzing the data by coding my data into thematic categories using Microsoft Word. I did this by reading my interview notes and identifying themes in the text using topic coding. I also compared some of the themes that emerged with information from literature about ecolabeling and the MSC program. In total, I identified six major themes that I will discuss in the results below.

RESULTS

Results of Industry member interviews, June – July 2008, Maine

Although I interviewed fishery managers, scientists, and retailers in addition to industry members to learn about the attitude of others outside of the industry towards MSC, I will not focus on those results in this report, since my goal of this study was to capture opinions from the Maine industry perspective. In order to gain a fairly good representative sample of lobstermen in each lobster management zone, I based the percentage of interviews that I conducted in each zone on the percentage of license-holders in each zone (Table 2). Although the percentages of lobstermen interviewed did not reflect the exact proportion of license holders in each zone, they were close, and I was able to get representation across every zone. Unfortunately, I only was able to interview three people in zone B and zone C, and as a result had a smaller percentage of total interviews in those zones than the percentage of license-holders in those zones.

Table 2: Total Maine lobstermen interview results by zone compared to total percentage of license holders in each zone

Zone	Support MSC Definite (number)	Support MSC Definite (%)	Support MSC qualified (number)	Support MSC qualified (%)	Do Not Support MSC (number)	Do Not Support MSC (%)	Don't know (number)	Don't know (%)	Don't care (number)	Don't care (%)	Total number of people interviewed:	Percent of Total interviewed:	Zone's % of Total ME licenses issued:	Rank of zones with most (1) to least (7) # of licenses:
East A	3	20%	4	27%	2	13%	6	40%	-	-	15	25%	19%	2
B	-	-	-	-	2	67%	1	33%	-	-	3	5%	10%	5
C	-	-	-	-	1	33%	2	67%	-	-	3	5%	16%	4
D	5	26%	4	21%	4	21%	5	26%	1	5%	19	32%	20%	1
E	1	17%	2	33%	2	33%	1	17%	-	-	6	10%	9%	6
F	4	57%	1	14%	-	-	2	29%	-	-	7	12%	17%	3
West G	4	80%	1	20%	-	-	-	-	-	-	5	8%	8%	7
Monhegan Island	1	100%	-	-	-	-	-	-	-	-	1	2%	0%	
Total:	18 31%		12 20%		11 19%		17 29%		1 2%		59 100%	100%	100%	
Total Support MSC:				51%	Total Do Not Support MSC, Don't Know, Don't Care:					49%				

Of the 59 lobstermen that I interviewed, fifty one percent were either definitely in support of MSC certification or were in support of MSC certification as long as they didn't have to give up something in particular as a result. Forty-nine percent of fishermen interviewed did not support MSC, didn't know, or didn't care (Table 2). Across the lobster zones, there was a trend from East to West: there seemed to be more support for MSC certification the further west the zone was (the western part of the state is closer to city centers like Portland and Augusta, while the eastern part of the state is primarily rural).

As the buyers are not affiliated with any particular lobster zone, I just tallied the results of all of the interviews I conducted, and found that 47% of buyers (n=8) were in support of MSC certification, while 53% were against MSC certification (n=9) (Table 3). These percentages are somewhat skewed since the sample size was fairly small, so it may be best to interpret these results as approximately half of the buyers of MSC were in support and half were against MSC.

Table 3: Opinions of Lobster Buyers about MSC certification

Support MSC Definite	Support MSC qualified	**Total Support MSC:**	Do NOT Support MSC	Don't know	Don't care	**Total Do Not Support MSC, Don't Know, Don't Care:**	**Total:**
7	**1**	**8**	**4**	**5**	**0**	**9**	**17**
41%	**6%**	**47%**	**24%**	**29%**	**0%**	**53%**	**100%**

Unfortunately, for both the buyers and fishermen, it is not possible to extrapolate these trends to the larger Maine population, since I only interviewed about 1% of commercial lobster license-holders and a small percentage of the total buyers of Maine lobster (which include wharf owners, cooperatives, distributors, processors, wholesalers, and retailers). However, it is still useful to understand the thoughts and concerns about MSC certification and to get a better understanding of what issues and benefits the industry sees with the program, in order to be able to address these concerns in the future.

The top five concerns that industry members had about MSC certification were:

1. **Getting certified and later losing certification:** Many fishermen worried that if the fishery ended up becoming certified by the MSC and then later it could not comply with conditions imposed on the fishery, it could risk losing the certification, which could negatively affect the fishery: "My worry: We'll get the certification, get the new market infrastructure, and then they'll pull the certification because of whales and herring. How will that affect the market?" (Interview 6.26); "A sustainable label is just another toxic fruit that puts fishermen out of business. If it can be yanked away for an unknown reason, that's what bothers me." (Interview 7.8)
2. **Funding- who will pay?:** Although the Maine Working Group on Lobster Sustainability plans to fundraise privately to cover all costs associated with certification, many fishermen did not trust that this would be guaranteed, and were worried that eventually the costs would be imposed on them. Buyers also were concerned about costs being imposed on them. One fisherman expressed his frustration, "Who's paying for it? Eventually it falls back on us. If there is a price gain, the buyers will see most of it. It won't make much difference to us in the end." (Interview 6.26) Another fisherman stated, "The costs of the certification are huge. It's laughable that they call themselves a non-profit. Where's all the money going?" (Interview 8.4)
3. **Additional bureaucracy by an outside agency:** Many interviewees expressed concerns that an outside organization that did not have historical experience with the Maine lobster fishery, would come in to evaluate the fishery and decide whether it should become

certified based on its own standards. One fisherman stated, “I don’t want people to tell me I can’t fish- if I can’t make a living, then that’s another thing.” (Interview 6.24A) Another one stated, “If it's just sustainability we can do it on our own. I don't like paying an outside entity that doesn't know about lobstering.” (Interview 6.25A) One buyer expressed his concerns about undergoing certification by a third-party organization just to address demand abroad: “I do agree with the principles, but I take more pride in working in a sustainable industry that I know is sustainable rather than pleasing a little old lady in Paris.” (Interview 7.25B)

4. **Additional regulations and costs imposed on fishermen, without any benefits to them:** Many fishermen expressed that historically, all of the costs usually get passed down to them through the supply chain, and they always having to bear the cost of regulations on the fishery without ever seeing many benefits: “My biggest concern is that the extra money that is earned from a price increase [does not get] down to the fishermen.” (Interview 6.11)
5. **Competition with Canada:** Some interviewees were worried about causing additional competition with Canada and felt that rather than differentiating Maine lobster from other lobster, they should decide together with Canada whether to go ahead with certification or not as one stock of lobster: “We should promote the North American Lobster, the whole range. The worst thing we can do is differentiate ourselves. We all need to be in this together: ‘United we stand, divided we fall.’” (Interview 6.25B)

The top five reasons interviewees cited for supporting certification include:

1. **Certification will open new markets:** “Anything to help the market is good- the biggest strain is the economy- the product itself is marketed well. If it helps gain a positive

market it's worth it." (interview 6.12); "I think it's something that's going to have to be done either now or later. I think the market absolutely needs it. We need to develop more markets and get away from Canadians; differentiation couldn't hurt." (interview 7.14A)

2. **If they don't do it, they will miss the boat, and it could hurt the industry in the long run:** "The fad for sustainable products in the US is just starting and will continue. People are starting to make connection to where their food comes from. [The U.S. is] light years behind Europe. If we don't do it we will lose some market share in 2011 by Wal-Mart-we will get shut out. In long run I think we'll get a price premium by tapping into new markets." (Interview 6.6)
3. **It will preserve current markets:** "I think they've opened the door now and we need some sort of sustainable label or pocket card. We've got a new eco-savvy consumer. I don't want to lose those people. We need to educate more people about lobsters." (Interview 7.16); "It's to our benefit to bring a good product to the market. It's to our benefit to do what we can to make it good. From the harvesters point of view [I think we're doing good things so far]. If we don't get certified then we'll lose a lot [of the market]." (Interview 7.22)
4. **It will differentiate Maine lobster and give it a marketing edge over other lobster:** "A lot of places call lobster Maine lobster but it isn't from Maine- we're getting a bad rap. Hopefully [certification] will keep the price up and get us a better market." (Interview 7.25A); "We could probably gain something- it would really help Maine's reputation to differentiate Maine lobster." (Interview 7.29) "The best benefit [of certification] is to be able to individualize our product as Maine lobster- that's what sells." (Interview 6.11)

5. **It will be funded through private donations:** "It's hard to say no to them if they're paying for it. Let's do it." (Interview 7.14B)

In addition to these comments, many fishermen stated that "economics will take care of the industry", and that therefore, there is no need for certification. By this they mean that the sustainability of the fishery is kept in check by the economy: when there are too many fishermen in the industry for the fishery to support them all economically, those that are not able to make a living will leave the industry, and fishing effort will be reduced. That will give time for the fishery and lobster population to recover. Then, once it does recover, along with the market for lobster, more fishermen will be able to enter the fishermen again. This is the way the fishery has been kept in check historically so many fishermen feel that there is no need to control it via regulation or certification. One fisherman summed it up succinctly: "Economics is going to take care of the industry. It's the way it's always worked. When [people] can't make money, people will leave." (Interview 7.14A)

Consumer survey results

Demographics

Of the three hundred and five online survey respondents, 298 are from 42 different states, one is from an unspecified location in the United States, one is from France, and six failed to specify where they live. Most of the respondents hailed from Midwestern states, as shown in table 4. There was good representation across the United States in this survey.

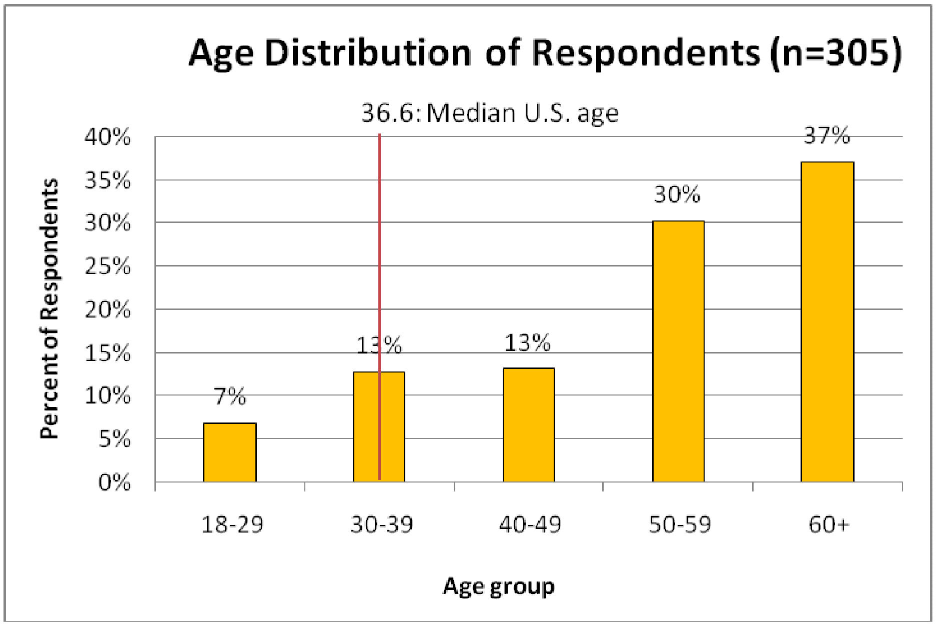
Table 4. Distribution of where respondents live

Location	Total Count	Percent of Respondents
United States: East (AL, CT, DE, FL, GA, KY, MA, MD, ME, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA, WV)	140	46%
United States: Central (AR, IA, IL, IN, KS, LA, MI, MN, MO, MS, NE, OK, TX, WI)	78	26%
United States: West (AZ, CA, CO, ID, NM, NV, OR, WA)	79	26%
United States (state not specified)	1	0%
EU: Paris, **France**	1	0%
No Response	6	2%
Total	**305**	**100%**

In respect to age, the majority of the respondents fell into the 60+ age group category, 67% of the total respondents were age 50 or older, and there exists a positive relationship between age and number of respondents: as the age levels increase, the number of respondents also increases (see Figure 2 below). The age distribution from this survey is completely the opposite of the age distribution in the 2008 Durham-Chapel Hill Seafood Survey: In that survey, there was an inverse relationship between age and number of respondents: the majority of the respondents (39%) were in the 18-29 age group with the number of respondents in each age group decreasing as the age levels increased.[97]

The age distribution in this survey indicates that there is likely an age bias of the people that participate in the online consumer survey research program set up by Greenfield Online, from which I gathered my survey respondents. Because the median age of respondents fell into the 50-59 age group, the responses in the survey may be biased towards an older demographic, and should not be generalized to the entire U.S. seafood-consuming population.

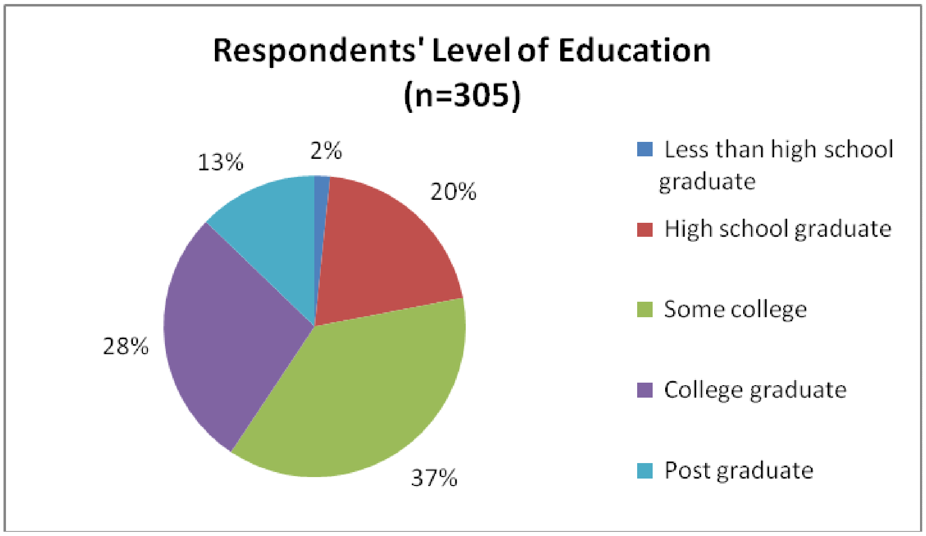
Figure 2. Age Distribution of Respondents



**Data for Median U.S. age from: U.S. Census Bureau, Population Estimates: Annual Estimates of the Population by Sex and Five-Year Age Groups for the United States: April 1, 2000 to July 1, 2007 (NC-EST2007-01). Released: May 1, 2008

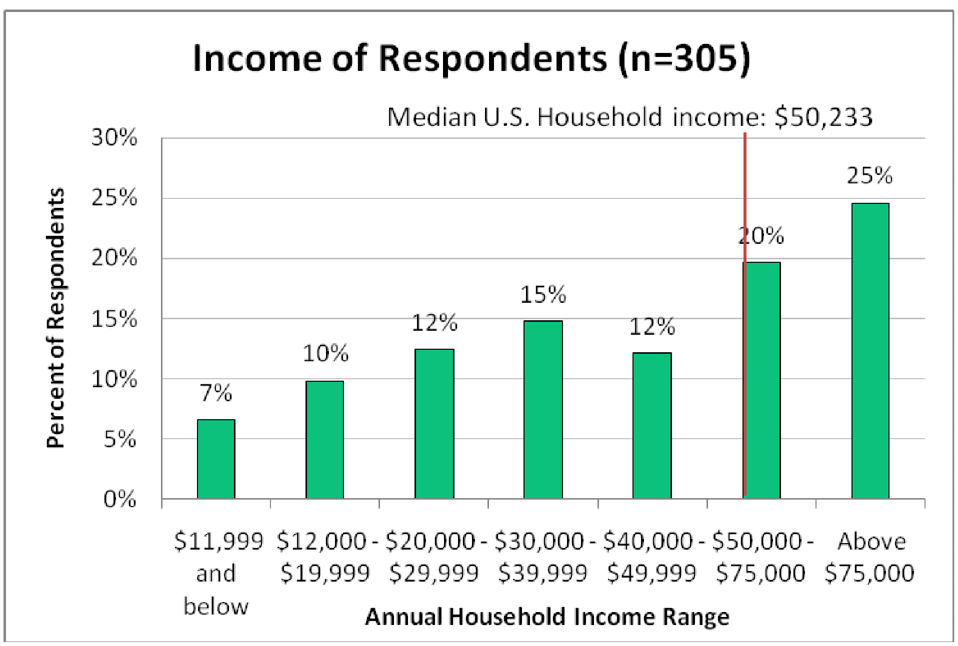
Respondents' level of education was fairly high, as only 2% of respondents indicated that they had less than a high school education and 78% indicated that they had attained an education beyond high school. Of those who reported an education beyond high school, 37% had some college, 28% were college graduates, and 13% achieved post-graduate education (Figure 3). The high level of education of survey respondents may be a result of conducting the online survey through a market research firm, as those survey respondents who have access to the internet and have the time to complete these surveys may often have higher levels of education. Also, because many of the respondents were older, they had more time to complete higher level education than younger respondents would have had.

Figure 3. Respondents' Level of Education



For annual household income, the largest percentage of respondents (25%) reported an income of above $75,000. The frequency distribution across incomes (Figure 4) somewhat mirrors the age frequency distribution (Figure 2), showing that a majority of respondents are

Figure 4. Income of Respondents



**Data for Median U.S. Household income from: DeNavas-Walt, Carmen, Bernadette D.Proctor, and Jessica C. Smith, U.S. Census Bureau, Current Population Reports, P60-235, Income, Poverty, and Health Insurance Coverage in the United States: 2007, U.S. Government Printing Office, Washington, DC, 2008.

both older and have a higher income. However, the median household income was centered in the $40,000 - $49,999 category, indicating a wide distribution of incomes reported by respondents.

Lobster eating and buying preferences

In order to gather data on type of lobster preferred by consumers and where consumers prefer to eat lobster, the survey began with a series of questions about consumers' lobster purchasing preferences. Seventy seven percent of the 305 respondents distributed nationwide indicated that they ate lobster one to four times per year (see table 5 below), and only 25 respondents (8%) reported that they ate lobster once a month or more. This result confirms the widely held belief that lobster is considered a luxury seafood item that is not eaten regularly by most consumers.

Table 5. Frequency of Lobster Consumption (n=305)

How often do you eat lobster?	Total count	Percent of Respondents
Never	-	0%
Once a year or less	**116**	**38%**
2-4 times per year	**118**	**39%**
5-11 times per year	43	14%
Once a month or more	25	8%
Don't know	3	1%
Total	305	100%

A majority of respondents (72%) reported that they usually eat lobster at restaurants rather than eating them at home (Table 6). Still, more than half of the respondents (58%) reported that they purchase lobster from other retailers besides restaurants (see Table 7). Additionally three respondents stated specifically that they purchase lobster at Sam's Club, a large U.S. wholesale grocer. Although this makes up only 1% of the respondents, it is interesting to note that three separate respondents indicated Sam's Club as a purchasing location separate from a grocery store (even though many would consider it a grocery store), and that Sam's Club was the only specific supermarket chain specified in the "Other" category of the question by respondents. This may indicate sampling error, if, for example, multiple people from the same family happened to take the survey. Or, these responses may just indicate that Sam's Club is a popular venue to purchase lobster.

Table 6. Location of Lobster Consumption (n=305)

Where do you eat seafood?	Total Count	Percent of Respondents
More often at home	44	14%
More often in a restaurant	**220**	**72%**
Equally at home and in restaurants	37	12%
Other	4	1%
Total	305	100%

Table 7. Where respondents purchase lobster other than restaurants (n=305)

If you buy lobster from somewhere other than a restaurant, where do you usually buy it from?	Total Count	Percent of Respondents
I don't buy lobster from somewhere other than a restaurant	129	42%
From the grocery store	72	24%
From a seafood market	88	29%
Directly from the fishermen (at a coop or at the dock)	8	3%
Online	1	0%
Sam's Club	3	1%
Other	4	1%
Total	305	100%

To determine what type of lobster is most highly demanded by consumers, I asked respondents what form of lobster they usually purchase at retail markets and restaurants. The majority of the respondents indicated that they preferred purchasing whole lobster (30% of restaurant-goers and 79% of those who purchase lobster from retailers to take home and cook) (see Tables 8 & 9 below). But, some respondents (20% of restaurant-goers and 4% of those who purchase lobster from retailers to take home and cook) still prefer lobster as "value-added" products (i.e. in a pre-made sauce, dish, soup, etc.). A few respondents (9) specified in the "other" category that they prefer to purchase lobster tails when buying them from a retailer.

Table 8. Type of lobster bought at retailers (n=305)

If you buy lobster to take home and cook, in what form do you most often buy it?	**Total count**	**Percent of Respondents**
I don't buy lobster to take home and cook	132	43%
Whole, live lobster	**92**	**30%**
Frozen, cooked lobster meat	54	18%
In some pre-made form (sauce, soup, chowder, bisque, canned, etc.)	11	4%
"Other" responses:		
Fresh, lobster pieces	2	1%
Frozen, Uncooked	3	1%
Tails: Fresh or Frozen, uncooked or cooked	9	3%
No response	2	1%
Total	305	100%

Table 9. Type of lobster preferred at restaurants. (n=305)

If you eat lobster at a restaurant, how do you prefer your lobster to be prepared?	Total count	Percent of Respondents
Steamed, whole lobster, with shell	**241**	**79%**
Made in a dish (as a sauce, soup, chowder, salad etc.) with the shell already removed	60	20%
I don't eat lobster in a restaurant	4	1%
Total	305	100%

Knowledge of health and environmental effects of seafood consumption

To test my first hypothesis that consumers know less about the environmental impacts of seafood consumption than they do about human health effects of seafood consumption, respondents were asked to answer four Likert scale questions and rate from 1 – 5 (1: Know nothing at all, 5: Know a great deal) their knowledge of: 1) the positive health benefits of eating seafood, 2) the effects from eating certain kinds of unsafe or contaminated seafood, 3) the effects of certain kinds of commercial fishing on the ocean environment, and 4) the effects of certain kinds of fish farming on the environment. (see questionnaire, Appendix 4, questions 6 – 9) As shown in the distribution of the responses (Figure 6) and confirmed by a two-sample t-test to test the difference in means at the 95% confidence level (Table 10 and Figure 5), respondents were significantly more knowledgeable about health benefits and contamination of seafood than they were about the effects of fishing and fish farming on the ocean environment.

For health-related issues, the knowledge of respondents was distributed relatively evenly across little knowledge (1-2), medium knowledge (3), and more knowledge (4-5). Approximately 1/3 of respondents rated their knowledge of health benefits (32%) and seafood contamination (35%) as 1 or 2, 1/3 rated their knowledge as 3 (33% for health benefits, 32% for seafood contamination), and 1/3 rated their knowledge as 4 or 5 (36% for health benefits, 32% for contamination). The mean difference in knowledge of these two health indicators was not statistically significant (see Table 10 below).

For environmental issues, the level of awareness was lower, as 41% and 52% of respondents had little knowledge (1-2) of fishing and fish farming effects (respectively), 33% and 26% had medium knowledge (3) of fishing and fish farming effects (respectively), and less than a third of the respondents had more knowledge (4-5) of environmental effects (26% for fishing effects and 22% for fish farming effects). For both of the health factors and one of the environmental factors, the largest proportion of respondents (approximately 1/3) rated their knowledge of fishing effects at level 3, whereas for fish farming effects, the largest proportion of respondents (30%) rated their knowledge as less, at level 2. Also, more respondents reported knowing nothing at all (1) about effects of fishing (13%) and fish farming (22%) on the environment than the number of respondents who reported knowing nothing at all (1) about health benefits (6%) and seafood contamination (7%). Two-sample t-tests at the 95% confidence level showed that the mean knowledge between fishing effects and fish farming effects on the environment was statistically significant, and statistically significant differences also exist between the mean knowledge of the health factors and the mean knowledge of the environmental factors (Figure 5). These results confirm my hypothesis that consumers seem to have a better knowledge of seafood-related health issues than environmental issues. Past studies done by the Seafood Choices Alliance (2003) to measure U.S. consumer attitudes on seafood sustainability[98], and by Nicholas School of the Environment master's students (2008) to measure consumers' seafood purchasing preferences in the Durham-Chapel Hill area of North Carolina[99] also show similar results.

Table 10. Two sample T-test to test the difference between means of knowledge factors.

Variable 1	Mean 1	Std Dev.1	Variable 2	Mean 2	Std Dev.2	Diff. Means	T-value	P-value
Knowledge of Health Benefits	3.1279	1.1298	Knowledge of Fishing Effects	2.8033	1.1559	0.3246	**t=3.51**	**p=0.0004***
Knowledge of Health Benefits	3.1279	1.1298	Knowledge of Fish Farming Effects	2.5803	1.2278	0.5475	**t=5.73**	**p<0.0001***
Knowledge of Seafood Contamination	3.0230	1.1310	Knowledge of Fishing Effects	2.8033	1.1559	0.2197	**t=2.37**	**p=0.0180***
Knowledge of Seafood Contamination	3.0230	1.1310	Knowledge of Fish Farming Effects	2.5803	1.2278	0.4426	**t=4.63**	**p<0.0001***
Knowledge of Health Benefits	3.1279	1.1298	Knowledge of Seafood Contamination	3.0230	1.1310	0.1049	**t=-1.15**	**p=0.252**
Knowledge of Fishing Effects	2.8033	1.1559	Knowledge of Fish Farming Effects	2.5803	1.2278	0.2230	**t= 2.31**	**p=0.021**
*** Indicates statistically significant results given a 95% confidence level**								

Figure 5. Mean Level of Knowledge for Health & Environmental Impacts of Seafood Consumption

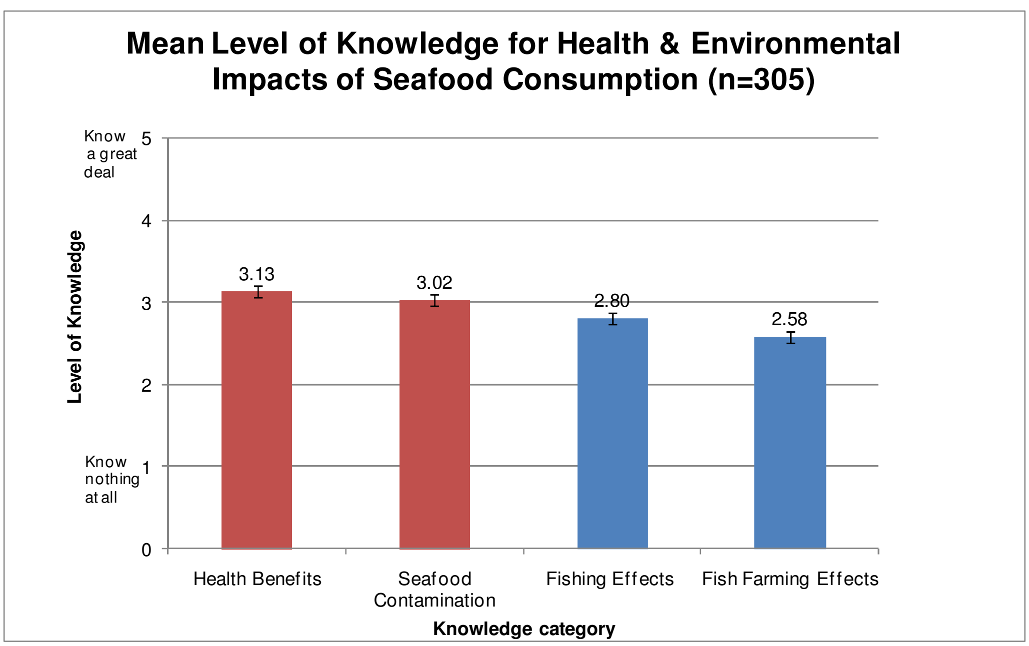
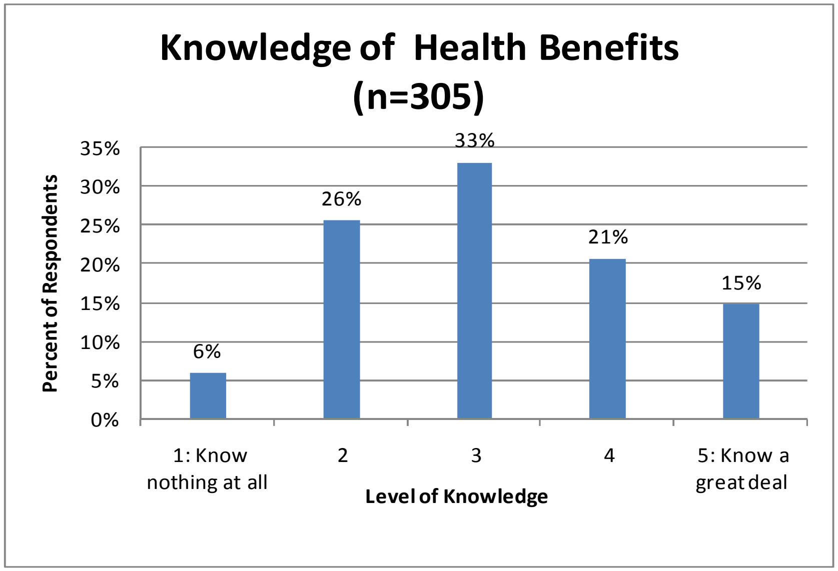
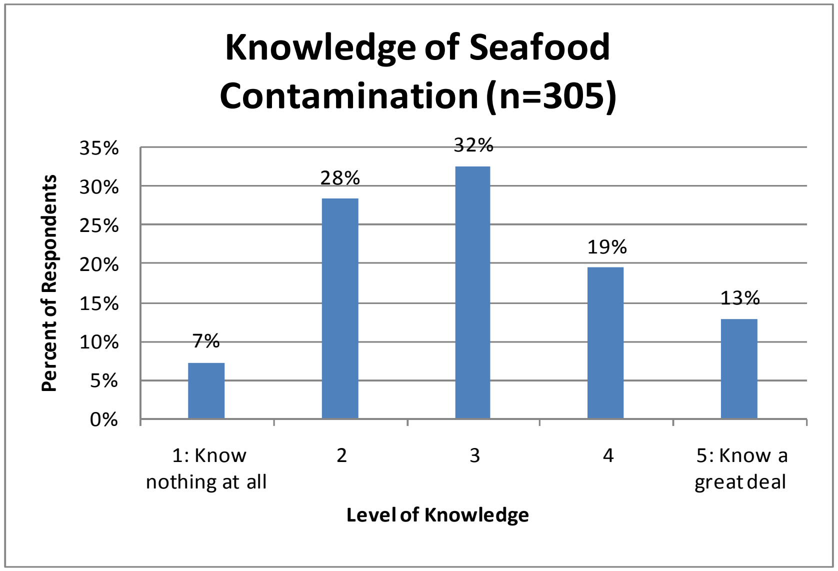
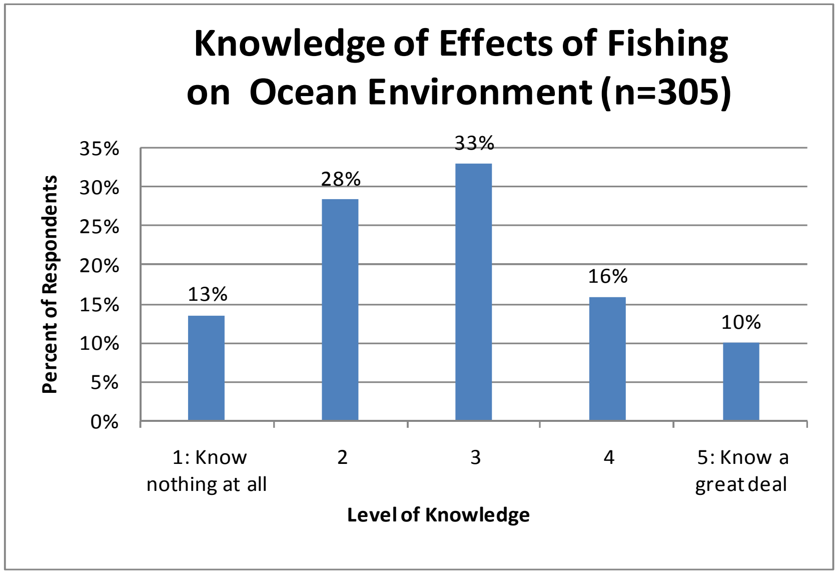
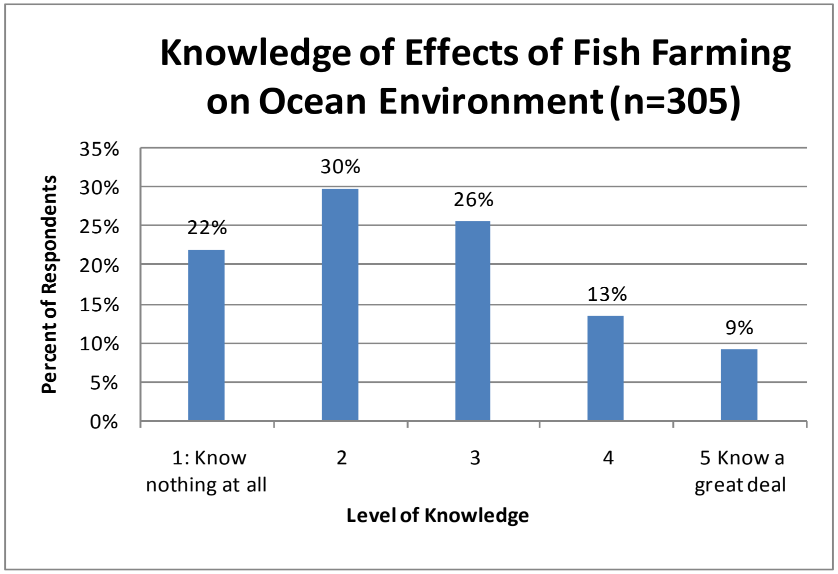


Figure 6. Respondents' knowledge of seafood-related health and environmental issues









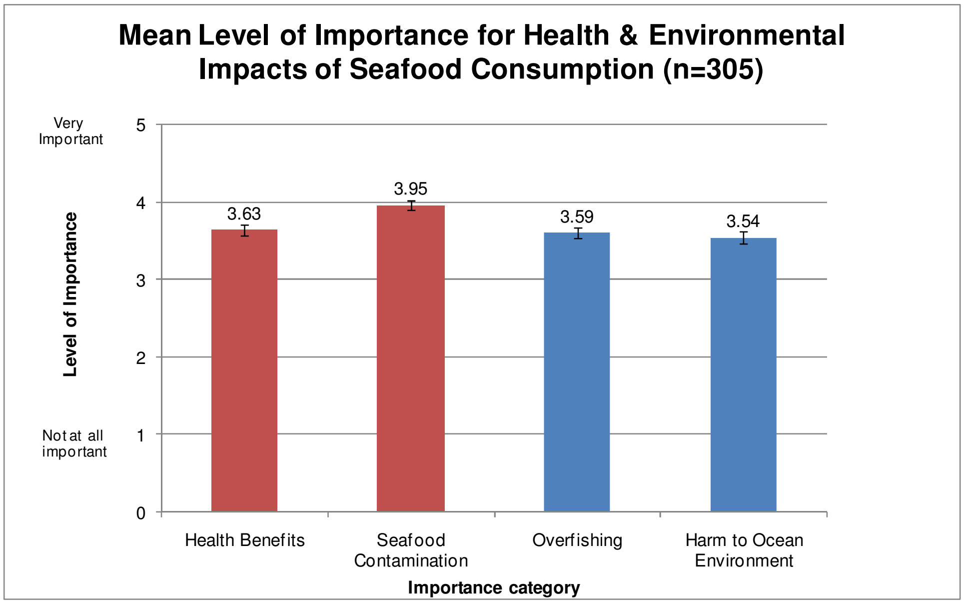
Importance of Factors in Influencing Consumers' Lobster Purchasing Preferences

The next section of the survey addressed how important different factors are in influencing consumers' seafood purchasing decisions. In a series of 10 Likert scale questions, respondents were asked to rate from 1 – 5 (1: Not at all important, 5: Very Important) the importance of the following factors: 1) Price, 2) Health Benefits, 3) The possibility of contamination with mercury or harmful chemicals, 4) Taste, 5) Freshness, 6) Whether lobster is overfished, 7) Recommendation by waiter or seafood counter employee, 8) Whether the lobster is caught in a way that may harm the ocean environment, 9) Where the lobster was caught (which state, country, etc.), and 10) How far the lobster was shipped to reach your plate (see questionnaire, Appendix 4, questions 10 – 19). An additional open-ended question titled "Other-Please specify" was also included so that respondents could list additional factors that influence their purchasing decisions. Twenty-two respondents answered this question. Interestingly, many of the respondents included factors that seem to be proxies for freshness of the lobster. For example, they specified traits that they look for when buying lobster such as color and consistency, amount of time it had been at the retail location, what other fresh options are also available on the menu, date of expiration, the smell in the market, and how long it had been since it was caught. Three respondents mentioned that size of the lobster is important, five indicated the importance of how the lobster is prepared, three reiterated the importance of cost and their budget at the time of purchase, and one person specified the importance of it being sold from a high-end retailer or restaurant.

After measuring respondents' knowledge of health and environmental issues related to seafood, I tested my second hypothesis that environmental impacts of lobster consumption are less important to consumers than human health effects of lobster consumption when deciding whether or not to purchase lobster. When looking at the top three importance categories (3 – 5), respondents ranked the importance of health benefits, seafood contamination, and overfishing relatively equally (85% ranked health benefits as 3 – 5, 89% ranked contamination as 3 -5, and 85% ranked overfishing as 3 -5). Harm to the ocean environment was slightly lower in importance, with 79% of respondents ranking it as 3 – 5. However, a larger proportion of respondents ranked the importance of seafood contamination as 5: very important (43%) than in the other three categories (30% ranked health benefits as 5, 28% ranked overfishing as 5, and 29% ranked harm to ocean environment as 5) (see Figure 8 below). Also, at a 95% confidence level, a two-sample t-test showed that a statistically significant difference in means exists between the importance of contamination and the importance of health benefits (t=3.48 , p=0.0005) , overfishing (t=3.89, p=0.0001), and harm to the ocean environment (t=4.34, p<0.0001) (Figure 7). These results partly support my hypothesis, since they indicate that out of these four health and environmental effects tested, seafood contamination seems to be the highest concern of respondents when purchasing seafood.

To determine what factors affect the level of importance that respondents place on health and environmental effects of seafood consumption, I ran multiple regressions and found a statistically significant correlation between the importance of health benefits and knowledge of health benefits (p=0.003, coefficient (slope)=0.236, R square=0.164), knowledge of contamination (p=0.016, coefficient (slope)=0.192, R square=0.164), and education (p=0.015, coefficient (slope)= -0.161, R square=0.164). These results show that as explained by 16% of the data (according to the R square value), the importance of the health benefits of seafood in influencing consumers' seafood purchasing practices increased as respondents' knowledge of

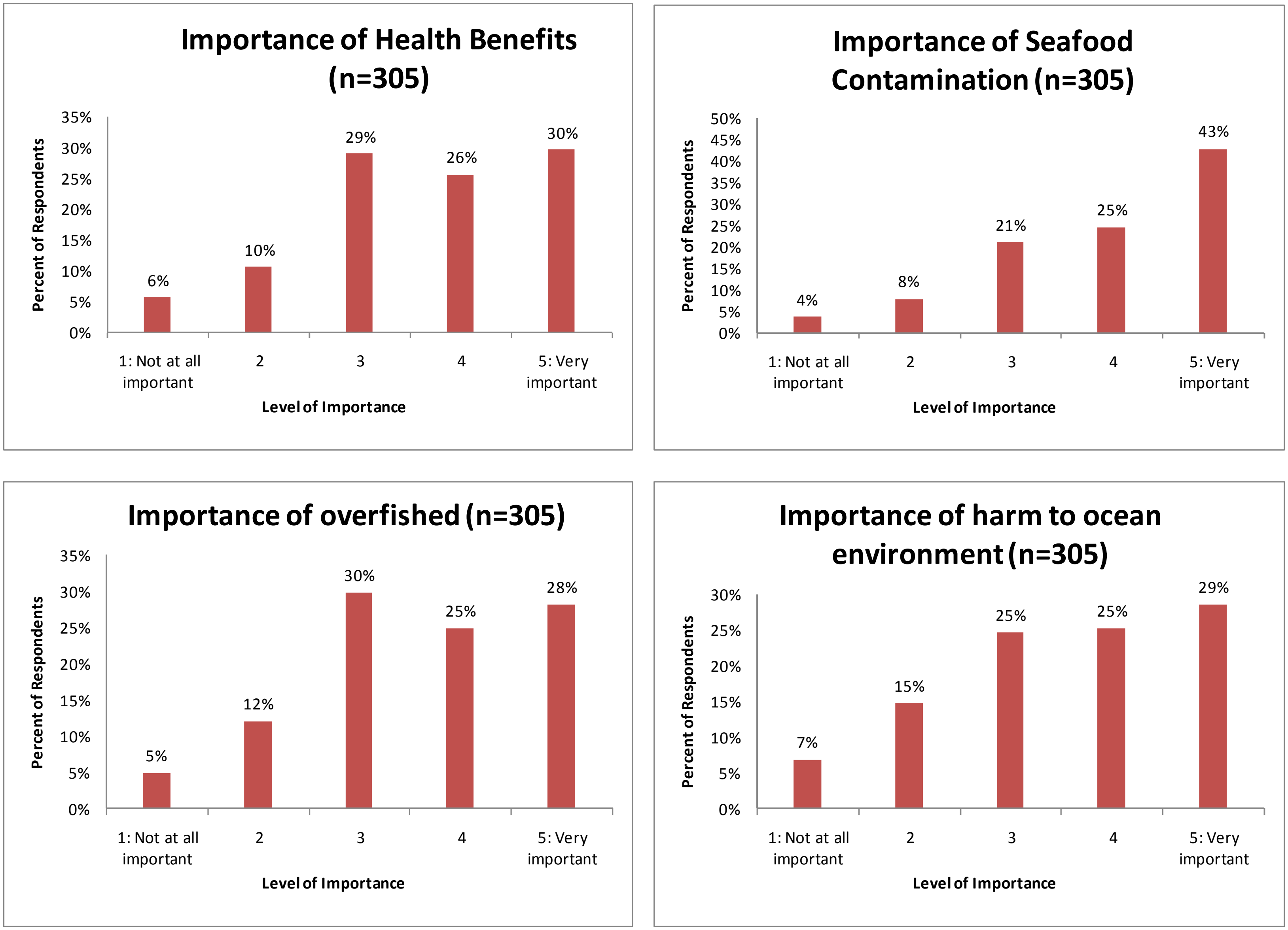
Figure 7. Mean Level of Importance for Health & Environmental Impacts of Seafood Consumption



health benefits and seafood contamination increased. As education among respondents increased, the importance of seafood health benefits decreased in importance. Also, as explained by 15.5% of the data (according to the R square value), a statistically significant correlation exists between the importance of harm to the ocean environment and knowledge of fishing effects (p=0.004, coefficient (slope)= 0.341, R square=0.155), and education (p=0.021, coefficient (slope)= -0.163, R square=0.155). Therefore, as respondents' knowledge of fishing effects increased the importance of harm to the ocean environment also increased, and as education among respondents increased, harm to the ocean environment decreased in importance as a purchasing factor.

Based on the distribution of the top two importance rankings (4 and 5) for the ten different factors listed, the most important factors that influence respondents' seafood purchasing decisions are Freshness, Taste, and Price (see Table 11). These results support my third hypothesis that freshness and taste are the most important factors that consumers take into

Figure 8. Importance of seafood-related health and environmental issues in influencing respondents' purchasing decisions



account when purchasing lobster. Seafood contamination and health benefits are ranked as the fourth and fifth most important factors, and harm to the ocean environment and overfished are ranked fairly low on the scale of importance, as the seventh and eighth most important factors. Although these results are only based on the proportion of respondents who ranked these factors as 4 or 5, the trend is very similar to the mean importance ranking of each factor (Table 11).

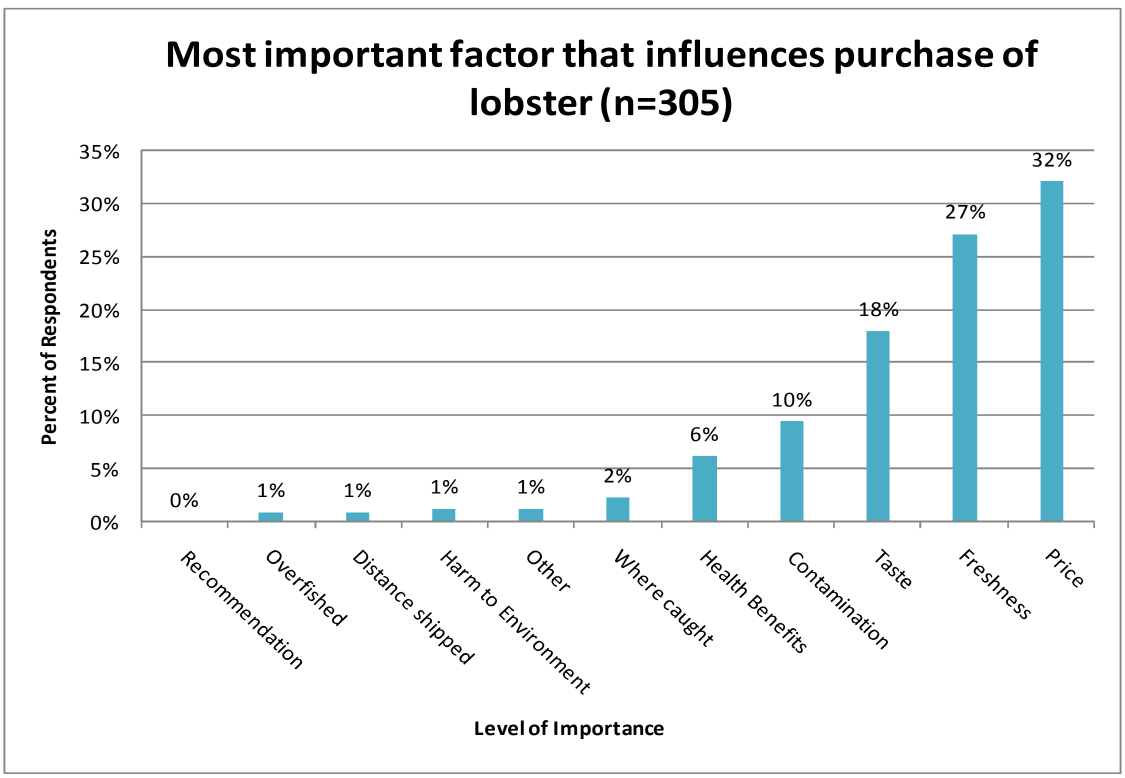
Table 11. Importance of Factors in Seafood Purchasing

Importance Factor	Percentage of Respondents who ranked factor as 4 or 5- Very Important:	Percentage of Respondents who ranked factor as 5- Very Important:	Mean Importance Ranking
Freshness	96%	75%	4.70
Taste	94%	73%	4.67
Price	75%	43%	4.09
Contamination	68%	43%	3.95
Health Benefits	55%	30%	3.63
Distance Shipped	55%	29%	3.53
Harm to ocean environment	54%	29%	3.54
Overfished	53%	28%	3.59
Where it was caught	52%	25%	3.44
Recommendation	42%	18%	3.16

In the importance ranking questions, respondents were not asked to rank each factor in order of importance relative to each other. Therefore, I included an additional question that asked respondents to indicate the most important factor that affects their seafood purchasing decisions. As Figure 9 shows, the results mirror those in the individual importance ranking questions. The top three most important factors are again Price, Freshness, and Taste, however price rose above freshness and taste when the respondents were required to rate these factors relative to each other. Contamination and health benefits are again ranked fourth and fifth in level of importance, and harm to the ocean environment and overfishing were tied for the second to last most important factor along with “other” and distance shipped. These results show that consumers seem to be much less concerned about environmental effects (including the carbon footprint of shipping lobster long distances) than they are with price, freshness, and health effects of lobster.

As a comparison, in the Durham-Chapel Hill seafood survey, taste and freshness were the two most important factors, and price was ranked fifth after health benefits and contamination of seafood.[100] The three environmental factors, harm to the ocean environment, distance shipped, and overfishing were all tied for the least important factor[101] as was found in this survey. Interestingly, in the Seafood Choices Alliance 2003 survey, freshness and contamination were ranked first and second as the most important factors, followed by taste, health, and price, in descending order.[102] Overfishing, possible harm to other ocean creatures, and possible harm to the ocean environment were all ranked as the least important factors. [103]

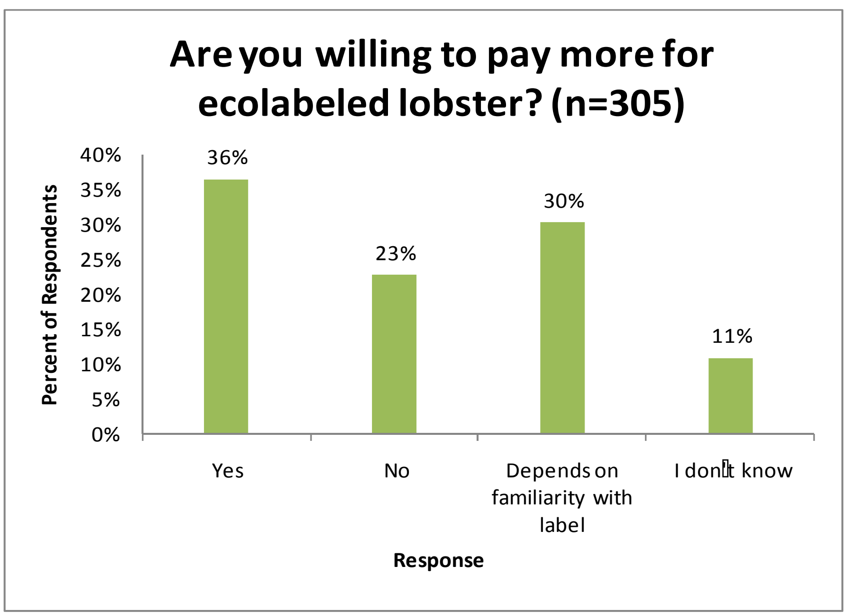
Figure 9. The most important factor that influences respondents' lobster purchasing decisions



Consumers' willingness to pay for ecolabeled lobster

To test my fourth hypothesis that only a small percentage of consumers are willing to pay more for ecolabeled lobster, I included a closed-ended survey question that asked respondents directly whether they would be willing to pay for lobster that has a consumer label on it showing that it came from a well-managed and sustainable fishery (see Appendix 4, question 22). Only about one-third of the respondents stated that yes, they would be willing to pay more, while 23% said that they would not, and 41% of respondents stated that they did not know or it depends how familiar they are with the label (see Figure 10). Because less than half of the respondents stated outright that they would be willing to pay more for lobster, these results support my hypothesis. However, I did not expect that as many as one-third of the respondents would be willing to pay more, so it is a pleasant surprise.

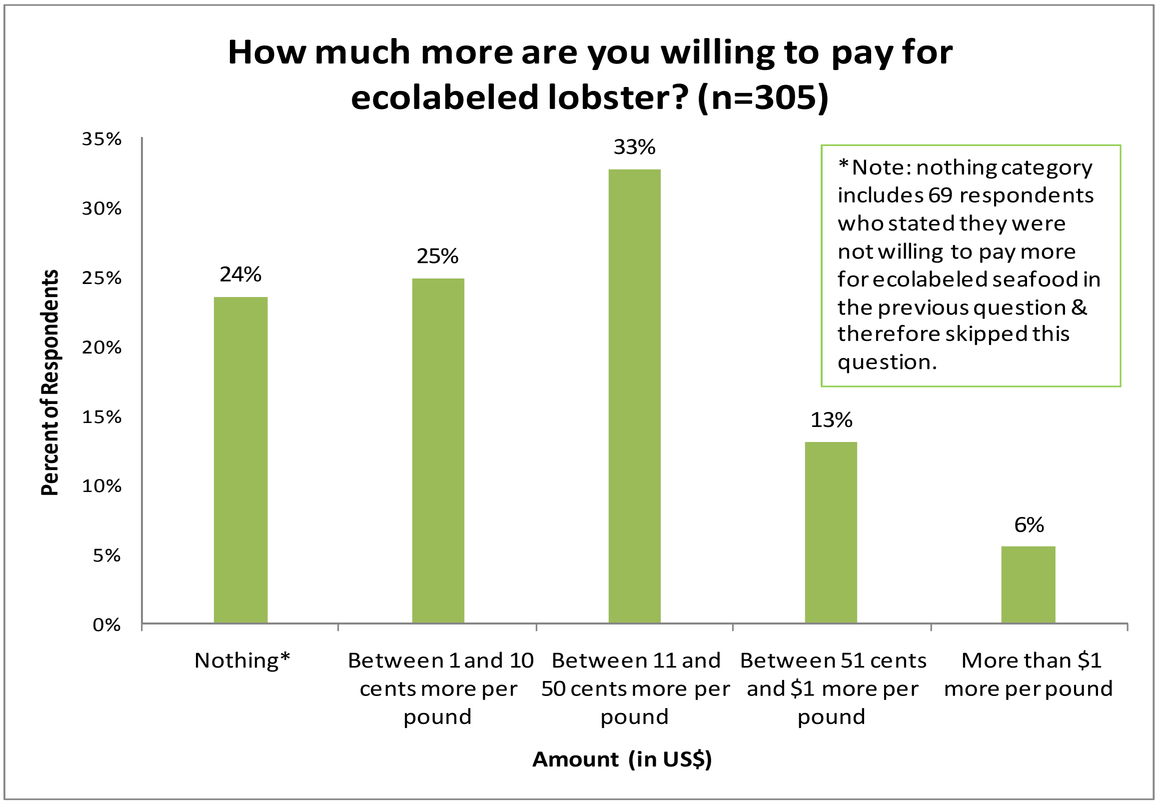
Figure 10. Respondents' willingness to pay more for ecolabeled lobster



Those respondents that stated they were not willing to pay for ecolabeled lobster were skipped to the next survey section, while the rest of the respondents were then asked how much more they would be willing to pay for sustainably labeled lobster than for lobster without a sustainability label (Appendix 4, question 23). Over half of the total sample population (58%) stated that they would be willing to pay 1 – 50 cents more per pound for ecolabeled lobster, and 19% of the sample population was willing to pay 51 cents or more per pound for ecolabeled lobster (Figure 11). These respondents included the 41% of the people who stated in the previous question that they were unsure if they would pay more, or it depended on how familiar with the label they were. One disadvantage of using closed-ended questions is that because the answer choices are preset, respondents may be forced to choose an answer that may not be the ideal response but acts as the "closest representation" of their actual response.[104] In this case, to get around that problem, I included an additional response category titled, "Another amount more per pound (please specify)". However, I did not include an answer choice of "I don't know" or "Nothing", so the respondents were forced to choose one of the willingness to pay categories listed. There is a chance, then, that some respondents may not have answered this question entirely truthfully. Only three respondents filled in the "other amount" category, and all three respondents entered comments rather than an amount: two of them (1% of the sample population) wrote that they would pay nothing, and one person stated, "Why should you have to pay for something that should be done anyway?"

To determine what factors affect consumers' willingness to pay, I ran a multiple regression between willingness to pay more for ecolabeled lobster, level of knowledge of environmental factors, level of importance of price and environmental factors, and demographic information. I found a statistically significant correlation ($p<0.05$ at the 95% confidence level) between willingness to pay more and the importance of price in affecting the purchase of lobster, the importance of harm to the ocean environment in affecting purchase of lobster, age, and education (see Table 12). These results indicate that the more important price is as a purchasing

Figure 11. Willingness to pay amount for ecolabeled lobster



factor, the less willing respondents are to pay more for lobster; the more important harm to the ocean environment is as a purchasing factor, the more willing respondents are to pay a higher price for lobster; as age increases, the less respondents are willing to pay more for lobster; and those respondents with more education are willing to pay more for lobster.

Table 12. Relationship between willingness to pay more for ecolabeled seafood and other factors measured

Factor measured:	Willingness to Pay more for Ecolabeled Seafood Correlation:	p- value	coefficient (slope)	R squared value
Importance of Price	-	<0.0001	-0.23	0.254
Importance of Harm to ocean Environment	+	0.0037	0.21	0.254
Age	-	0.0011	-0.16	0.254
Education	+	0.0479	0.12	0.254
Income	Not significant			

Consumer preference of origin of lobster

The lobster industry is an important part of Maine's identity, and as a result the Maine Lobster Promotion Council has invested a lot in marketing the Maine lobster brand, and getting consumers to associate American lobster with "Maine" lobster. In order to gauge whether this marketing effort has an effect on consumer preferences for where their lobster comes from, I first asked respondents to indicate whether they had a preference for where their lobster was caught, and then asked them to specify in which states/countries (the United States or Canada) they'd prefer their lobster came from. Exactly one-third of respondents (33%) stated that they had a preference for where their lobster was caught. Of those who indicated a preference, 80% (82 out of 102 respondents) specified Maine as the preferred origin of lobster, compared to the other locations listed. (Note that all 11 U.S. states plus Canada that represent the range of lobster habitat were listed as answer choices, and respondents were allowed to mark more than one answer choice.) Massachusetts and Canada were the second and third preferred locations for lobster respectively, with 27% of respondents choosing Massachusetts, and 22% of respondents choosing Canada. There is a possibility that when answering this question, respondents were not necessarily thinking about where the lobster is from, but could have been thinking about where they preferred to be when eating the lobster, which may have skewed some of the responses.

Evaluation of other product labels sought by consumers

My final survey research question addressed whether survey respondents normally looked for different types of "ecolabels" when they purchased both food and household products, in order to get an idea of whether consumers actively seek out labels when making purchases. I listed 11 different types of labels commonly found on products including Fair-trade certified; Bird-friendly coffee; Certified Organic Marine Stewardship Council certified; Grass-fed beef;

rBGH or hormone free dairy products; local or regional label for produce seafood or meat; Country of origin label; Cage-free, free range, or free roaming eggs; Energy Star Certified appliances; and percent of recycled content. I also included an "other" category, to give respondents the opportunity to include other labels not listed. Seventeen percent of respondents did not seek out any of the labels listed, and the largest proportion of respondents (24%) sought out only one label out of the eleven choices listed (see Table 13). Only three additional labels were listed in the "other" category by six different respondents. So, these results show that most respondents seek out at least one product label when shopping.

Table 13. Number of product labels sought by respondents

Number of Product labels chosen by respondents:	Number of respondents:	Percentage of total respondents:
0	52	17%
1	73	24%
2	42	14%
3	34	11%
4	21	7%
5	32	10%
6	15	5%
7	16	5%
8	6	2%
9	5	2%
10	5	2%
11	4	1%
TOTAL:	**305**	

Of all of the labels listed, the Energy Star certified appliance label was the one sought out by the most respondents (44%). The second most common label sought by respondents was the country of origin label, and the percent of recycled content label was listed as the third most popular label sought by respondents (Table 14). Approximately ¼ of respondents seek out most of the food labels except for the Marine Stewardship Council certified or Bird-friendly coffee label. Thirty-seven respondents out of 305 total (12%) indicated that they sought out the Marine Stewardship council label, indicating that there is some awareness of this label, but it is fairly low. Although I expected most of these respondents to be located on the west coast of the U.S. since there seems to be a higher level of seafood sustainability issues there than in the rest of the country, the respondents who chose the MSC label were fairly well distributed around the country with more respondents actually from the east (n=14) and central (n=14) parts of the U.S. than from the west (n=9).

Table 14. Respondents who seek out product labels

Product Label	Number of respondents	Percentage of respondents
Energy Star certified appliances	135	44%
Country of origin label (displays country where seafood is caught, processed and packaged)	112	37%
% of recycled content (for paper or other products)	110	36%
local or regional label (for produce, seafood, or meat produced in your local area)	96	31%
Certified Organic	80	26%
Grass-Fed beef	79	26%
Fair-trade certified	76	25%
rBGH or hormone-free (for dairy products)	74	24%
Eggs labeled as Cage-free, free range, or free roaming	68	22%
Marine Stewardship Council certified	37	12%
Bird-friendly coffee	19	6%
Other labels indicated by respondents:		
nutrition value	3	1%
% of content	1	0%
No msg	1	0%
all natural	1	0%
No Label Chosen	64	21%
Total Respondents	305	

Lessons Learned from representatives of MSC certified fisheries

From my five interviews with fishery experts, the email communications I received, and my review of the Baja California Lobster Fishery case study, I identified six themes, described below, that relate to my third research question about what lessons can be learned from past experiences with MSC certification to inform the Maine lobster fishery certification process.

Theme #1: Disadvantages of MSC

As with the interviews with lobster fishermen and dealers in Maine, the fishery experts identified several disadvantages of the MSC certification program, many of which overlap with the concerns that the fishermen and buyers had expressed. Nine disadvantages were cited and are described below.

1. **The cost of MSC certification:** Four out of five of the interviewees discussed cost as a potential barrier to MSC certification (Interview 10.22, 10.29A, 11.5, and 10.29B). One interviewee stated, “Not everyone wants to pay the cost to use the logo [which includes a] licensing fee, audits, paying for logo use, and recertification. It gets very expensive, very quickly.” He also stated that “the downside [of certification] is that you also have to promote the MSC brand [once you become certified- MSC won’t help with that]. We no longer advertise for MSC.” (Interview 11.5) However, interviewee 11.12 noted that although MSC certification can be costly, the cost is beginning to decrease: “Now certification doesn’t cost as much because there are many more certifiers and competition amongst themselves drives down the price.” In addition, estimating the total cost of MSC certification is also difficult to do as one interviewee explained: “If it was just costs of certification, it would be easier to calculate, but when you lump in all other costs [due to management changes], it’s harder to judge what’s due to MSC and what would’ve been done anyway.” (Interview 10.29B)

As an example of the type of expense involved to undertake MSC certification, the costs of the Western Australia Rock Lobster fishery certification are outlined in Table 15 below. These costs only include direct costs needed to complete the certification and comply with annual audits required by the MSC in order to remain in compliance with the standard. Other expenses that are not incorporated below include indirect costs such as the cost of research and management action that needs to be taken to meet the conditions placed on the fishery as a result of certification. Those indirect costs can be substantial depending on how strict the conditions are, but some of them may need to be incurred anyway as a result of government regulation. As mentioned by interviewee 10.29B above, it is therefore often difficult to calculate the true cost associated with MSC certification of a fishery, since there can be overlap between management measures required by the MSC standard and those required by other regulations, and it's difficult to attribute a particular cost to one management measure over another.

Table 15. Direct costs related to MSC certification and recertification of the Western Australia Rock Lobster Fishery (data from email 10.15)

Item Description	Approximate Cost (US$)
1999 MSC assessment	50,000
Additional expenses (staff time, costs to gather data for the assessment, etc.)	20,000
2005/6 MSC reassessment (includes assessment costs, expenses, and annual final audit costs)	83,000
Annual audit costs incurred since certification ($10-$15K / year x 8 years)	80,000-120,000
Total estimated MSC certification costs:	**$233,000 - $273,000**

*Note: The Western Australia Rock Lobster Fishery consists of approximately 600 license holders (email 10.15), with annual landings of approximately 10,750 metric tons[105].

2. **Unclear Return on Investment:** Interviewee 10.22 explained the difficulty with estimating return on investment of MSC certification: “It isn’t clear what they are getting for money in return for the cost of certification- It isn’t clear if they are actually getting a price premium, or if they are reaching new markets as a result of certification.” Interviewee 10.29A also supported this when he stated, “Since 2002, there’s been a gradual but steady increase in the price of Alaska salmon- mostly due to the Alaska Salmon Marketing Institute. I don’t know about the effect of MSC.” These comments show that it is unclear in some fisheries whether MSC certification will bring a higher price to seafood, or whether an increase in price may be caused by other marketing or additional factors.
3. **Outside bureaucracy being placed on the fishery:** Interviewee 10.22 explained his frustration with having a third-party certifier that is unfamiliar with the local conditions of the fishery impose additional regulations on the fishery: “There is a disturbing lack of sovereignty and cultural and economic imperialism of the ecolabeling movement. It drives me crazy that people in London know better than the best fishery managers in the world. The certifiers spend our money here to get up to speed on our fishery and then tell us what to do according to their standards. It’s disturbing that people in London can tell you the right way to do something with no knowledge of the social or economic issues and consequences that you may be dealing with. Fisheries management and research is expensive. If you can’t afford it, you’re out of luck. Alaska can afford it, but undeveloped countries can’t. The whole thing bothers me at my core. I believe in managing fisheries well but the whole idea that we go and tell people that we know the right way to do things [doesn’t seem right].” Another interviewee expressed the concerns of some industry members when he stated, “They don’t want MSC to bring in contaminated views from outside Alaska and have people assume that

Alaska is doing the same thing. They want to make sure it's no Trojan horse." (Interview 10.29A) In addition, interviewees 10.29A and 11.5 explained that there were often disagreements between the third-party certifier and the fishery managers about what conditions should be put on the fishery and how best to manage the fishery. Although there is a negotiation period between the groups before the final conditions are set, the third-party certifier has the final say of what needs to be implemented, and this can sometimes cause conflict between the parties if the managers do not agree with the requirements.

4. **One size fits all:** Interviewee 10.29A explains the issue with the MSC process: "It's a difficult process- it is standardized for all fisheries, and one size fits all- but fisheries vary a lot. There are lots of distinctions among them...For example, marine fishery requirements don't all fit anadromous species like salmon. There are problems with some of the conditions and they are trying to fit a round ball into a square hole." He also acknowledges that the size of a fishery may be difficult to manage under the MSC: "The scale and complexity of the fishery is also difficult; in the recertification MSC came up with 70 conditions to address [in order] to maintain certification." (Interview 10.29A)
5. **MSC reputation and affiliation:** Interviewee 10.29A explained industry members' concerns about this issue: "In general fishermen are concerned about the [reputation generated from certification]. They don't want to be painted with the same brush as those places in Europe and elsewhere where stocks were overfished." Interviewee 11.5 also expressed his frustration that the MSC is losing its goal of encouraging fisheries to become more sustainable: "If MSC focused more on [making fisheries more sustainable], it would be good, but they're focusing more on branding right now…Why are [they] beating up on sustainable fisheries rather than

going for unsustainable ones?...And what are they doing for non-sustainable fisheries? They're letting them come in at a weaker level in hopes of making them stronger."

6. **Arduous process:** The MSC certification process is time-consuming, as was acknowledged by two of the interviewees: "Don't underestimate the effort required to meet certification and the audits- it's a very high burden and an arduous process." (Interview 10.29A) Interview 11.12 summarized this concern succinctly: "The whole assessment process is extremely rigorous- it's not fly by night."
7. **Undefined endpoint that requires unlimited timeframe, improvements, and funding:** Interviewee 11.29A explained that one of the goals of the MSC is to continuously improve fishery management, but that makes it difficult for public agencies and other groups that may not have unlimited funding to continue to fund and make improvements to the fishery. He implied, therefore, that it is difficult for fisheries to be involved in the MSC process indefinitely.
8. **Eventually MSC certification can be a barrier to market entry:** Two of the interviewees (10.22, 11.5) acknowledged that although the goal of MSC certification is to differentiate products, increase markets, and possibly gain a higher price as a result, fewer fisheries will see these advantages as more fisheries become certified: "The irony is that all of your value disappears if everyone gets MSC certified, since you are no longer differentiated from everyone else." (Interview 10.22) Interviewee 11.5 also explained that MSC certification is beginning to become a barrier to market entry as more retailers begin to require it for their seafood products: "The more products [MSC] can get, the stronger they become, and the more not having a logo will be a barrier to market entry. Then you need to pay a new cost to

get into it. That's all you get from MSC certification [(a market barrier)] as stores require it more and more."

9. **Uncertainty of the effect on the market if the fishery is not recertified:** In my interviews with fishermen and dealers, many people had expressed their concerns about becoming certified and then losing certification in the future if they are unable to comply with future conditions, and how that would affect the industry. Interviewee 11.12 responded to this issue by stating: "It seems to me highly unlikely to become decertified once a fishery gets certified; unless it's in a country where management changes for the worst, it will not get decertified. Things can change from the stock perspective, but the key is that a fishery is managed well enough to adjust."

Theme #2: Expected Benefits of MSC

In addition to the disadvantages of MSC certification, several interviewees commented on the expected benefits of certification that are often cited by supporters of the MSC program. Interviewee 11.12 first stated that the program must be providing some benefits because so many fisheries are pursuing certification, and they wouldn't do it if there were no benefits. However, some of the interviewees expressed their belief that the perceived benefits of MSC certification do not always occur. Four expected benefits of MSC certification were discussed by the interviewees and described below.

1. **Market Penetration:** Although increased market penetration is commonly cited as a benefit of MSC certification, interviewee 11.12 noted that success of increased market penetration by a fishery as a result of certification depends on which markets are targeted by the fishery: "For example, the European market has a relatively sophisticated consumer who is more aware of the issues and willing to pay more for a sustainable product, at least before the

recession... If Maine could capture the European market [as a result of becoming certified by MSC], it would be a bonus. If not, it would be an extra cost that may or may not help...Europe is a big MSC market."

2. **Third Party verification:** Three interviewees mentioned the importance of third-party certification in verifying through an independent organization that the fishery is well-managed and sustainable, in order to gain the trust of the consumer (10.29A, 11.5, and 11.12): "In Europe, it's almost required to have 3rd party certification because they don't trust fishery managers and governments to manage their fisheries well." (Interview 11.5); "The value of 3rd party certification is that you have standards to say yes it's good [sustainable]." (Interview 11.12); and "...we got independent verification that it's a good management program and that we're meeting the goal of sustaining the stocks with good management regimes." (Interview 10.29A) However, interviewee 11.5 also expressed concerns about using third party certifiers: "These groups are charging us to tell us how to do our job. It becomes a real long-term problem. Why pay someone to certify?"
3. **Differentiation of product?:** Interviewee 11.5 stated that although the goal of MSC is to differentiate a particular seafood product in order to gain a higher price, fisheries in Alaska may not necessarily benefit from MSC certification: "Assuming you have a sustainable product, the goal of marketing is to find differentiation to get a better price. Will MSC do that? In Alaska, no, because it all becomes a cost of entry into the market."
4. **Increase value of product?:** Interviewee 11.12 explains that when MSC certification began, it was assumed that by differentiating seafood as sustainable and well-managed, fisheries would be able to charge a higher price for those products. However, things have since changed: "Research since [1997, when MSC first started,] has shown that when you educate

consumers through marketing, some are willing to pay more for sustainable products, but not all are willing to pay more. This leads to other questions: Is this universal across all countries? Is the amount that consumers are willing to pay sufficient to cover costs?...If a fishery sees a change in price, it isn't based on if the consumer is willing to pay, it's based on whether the processors and buyers are willing to support sustainable practices. Seafood is a public good and all people feel they should have it. Are retailers and processors willing to pay for that cost and pass it on to the consumer? In this economy, absolutely not." Interviewee 11.5 also explains this problem in terms of Wal-Mart's commitment to selling only MSC certified seafood: "To sell [at Wal-Mart] you need to have an MSC product. What have you accomplished to increase the value of the fishery? Nothing. All you've done is used a common denominator to sell at Wal-Mart- the lowest priced retailer. Well, at least you have the ability to sell your catch." Therefore, as the interviewees stated, it seems that the question of whether MSC certified products will gain a higher price in the market depends on many external factors including the state of the economy, the willingness of the consumer to pay, and the retailer's willingness to charge more for the ecolabeled product.

Theme #3: Factors that influence the outcome and success of MSC certification

In addition to the advantages and disadvantages of MSC certification, several factors were discussed that influence whether MSC certification is ultimately beneficial to the fishery.

1. **How and why MSC certification is sought by a fishery:** In the case of the Alaska Salmon Fishery, according to interviewees 10.22 and 11.5, an economic crisis occurred in the late 1990s which caused a drastic decline in the price of salmon. The industry was then looking for a way to turn the market around: "...MSC approached [the Alaska Salmon fishery managers] and told them that [MSC certification is] a good selling point for Europe. Alaska

was looking for any differentiation to increase the value of their fish." (Interview 11.5) Interviewee 10.22 added, "Both MSC and Alaska sought each other out. MSC brought new markets to the Alaska salmon fishery, and certification of Alaska Salmon brought MSC credibility since it was the first major fishery to be certified by the MSC." So, the Alaska Salmon fishery did seem to benefit from MSC certification at the time, as it helped the fishery endure the economic crisis and open new markets.

In contrast, the Western Australian Rock Lobster fishery sought MSC certification mainly for political reasons: "Before the MSC [approached the fishery], the Western Australia Rock lobster industry took an interest in the MSC. A few major companies got together to decide to become certified. At the time the MSC was looking for people to experiment with...there were very few market reasons at all for becoming MSC certified- it was mostly political." (Interview 10.29B) In the early 1990s, the federal government required Australia's fisheries to comply with the federal Environmental Protection and Biodiversity Act (previously, exported seafood including rock lobster had been exempt from this law). (email 10.15) The Western Australian Rock Lobster industry members did not want this increased federal control over their fishery, and decided to pursue MSC certification so that they could show that the fishery was being sustainably managed and therefore did not need additional government regulation. However, the government continued to regulate the fishery under the Act anyway. (Interview 10.29B) The focus on certifying the fishery for political rather than market-based reasons caused some conflict between stakeholders in the fishery, and almost cost the fishery its recertification. Although the companies pushing for certification had speculated that they would receive a price premium for MSC certified lobster, they did not make much effort to advertise their products in the marketplace.

Therefore, when no price premium or other market benefits materialized as a result of certification, many fishermen were upset and considered not recertifying the fishery. In the end, the fishery was recertified after much debate. This case study shows that if MSC certification is sought by a fishery for reasons other than pursuing improved market benefits, it can cause large conflict among stakeholders and jeopardize the success of the program.

The Baja California Spiny Lobster fishery, on the other hand, pursued MSC certification in order to compete with the Western Australia Rock Lobster fishery in the global market for certified lobster products. The Baja fishery already managed a niche market in which it sold live lobsters to Asian markets in Hong Kong and Taiwan for a price premium, and therefore did not feel the need to pursue MSC certification to increase its lobster value. The main reason it pursued certification was to diversify its markets into Europe and the U.S. It also wanted international recognition that it was well-managed so that it could lobby for more support from the Mexican government to help maintain its high management standards. Unfortunately, after attempting to open new markets with the help of other NGOs, the fishery was unsuccessful for several reasons: there was not enough production available for new buyers; the price was too high for new buyers since they preferred to buy other forms of lobster (i.e. tails) over live lobsters; some buyers desired only a small amount of product making it uneconomical for the fishery to divert sales destined for Asian buyers; and the fishery did not have a market distribution network set up for the lobsters, which would have increased distribution costs and the price of lobster or decreased returns. However, as a result of MSC certification the fishery did gain a better reputation within Mexico and internationally, and was able to attract the attention of the Mexican government, which has since increased support to help maintain management of the fishery and has also invested in community development products.[106] This case study shows that MSC certification can help a fishery achieve its expected goals under the right circumstances if the fishery sets clear objectives about what it hopes to get out of certification and works diligently towards those goals.

2. **MSC certification client/sponsor:** According to the interviewees, the sponsor of MSC certification is important, since it may help the process move along smoothly, or may cause conflict. In most fisheries that have been certified by the MSC, the client is an industry-based group rather than the fishery managers. However, in the Alaska Salmon fishery, "... [the] Alaska Department of Fish & Game was willing to sponsor the certification because the state government was glad to help the salmon industry get out of the economic crisis." (Interview 10.22) "The decision to make the Department of Fish and Game the client was the outcome of the talks with industry to decide to go forward with MSC [certification]. There was no industry organization identified as a potential client...Now the Department wants to transfer the certification to a private client and industry groups are discussing it. They will hopefully decide on a new client by end of this certification cycle." (Interview 10.29A) However, interviewee 11.5 expressed the difficulty of using industry groups as clients rather than the fishery managers: "[The] MSC should be working only with fishery managers to certify fisheries. But, they're giving the logo to companies in hopes that companies will need to agree to conditions and will then go to fishery managers to get them to change things to meet the conditions. If the managers don't want to do it, then what?" In contrast, in Western Australia, "the Rock Lobster industry took an interest in MSC. A few major companies got together to decide to become certified... There were big issues between supporters of MSC and the government." (Interview 10.29B)

3. **MSC certification Funding:** In most fisheries that have been MSC certified, the cost of certification is paid for by the client organization that sponsors the certification. In Alaska, the Alaska Department of Fish and Game currently funds any costs related to MSC certification. However, the funding will soon be shared by both the government and the industry when the client organization switches from the government to an industry-based group: "...the industry should pay for all certification costs; it's an industry-benefiting system. The state and public did its share to set up the system and pay for it for 6-7 years. The agency may pay for some additional costs falling on it depending on what they are...The industry will be in charge of the funding when it switches. But the agency will still need to pay for any research required and staff will still be involved in providing info." (Interview 10.29A) In Australia, however, the fishermen are required to pay for the costs of fishery management and the rights to fish, and therefore the direct costs of MSC certification fell upon them. In this case, because the fishermen agreed to fund the certification and the reassessment, they were able to move forward with it. However, certification funding can often be a contentious issue and may sometimes be a barrier to achieving the full MSC certification.

4. **Involvement of industry members in the MSC certification process:** Most of the fisheries representatives consider industry involvement and support of MSC certification a key factor contributing to the success of the program. In Alaska, the industry members were involved in the decision-making process to implement MSC certification and were in support of it when it was first pursued: "The decision to make the Department of Fish and Game the client was the outcome of the talks with industry to decide to go forward with MSC [certification]...The industry was supportive of certification with reservations...We had a consultative process

with state government representatives, processors, and fishermen. They developed conditions and expectations about the process before they decided to go ahead with it." (Interview 10.29A) However, after being certified for eight years, the support by the industry of MSC certification seems to have dissipated: "To me, I see that the fact that no industry group came forward to take over from Alaska Fish and Game for certification means that the industry is not hugely supportive of it." (Interview 10.22) But, interviewee 10.29A disagrees somewhat: "Since we announced early that we aren't going to continue as the client for the MSC, industry players are talking about it and some players are emerging. That tells me they think it's valuable. But, I don't know how many are actually using the label on their product. I don't know how important it is. There was some skepticism. Processors who are closer to the market seem to support it more than fishermen who don't have enough information about the benefits of it." And interviewee 11.5 has a slightly different view of the situation: "Some major Alaska salmon processors are very frustrated with the MSC and want it to go away... Part of it is the strong arm technique- like Wal-Mart. They don't like that and don't like the costs." In Alaska, then, the industry members seem to have been very involved from the beginning about whether to pursue MSC certification, and now have the authority to decide whether to continue to pursue it or not.

In the Western Australia Rock Lobster fishery, interviewee 10.29B believes that the lack of involvement by fishermen in the decision-making process to move forward with certification has caused some issues with the program. When the major companies got together to pursue MSC certification, they did not engage grassroots support from the rest of the industry, since getting consensus from all 600 license-holders is difficult, time-consuming, and requires attention and resources.(email 10.15) The fishermen and processors therefore were not fully aware of the benefits and costs of MSC certification and did not market their products: “There was complete non-engagement by the processing sector- no promotion of the label at all. They said that they were traders, not marketers. Major players were the [fishing cooperatives]: they returned as much surplus as possible to the fishermen. They were not interested in marketing, they were just interested in selling fish. The price goes straight back to the fishermen and there is no surplus left to do marketing. The fishermen see no benefit in it at all because no company is marketing the label.” (interview 10.29B) As a result, interviewee 10.29B feels that “...there needs to be a little more education over the years with the fishermen about MSC to increase awareness...fishermen should have a handle on what’s happening [so they can] can put pressure on the processors to do marketing.” He also suggests that fisheries pursuing MSC certification should “...get a reasonable amount of grassroots support and market-focused sellers of the product” such as processors and buyers to promote the program from the beginning.

The authors of the Baja California lobster fishery case study agree that industry involvement in the certification process could have been improved. They explain that the certification team only dealt with administration boards and industry officials during the assessment process, and those people transferred little information to their constituencies about the details of MSC certification. As a result, the fishermen did not know what benefits they could expect. The authors state that, “Even in these cooperatives that have good organization and representative boards, the flow of information could have been improved and stronger support from the fishers themselves would have been secured.”[107] Again, this case study shows that it is important to include representatives from all parts of the industry into the MSC certification process.

5. **Conflict between stakeholders:** In fisheries pursuing MSC certification, conflict often arises between industry members and the third-party certifiers that come in to assess the fishery against the MSC standard. As described earlier, government fishery managers in Alaska had some disagreements with the third-party certifier over what conditions should be placed on the fishery. In Australia, there were difficulties with the certifier, but there was also conflict between the government and the industry, which caused some problems with the MSC process: "When the MSC wanted to do the assessment, the industry...had to pay for everything. They were happy to conduct another assessment and the industry was driven to become certified, but there was still substantial resistance to certification in the government. There were big issues between supporters of the MSC and the government." (Interview 10.29B) According to interviewee 10.29B, this conflict was one of the factors that almost lost the Western Australian Rock Lobster fishery its recertification. Fisheries that are pursuing MSC certification should therefore be aware of the possible conflicts that can arise among the auditors, industry, managers, and the MSC, and try to dissipate any tensions among groups as best they can, so that the conflict does not become a barrier to achieving certification.

Theme # 4: Feasibility of Industry self-certification

Several dealers and fishermen in Maine asked me about the possibility of conducting an industry self-certification of the Maine lobster fishery rather than going through MSC certification. For that reason, I asked the fishery experts whether they thought industry self-certification was a feasible option for fisheries that may not be able to afford MSC certification. According to interviewee 11.5, the Alaska Salmon fishery is actually considering self-certifying themselves rather than recertifying the fishery through the MSC: "Alaska is capable of standing on its own to market all fisheries. We point to FAO standards as the basis for our own claim that all Alaska fisheries are managed sustainably." He stated that if the Maine fishery wants to self-certify, it needs to assess two very important factors first: "1) Does Maine have the grounds to make legitimate claim that their fishery is sustainable? 2) Then if you really want to differentiate your product, you need to put money into it and explain why your product's better than others." He also states that the fishery needs to evaluate its management practices to determine if they meet the FAO Code of Conduct for Sustainable Fisheries, which is what the MSC follows. Interviewee 11.12 stated that the success of an industry self-certification depends on which markets the fishery is already in, and which markets it wants to get into: "Some fisheries are getting certified because they're worried they will lose their current markets... It's a question of knowing your market and talking to the buyers to ask them if they would buy [your product] if you did this or that."

Theme #5: The role of large retailers and NGOs in promoting MSC certification

According to interviewee 11.12, MSC certification is now being driven by the retailers, not by the consumers: "What's really driven all [sustainable seafood] programs is that supply chains have gotten on board because the NGOs told them [they] need to supply [a particular] product...It's not consumers driving certification...EDF [Environmental Defense Fund] has an office in Arkansas to keep an eye on Wal-Mart, and is putting the pressure on them and keeping them accountable. The NGOs want retailers to change their ways no matter what consumers think. They have that power in the US now." She also notes that retailers need to have faith in whoever conducts the certification: "If you're marketing directly to consumers, it's another question, but in between the consumers and the fishermen is where it's marketed. Corporations need credibility." Interview 11.5 also noted, "It is the corporate responsibility of the retailers to show where their seafood is sourced. Some retailers like the third party certification like the MSC; [they like to] check off a box. That's fine if you're willing to spend extra money to do that."

Theme #6: Major Lessons Learned from MSC certification process

Two of the interviewees shared some of their lessons learned from their experiences with the MSC. Interviewee 11.5 gave the following guidance based on his experience with the Alaska Salmon fishery:

"1) If the fishery is truly sustainable, it should be able to stand on its own;

2) If you can tell that the MSC will give you a competitive advantage in the market over others, then go ahead, but if everyone else is getting it, then it won't give you an advantage.

3) Think of all the downstream costs- particularly for the conditions- it's expensive.

4) Be careful that you aren't getting cornered and don't get a competitive advantage."

As a comparison, interviewee 10.29B noted the following lessons learned in the Western Australia Rock Lobster Fishery:

"1) Involving the fishermen from the beginning is important.

2) You need to be clear about your objectives- there's no point coming back in 3 years with everyone having different expectations and then pointing fingers at the MSC.

3) Write down the things you hope to achieve from certification.

4) Get a reasonable amount of grassroots support and market-focused sellers of the product."

DISCUSSION AND RECOMMENDATIONS

From the interviews with Maine industry members and MSC fishery experts, and the nationwide consumer survey, several key issues were raised concerning the effectiveness of the MSC certification program. Based on the issues discussed, there is still a question about whether MSC certification is the best program for the Maine lobster fishery to pursue in order to help reach its ultimate goal of improving the market for Maine lobsters while maintaining the sustainability of the resource. Again, the key question to evaluate is whether the benefits of certification outweigh the costs. The expected benefits are fairly straightforward: to differentiate the product, preserve current markets, open new markets, and possibly gain a higher value as a result. The costs are a bit more complicated because they include not only the financial costs of conducting certification and managing the resource, but more importantly include the value of the 6,000 livelihoods that depend on the Maine lobster fishery. The major cost at stake is the long-term survival of the Maine lobster industry. The key question to address is: Will certification allow the lobster fishery to last longer and support more fishermen over the long-term than it would if it were not certified? Although this is not a question that I, or anyone, can answer at this point in time, my research can give some clues to begin answering this question, which can help the decision-making process moving forward. If all of the expected benefits of certification can be achieved, then the benefits have a good chance of counteracting the costs.

Five major factors have emerged from my studies that are important in defining how beneficial MSC certification will be to the Maine lobster fishery. I will define and discuss these factors below and provide recommendations for how the Maine Lobster Industry should address each of them.

Marketing and differentiation of Maine lobster

Will MSC certification help differentiate Maine lobster and increase market penetration of Maine lobster products? According to the online consumer survey, the Seafood Choices Alliance survey, and the Durham-Chapel Hill study, respondents knew more about and were more concerned with health effects of lobster consumption than environmental effects of lobster consumption, suggesting that the ecolabel itself (that does not have any reference to health of lobster) may not convince more people to purchase MSC certified lobster over other lobster. However, the correlations found in the online survey between knowledge and importance of health benefits and knowledge of fishing effects and importance of harm to the ocean environment provide some evidence that increased consumer awareness of health and environmental effects of seafood consumption may affect the importance they place on these factors, and could influence their purchase of ecolabeled seafood. Therefore, if more education of consumers is conducted to increase awareness of the environmental impacts of seafood consumption, then consumers may be more likely to purchase MSC products. Many environmental groups have attempted to educate consumers about sustainable seafood issues in hopes that they will become a driving force in the market to encourage sustainable fishery management practices. However, as the surveys have shown, U.S. consumers still seems to lack awareness of these issues, so continued education of the public is important to improving the market penetration of the MSC label in the U.S.

Europe, on the other hand, is a different story. In 2004, Jaffry et al. conducted a survey in the U.K. to measure what factors influence consumers' seafood purchasing preferences. They asked respondents to choose among seafood products in different forms that were certified for sustainability, for quality, or not at all. They found that consumers were more likely to purchase sustainably-certified seafood than seafood that was certified for quality or was uncertified.[108] These results show that environmental effects of seafood consumption are more important to U.K. consumers than quality or freshness of seafood, unlike the results of the nationwide consumer seafood survey, the Seafood Choices Alliance survey, and the Durham-Chapel Hill survey, all of which were conducted in the U.S. It would be useful to replicate Jaffry et al.'s study in the United States to determine if U.S. citizens would also choose sustainably-certified seafood over other seafood choices. The results of the U.K. study are promising for the Maine lobster industry, as they show that at least the market for ecolabeled seafood products in the U.K. is strong.

According to the nationwide consumer seafood survey, the Seafood Choices Alliance survey, and the Durham-Chapel Hill survey, freshness and taste were also more important factors than environmental issues in influencing U.S. consumers' purchasing preferences. In 2006, a study was conducted to measure the importance of taste in influencing whether consumers would be willing to purchase ecolabeled seafood.[109] U.S. consumers were asked if they would switch away from their favorite seafood species that did not display an ecolabel to a less desired species that was ecolabeled. The study found that consumers are not willing to substitute their favorite (by taste) seafood species with a less desired seafood species that has a "no overfishing" ecolabel on it.[110] This supports the conclusions of the surveys, and implies that consumers will only purchase ecolabeled seafood if it is a species that they like to eat. Luckily, many consumers enjoy the taste of lobster, so its reputation as a delicious seafood choice makes it a good candidate for MSC certification based on this study. Still, this study does not measure whether consumers would be more willing to purchase MSC certified lobster of non-labeled lobster.

One positive result of the nationwide survey was that the vast majority of respondents who indicated a preference for where their lobster comes from prefer to buy lobster from Maine. Unfortunately, the MSC chain-of-custody procedures do not require that the state of origin is listed along with the ecolabel. But, the country of origin and method of production (wild or farmed) are required to be listed on all seafood according to the new COOL law (Country of Origin Labeling) recently issued by the United States Department of Agriculture (USDA). [111] The COOL label will allow consumers to distinguish between U.S. lobster and Canadian lobster, but consumers will not know that the MSC certified lobster is from Maine without an additional label showing that the lobster originates from Maine.

Also, even with the strong support for the Maine lobster brand, some barriers exist that might prevent consumers from choosing Maine lobster over other lobster. First, two-thirds of the nationwide survey respondents specified no preference for where their lobster is caught, which may reflect the proportion of U.S. consumers who feel the same way. Second, the origin of lobster purchased ranked as the second to last most important factor in influencing respondents' seafood purchasing practices. Third, even if consumers do seek out Maine lobster, there is a prevalence of false advertising in the marketplace, and often retailers label lobster as "Maine lobster" when it doesn't originate from Maine. In order to prevent this false marketing, the state of Maine should find a way to patent the "Maine lobster" name so that it can only be used if it is proven that lobsters being sold are indeed from Maine. In 2006 the Maine Lobster Promotion Council attempted to address the problem of "imposter lobsters" by starting a Maine lobster certification program in which it gave dealers "certified Maine lobster" tags to attach to lobsters they sold. Unfortunately, the program has not worked quite as well as they had hoped, and the mislabeling of lobsters worldwide is still fairly prevalent.

Finally, it is useful to know where consumers tend to purchase and eat lobster, and the effect it might have on the marketing of MSC certified lobster. Several studies have shown that consumers over the age of 59 tend to eat out less often[112,113,114] and spend less[115] eating out than younger people. Still, in the online survey which was dominated by respondents over age 50, most respondents indicated that they ate lobster more often at restaurants than at home. These results suggest that lobster distributors should market their lobster to restaurants rather than to retail markets.

One possible explanation for these results is that because lobster is considered a luxury item, many people may only eat it when they go out to restaurants for "special occasions". Also, as American Lobster is native to the east coast, it may be less readily available at retail markets in other parts of the country than it is on the east coast (especially in New England). The price of lobster in retail markets is also usually much cheaper in states where it is locally caught and readily available (especially in Maine and Massachusetts) than it is in other parts of the country, and therefore consumers in New England have a higher incentive to purchase lobster at the store rather than spend a higher price for lobster at a restaurant. In addition, it is traditional in New England to cook and eat lobsters at home, whereas this is not as much of a tradition in the rest of the U.S. If this survey were to be conducted only in New England, I would expect the results of the location of lobster consumption to be different than they are in this nationwide survey. It would be interesting to pursue a follow-up study based only in New England to compare results.

In summary, although Jaffry et al.'s survey suggests that MSC certification may help the market for Maine lobster in Europe, it is uncertain whether the addition of the MSC ecolabel will improve the marketing, differentiation, and market penetration of Maine lobster in the United States. Because health and freshness rank higher than the environment in the importance factors that affect consumers purchasing preferences, the Maine lobster industry should focus on marketing lobster that is healthy and fresh from Maine, rather than just focusing on the MSC ecolabel. Since the Maine lobster fishery is currently the only fishery in the U.S. that is pursuing MSC certification, the MSC ecolabel will help to differentiate and authenticate "real" Maine lobster, but it might not convince consumers to buy it just because it's well-managed and sustainable. However, if lobster distributors and retailers were to advertise MSC certified lobster as "Fresh from Maine", then consumers may be more willing to purchase it.

<u>Potential for charging a Price Premium for Ecolabeled Lobster</u>

As stated earlier, one big incentive of entering an ecolabeling program such as the Marine Stewardship Council is the chance for retailers to charge a higher price for their ecolabeled products. In some cases, MSC certified seafood sellers have been able to charge more, whereas in other cases they have not been able to, due to different market demand for their products. Retailers cannot charge a higher price, however, unless consumers are willing to pay it. The comment, "Why should I pay for something that should be done anyway?" stated by a respondent in the online consumer survey demonstrates that some people may expect fishing practices to be managed sustainably as a matter of principle, and therefore may not be willing to pay more to ensure environmental sustainability even if they are concerned about the environment.

Price was less important to consumers in influencing their purchasing of seafood than health, taste, and freshness were in the Seafood Choices Alliance and the Durham-Chapel Hill studies while it was the most important factor in the online consumer survey. One explanation for this difference is the current global economic recession, which began in the latter part of

2008 (after the other two surveys were conducted) and may be influencing U.S. consumers' level of concern about the price of seafood and other foods. Recent studies have confirmed this: as a result of the recession, U.S. consumers, and particularly middle-aged and older Americans, are dining out less and are purchasing less expensive food products .[116,117] So, will these consumers be willing to pay a price premium for MSC certified lobster?

To date, due to the lack of market data and the difficulty of evaluating what effect price has on consumers' purchases of ecolabeled seafood compared to other factors, no peer-reviewed economic research has been done based on market data to determine whether consumers are actually willing to pay price premiums for ecolabeled products in the marketplace. All of the studies done, including the online consumer survey, have used stated preference techniques, where consumers are asked through surveys how much they would hypothetically pay for ecolabeled seafood under different circumstances.[118] Although respondents in a survey may state that they are willing to pay more for ecolabeled seafood in hypothetical situations (as 77% of respondents stated in the online consumer survey), it is difficult to judge whether they will actually do that in practice.

The price difference between ecolabeled products and unlabeled products does, of course, have a big influence on whether consumers will choose to purchase the ecolabeled product or not. My survey results showed that as the importance of price increased, respondents were less willing to pay a price premium for ecolabeled seafood. Other studies have confirmed this finding. Wessels et al. (1999) conducted a U.S. market study where they asked consumers to choose between purchasing sustainably-certified seafood products with higher prices and uncertified versions of the same product. Seventy percent of respondents chose ecolabeled products over the non-ecolabeled products, but as the price premium increased, respondents were less likely to choose the ecolabeled product. Also, the likelihood of purchasing the ecolabeled product differed by species, household location in the U.S., household budgets, and gender: women were more likely to choose ecolabeled products than men.[119] To compare preferences for ecolabeled seafood between countries, Johnston et al. conducted a nearly identical survey with Norwegian residents in 1999. They found that although most respondents chose ecolabeled products over non-ecolabeled products, Norwegians were less likely to choose ecolabeled seafood as the price premium increased, and the effects were stronger in Norway than in the U.S., showing that Norwegians may be more price-sensitive than Americans.[120] Also, the respondents in both countries were educated about the meaning of the labels, which may have influenced their responses. These studies demonstrate that consumers' level of awareness about the issue the ecolabel addresses and the amount of the price premium that is put on ecolabeled products both influence whether shoppers will be more or less likely to purchase products from certified fisheries.

Based on the results of the studies described above, one can make a case that more education of consumers about the environmental effects of unsustainable or poorly managed fishing on the ocean environment can increase their willingness to pay a price premium for sustainably managed, ecolabeled lobster and other seafood. These findings coincide with the 2003 Seafood Choices Alliance survey which found that consumers are very receptive to receiving information about the environmental implications of seafood consumption, and that once consumers are aware of these issues, many of them are willing to purchase "ocean-friendly" seafood.[121] The Durham-Chapel Hill consumer survey also found that the majority of respondents were willing to receive more information about environmental effects related to seafood.[122]

So, although it is difficult to determine how much of a price premium consumers would be willing to pay for an ecolabeled product in the marketplace, past studies have shown that increased education of consumers about environmental sustainability issues related to marine fisheries should increase demand for sustainably-harvested seafood. However, it is important to keep in mind that price is a much more important factor to consumers when purchasing seafood than environmental sustainability is, according to the survey results, and that even with increased knowledge and awareness of environmental issues, consumers, especially during this recession, will likely opt to choose price over the environment. My survey results show, then, that consumers may be willing to pay more for certified lobster, but it is highly uncertain in this economy. Now that the MSC ecolabel has been in the marketplace for ten years or more, it would be useful to gather actual market data on consumers' purchasing of different types of MSC certified seafood to determine whether, on average, consumers are paying a price premium or not for ecolabeled products.

In addition, the markets that a MSC certified fishery is targeting will dictate whether the fishery can charge a premium for its ecolabeled products (interview 11.12). Wal-Mart, for example, caters to customers who want to save money. It therefore has a strong policy of charging its customers the least amount possible for products that it sells, so it will definitely not pay a price premium for MSC certified lobster. However, Wal-Mart makes up such a large proportion of the lobster market that the industry does not want to lose it as a buyer. Therefore, the Maine lobster industry will not be able to charge a price premium for any MSC certified lobster that is supplied to Wal-Mart. On the other hand, because there is more demand for ecolabeled products in Europe, consumers there may be willing to pay more for MSC certified lobster. There also likely exists a small niche of consumers who are very concerned about the environment (such as those who seek out certified organic products, which on average are more expensive than conventional products), and may be willing to pay a price premium for MSC certified Maine lobster, but this is probably a very small percentage of the population. Unfortunately, as some fishery experts indicated in the interviews, as more fisheries become certified, MSC certified fisheries become less differentiated, and therefore are less able to charge a price premium if they want to compete with the other seafood providers. It seems that the ability to charge a price premium for MSC certified products, which was originally touted as one of the great advantages of certification, is disappearing, and other benefits such as preserving current markets and accessing new ones are now becoming the primary reasons to become certified. The Maine lobster industry should not count on being able to charge a price premium for MSC certified lobster, but if it begins to target niche markets of well-off, environmentally-savvy consumers, it may be able to charge a bit more if it emphasizes the freshness of the lobster as well.

Markets and the role of large buyers

Since the Maine lobster industry cannot expect to charge a higher price for its certified lobster, will MSC certification help it to achieve the other expected benefits of preserving current markets and accessing new ones? To answer this question, it is important to evaluate first whether consumers will likely take notice of an ecolabel and purchase a product as a result. The survey addressed this question by asking respondents to identify which labels they look for when purchasing products. Most survey respondents tended to seek out at least one label on household or food items (although only 12% sought the MSC label). The label sought by most respondents was the Energy Star label, which gives consumers a clear incentive in saving money based on more efficient energy use. The second most common label sought by respondents, the Country of Origin Label, reflects consumers' nationalistic tendencies and preference to buy products from the U.S. The third and fourth most common labels sought by respondents are a percent of recycled content label and a local or regional label, respectively (see Table 14). The fact that the top four labels sought by respondents are not related to the environmental sustainability of food products may suggest then that most consumers do not actively seek out ecolabeled food products. Yet approximately one quarter of respondents indicated that they look for the certified organic label on products. So, if some consumers are willing to purchase certified organic products, then maybe they would be willing to seek out MSC labeled products if they understood what it represents and consider environmental sustainability issues related to fisheries important. However, because consumers place a higher importance on health than environmental issues, and the MSC ecolabel does not encompass a health component as does the certified organic label, grass-fed beef label, or nutrition label, it is difficult to speculate whether consumers, in practice, will be willing to purchase MSC certified seafood over non-labeled seafood. For that reason it would be useful to gather market data on the number of consumers that purchase ecolabeled products compared to products with other types of labels.

Consumers, however, are not the main drivers of MSC certification; currently, large seafood buyers such as Wal-Mart, Ahold, and Wegmans are taking the lead to require that the seafood products that they sell are sustainably managed. These firms are doing this to demonstrate Corporate Social Responsibility (CSR) to their customers. According to Portney (2005), CSR is "a consistent pattern of private firms doing more than they are required to do under applicable laws and regulations governing the environment, in the communities in which they operate." Portney concludes that firms are most likely to pursue CSR because it's profitable.[123] CSR can improve the public image of corporations that supply environmentally-friendly products, consumers may be more loyal to firms that practice CSR, and they may then be willing to pay more for environmentally sustainable products.[124] Of course, corporations also pursue CSR for their own self-interest, in this case, to ensure that a sustainable supply of seafood products will continue in the future. For large buyers, the costs for logo-licensing and the chain-of-custody certification are not prohibitive, and the market benefit of selling MSC certified seafood is expected to outweigh the costs.[125]

With large buyers like Wal-Mart, Marks & Spencer, and Sainsburys requiring that all of their wild seafood products be MSC certified and many other retailers adopting sustainable seafood sourcing policies, it is almost unavoidable now for fisheries to become certified if they want to preserve their markets with these current buyers or open markets to new buyers that adopt similar policies. MSC certification is one of the easier ways to advertise to a retailer or restaurant that a fishery has well-managed and sustainable practices, since the certification is well-respected worldwide and transparent, and retailers can easily point to it to show its customers that it is sourcing sustainably-harvested products.

As mentioned earlier, whether MSC certification will open new markets depends on what markets a fishery is targeting. Because the Maine Lobster Fishery has specifically stated that it would like to expand to Europe and continue to sell to Wal-Mart, then it must become MSC certified or it will be shut out of those markets. If the Maine fishery decides that it does not wish to continue with MSC certification, then it has some other options. The first option is for it to do nothing, however this option seems unlikely, since the Governor's Task Force on the Economic Sustainability of Maine's Lobster Industry is already working towards outlining steps to improve the lobster market. The second option is to do an industry self-certification, in which the industry creates its own standards and certifies itself against those standards. The problem with this method is that it is not as credible worldwide as a third-party certification would be. The third option, then, which would probably be the most desirable next to MSC certification, is to find a third-party, internationally-recognized, accredited certification body to assess the fishery based on the FAO's "Guidelines for Eco-Labeling of Fish and Fishery Products from Marine Capture Fisheries." The state of Alaska has done this for its salmon fishery, and Iceland has recently decided to certify all of its fisheries in this way as well and create its own seafood ecolabel rather than certifying its fisheries by the MSC.[126] One of the disadvantages of having multiple fisheries create their own ecolabels is that they may cause confusion among consumers in the marketplace. Also, if Maine were to adopt its own ecolabel, it would have to invest into marketing the label, which may end up being more expensive than the cost of MSC certification. Alaska is considering not recertifying Alaska Salmon through the MSC, but they have several advantages over Maine. First of all, they have a large marketing budget, and have widely marketed the wild Alaska Salmon brand for several years, so that it is now very well known in the marketplace and has a strong reputation for being sustainable. Second, the state of Alaska produces most of the wild pacific salmon worldwide (and even more so now that many of the other pacific wild salmon stocks have recently collapsed), so if retailers want to sell wild salmon, they need to purchase it from Alaska. These reasons make it easier for Alaska to retain its buyers, even if does opt to drop the MSC certification. Maine unfortunately has quite a bit of competition with Canada and does not dominate the lobster industry as much as Alaska dominates the wild salmon industry. Also, the Eastern Canada offshore fishery is currently pursuing MSC certification. If other Canadian fisheries follow in its footsteps and Maine does not decide to go forward with certification, then that could be detrimental to the Maine lobster market. In addition, the state of Maine does not currently have a big enough budget to pursue a widespread marketing campaign, but if it were able to raise more funds to market its lobster, then pursuing its own certification could potentially be a better and less-costly option than MSC certification in the long run. At this point, though, I would recommend that the Maine lobster fishery continue to move forward with MSC certification if it wishes to sell to Europe, since the MSC brand is strong and well-trusted there.

Industry Support and Involvement in the Certification Process

The representatives from the three MSC certified fisheries highlighted in this study (Alaska Salmon, Western Australia Rock Lobster, and Baja Spiny Lobster) all discussed the importance of industry member involvement and support of the MSC certification process in ensuring the success of the MSC certification program. Involvement of industry members means including representatives at all levels of the industry: fishermen, dealers, processors, and distributors. In both the Australian and Baja fisheries, some portion of the industry was included in the MSC certification planning, but much of the industry was not included in the decision-making which caused some problems later on in the process. Therefore, it is vital that Maine Lobster members are included in the MSC certification process in order to achieve the benefits that certification can bring.

In my interviews with Maine industry members, several people expressed their frustration with not being included in the decision-making process for MSC certification, their mistrust of those individuals in the Working Group on Maine Lobster Sustainability who were leading the certification effort, and their skepticism about MSC certification, mainly due to their lack of knowledge about the program. Many interviewees expressed interest in learning more about the

MSC, and were willing to attend public informational sessions if they were held in convenient locations and at convenient times. From these interviews it is apparent that there is little awareness and detailed knowledge about the MSC program and the benefits of it, and more outreach needs to be conducted to the 6,000 commercial lobster license-holders to fully inform them about the certification process and its potential benefits. When the MSC pre-assessment for the lobster fishery was completed, the Working Group on Maine Lobster Sustainability convened three public meetings in different lobster zones in Maine to gain feedback from fishermen about their thoughts on going forward with the certification, and to answer questions they had about the certification process. Unfortunately, only about 30 people showed up at all three meetings, which may have appeared to the Working Group that industry members are just not interested in the issue. However, I would argue that although this may be the case with some fishermen, many are willing to learn about the certification process if meetings are held more often, in convenient locations, at convenient times, and are well advertised.

I would recommend to the Fund for Sustainable Maine Lobster that throughout the full assessment process, they conduct a variety of public meetings in all lobster zones to discuss the MSC process and to encourage industry members to become involved and continue to provide feedback about it. These meetings may be combined with regular zone council and zone community meetings that are facilitated by the Maine Department of Marine Resources. In addition, there needs to be consistent outreach and education with fishermen and dealers about certification through wharf visits, distribution of fact sheets, email correspondence, and any other means of getting the message out to members to prevent rumors from circulating and to gain as much grassroots industry support for MSC certification as possible. If effort were put into communicating with industry members and gaining their buy-in early in the process, problems and conflict with the industry may be prevented in the future.

I would also recommend that the Fund for Sustainable Maine Lobster conduct targeted outreach to dealers, distributors, and processors to teach them about the chain-of-custody certification, what it entails, and what benefits using the MSC logo might bring them. In order for MSC certification to really help the industry, dealers will need to use the logo on their products; there is no real advantage of spending the money to certify the Maine lobster fishery if very few dealers end up using the MSC logo. In order to sell Maine lobster to the markets that are requiring MSC certified seafood, all members of the supply chain will need to undertake a chain-of-custody audit. It would be useful to explain what that process entails to as many suppliers as possible before the fishery becomes certified, so that they are ready to conduct the audit if and when the fishery receives the certification.

Again, all fishery representatives interviewed stressed the importance of including the industry members in the MSC certification process, in order to ensure its success. At this point, very few of the Maine lobster industry members know anything about MSC certification, and even fewer are currently involved in the decision-making process. It is therefore vital for the Fund for Sustainable Maine lobster to do what it can to encourage industry involvement in the process. The more dealers there are that are willing to adopt the MSC ecolabel and the more fishermen there are that understand what the certification process entails and how it might affect them, both positively and negatively, the better off the Maine lobster fishery, and its markets, will be.

Long-Term Costs

The last major factor that will affect the enduring success of MSC certification of the Maine lobster fishery is how to address long-term costs. MSC certification is expensive, and if it is going to be continued for multiple years, there needs to be a long-term funding mechanism established to sustain it indefinitely. One of the most common strategies that other fisheries have used to fund certification is to split all certification costs among industry members, as was done in Australia. In Alaska, the state government has covered all costs related to MSC certification to date, but that will change if a new industry-based group takes over as the certification client. If the Alaska salmon fishery does end up renewing its certification, the costs will be shared between the industry and the government.

Unfortunately, both of these strategies put quite a large financial burden on the industry itself, when the whole goal of MSC certification is to try to increase the value and sustainability of the fishery. Also, much of the cost often ends up getting passed down to the fishermen themselves from buyers, processors, and distributors. The Maine lobstermen are already suffering tremendously in this economic downturn, and if the certification cost were placed on industry members, there would be very little support for the program, since they cannot deal with additional financial burdens. In fact, in my Maine lobster interviews, many of the industry members who were in support of MSC certification gave a qualified answer, stating that they are in support of it as long as the costs of certification do not fall upon them. Therefore, I recommend to the Fund for Sustainable Maine Lobster that they continue to privately fundraise and eventually establish a long-term endowment to fund both the direct and indirect costs of certification. An endowment would hopefully be able to fund the majority of the direct costs associated with MSC certification and some of the indirect costs, and then depending on what conditions are put on the fishery, the Maine Department of Marine Resources may have to set aside a portion of its budget to fund improved management practices. Securing private donations during the recession will be a big challenge, but the group should do whatever it can to pursue them. Funding of certification is always a contentious issue, so it would be ideal if it could be provided by a private entity rather than allowing the burden to fall on the lobster industry members.

CONCLUSION

Based on the results of my three studies, MSC certification of the Maine lobster fishery could provide some benefits to the industry by helping it to tap new markets in Europe, sell to retailers that have developed corporate sustainable seafood policies, and preserve its current markets with large buyers like Wal-Mart. Also, with the trend to source more sustainable seafood becoming more widespread, in order to compete with the increasing number of fisheries that are becoming MSC certified (including other American lobster fisheries), it is probably smart for Maine to pursue MSC certification at this time. However, my results also show that most consumers will likely be unwilling to pay a price premium for MSC certified products, especially in this economy, and therefore a price increase for MSC certified lobster should be avoided.

Ecolabeling programs such as the Marine Stewardship Council are fairly new, and it is unclear what the future holds for them. More research on the actual market benefits of ecolabeling programs needs to be conducted at all levels of the market to determine if they really are providing benefits to fisheries that are making the effort to maintain sustainable management practices. Also, if a price premium is paid by the consumer on a certified product, it is important to evaluate whether that financial benefit is being passed down the supply chain to the fishermen, or whether it is being entirely absorbed by the suppliers. In order for certification to be successful, all members of the lobster industry, including the fishermen, should see some sort of benefit- whether it be a higher value for their products or just increased demand. If the market benefits of ecolabeling are high enough to cover the costs of certification, then fisheries will have a strong incentive to become certified, and seafood suppliers, processors, and retailers will promote ecolabeled seafood, beginning a positive feedback loop of continuous improvement and sustainability of wild fisheries worldwide.

Besides looking at the market effects of MSC certification, research also needs to be done to determine if wild fish stocks and the ecosystems they depend on are actually benefiting from certification. If they are not, then the whole goal of certification is lost, and the program should be abandoned. It is important to remember that although the MSC program uses market incentives to involve industry members in the management and sustainability of the fishery, its main goal is to promote the health and sustainability of wild marine species populations. Now that the MSC program has been in existence for 10 years, it is a good time to start measuring the impacts on the fisheries that were first certified to see if they have made any improvement in their ecological health and sustainability. In the case of the Maine lobster fishery, it is hopeful that MSC certification will not only prevent overfishing of the lobster resource and damage to the surrounding ecosystem, but will also sustain the livelihoods of all fishermen and suppliers that depend on the health and abundance of Maine lobsters for years to come.

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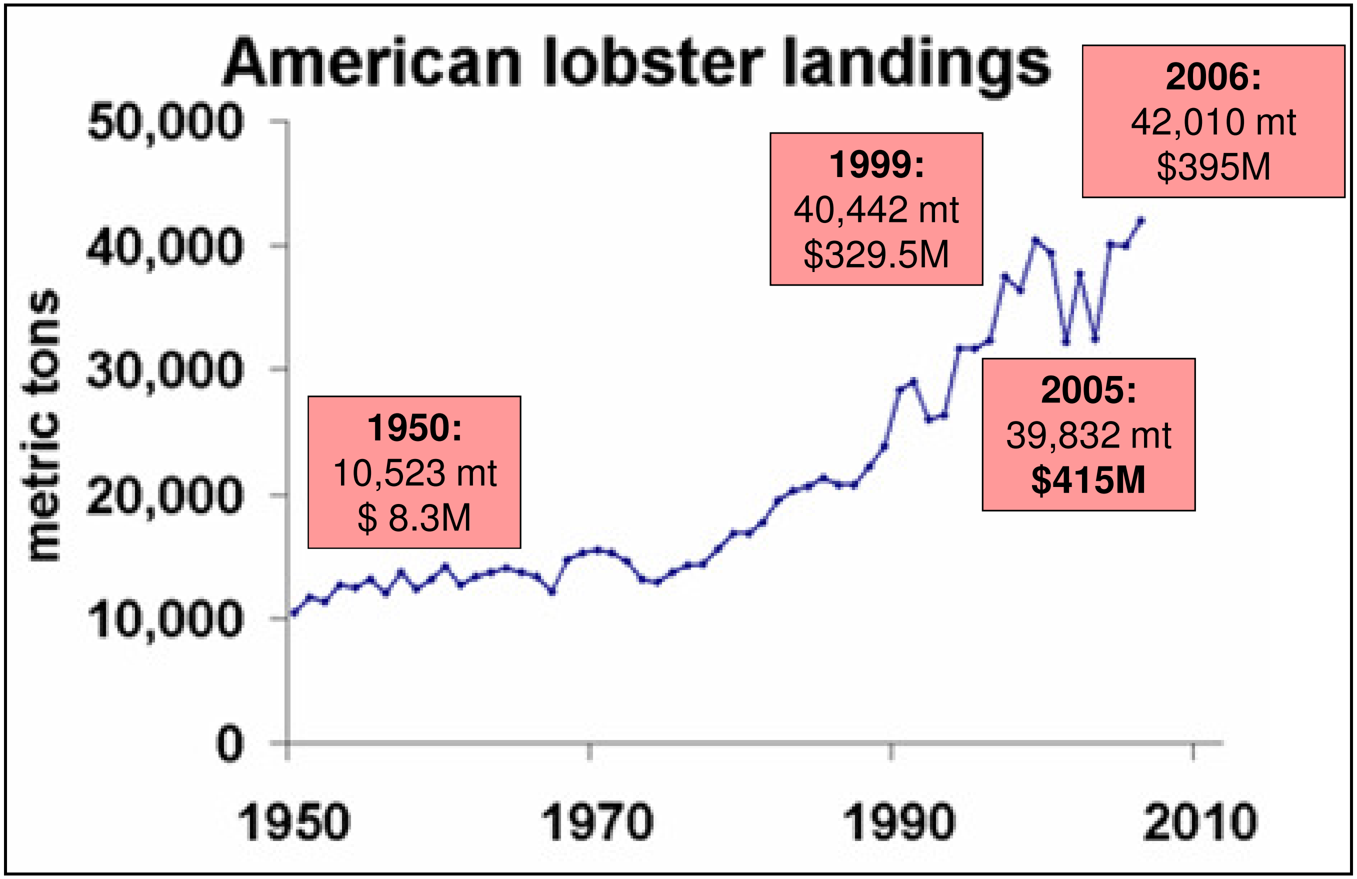
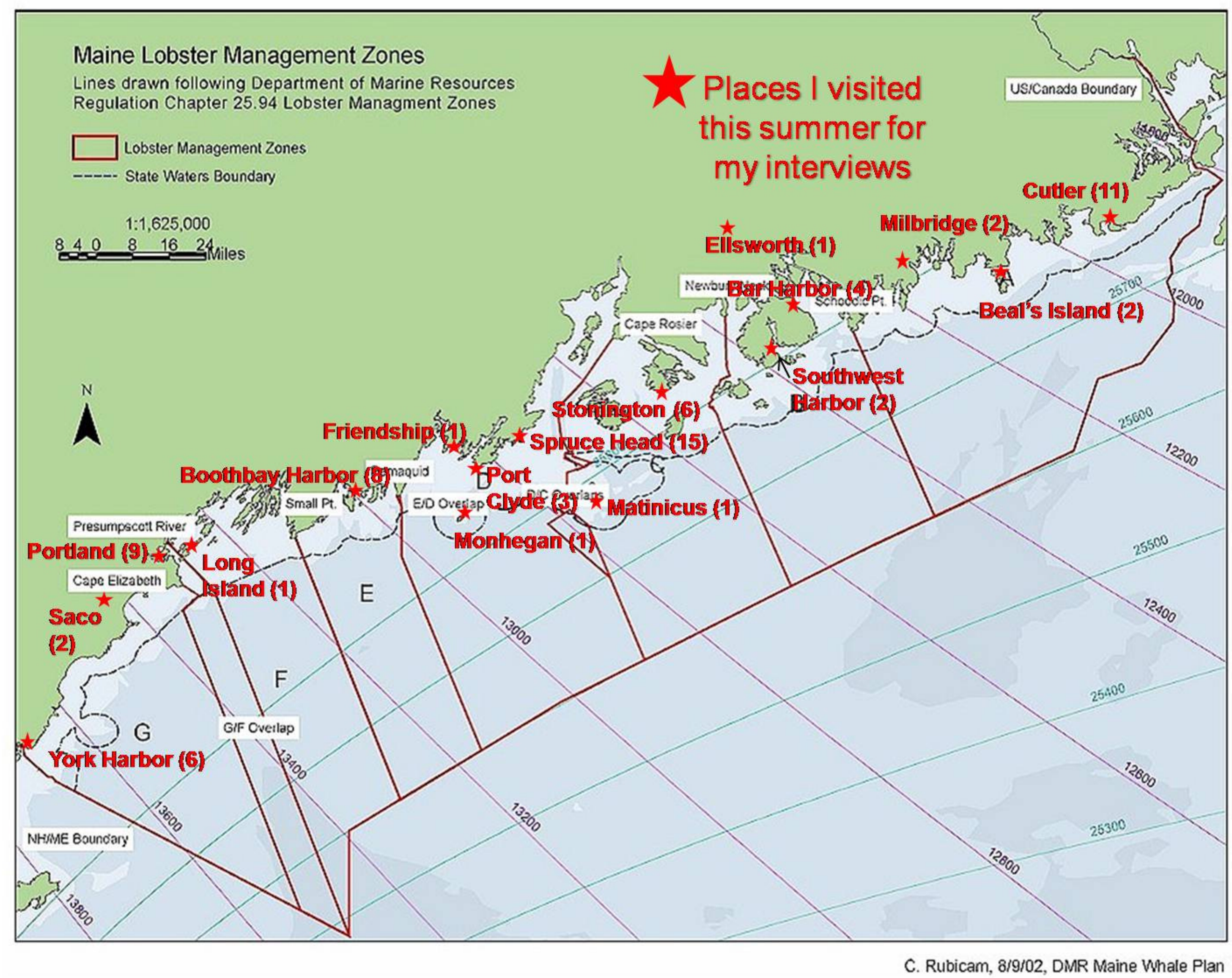
Appendix 1: American Lobster Landings in the United States from 1950-2006.



Source: http://www.nmfs.noaa.gov/fishwatch/images/am_lob_chart_land.gif

Appendix 2: Map of Maine Lobster Zones and my summer interviews with industry members



Appendix 3:
SAMPLE INTERVIEW QUESTIONS

A: Sample Interview Questions for Lobstermen

1. How long have you been fishing in general, and for lobster specifically?

2. Have you noticed any changes in your catch rates over the years that you've been fishing? If so, please describe.

3. Do you expect your catch rates to change in the next few years: in approximately 5 – 10 years?

4. Do you think the lobster fishery is sustainably managed? Do you see there being an increase in demand for sustainable products in the future or is it just a fad?

5. Have you heard about the proposal to sustainably certify the Maine lobster fishery through the Marine Stewardship Council (MSC)? If the lobster industry were certified, it would be able to use a "green" ecolabel that will show consumers the fishery is sustainably managed. How do you feel about this certification? Do you support it? Why or why not? What are your biggest concerns about certification?

6. Under what circumstances would you NOT be willing to go through the certification process to become MSC certified? (ex. changes in gear, changes in bait, regulations on size/location of catch, etc.)

7. One of the benefits of certification is that you are able to open new doors for your product and possibly differentiate it from other lobster fisheries in Canada and other U.S. states. Do you feel that this differentiation of Maine Lobster as sustainably certified would help you to sell more of your product and possibly earn you a higher price for the lobster?

8. If you stated above that you don't support certification, is there a minimum price premium for your lobster that you would you need to get to be willing to become sustainably certified?

9. What do you see as other benefits of certification?

10. Would you be willing to contribute an amount per pound to help support the cost of certification? If so, how much? 1 cent/lb, 3 cents/lb, 5 cents/lb. etc.

11. Do you have any suggestions for other management measures that can be put in place to help protect stocks?

12. Do you have any interest in going to an informational session about the MSC process? Do you know if others would be interested in learning about it?

13. Could you give me names and contact information of 1 or 2 other people who would be willing to talk to me about this issue? Would you be willing to introduce me to them? I would love to talk to anyone who has an opinion on the issue- whether pro or con.

B: Sample Interview Questions for Buyers

1. Have you heard about the proposed MSC certification of the lobster fishery in Maine?

2. Would you support the MSC certification of the lobster fishery?

3. Do you know about the chain of custody audit and what it requires? Would you support it?

4. How big are you? (compared to others, or whatever info you want to give)

5. Where do you buy from and ship to?

6. Have you gotten pressure from your customers (especially Europe) to provide more MSC or sustainable seafood?

7. Do you think MSC will help the industry? Do you think it will secure current markets or help to gain new markets? Will it help the industry gain a higher price for the lobster?

8. Do you think the industry needs this market push or is it ok as is?

9. Would you be willing to contribute an amount to help fund certification of the fishery? If so, how much?

10. Do you think it would be useful to the Maine seafood industry to certify other fisheries besides lobster?

11. Do you have any concerns about the MSC certification?

C: Sample Interview Questions for Managers/ Scientists/ Other industry members

1. Do you think the Maine Lobster fishery is sustainable?

2. Have you heard about the proposed MSC certification of the lobster fishery in Maine?

3. Would you support the MSC certification of the lobster fishery?

4. Do you think MSC will help the industry? Do you think it will secure current markets or help to gain new markets? Will it help the industry gain a higher price for the lobster?

5. Do you think the industry needs this market push or is it ok as is?

6. Where should funding come from to fund certification?

7. Do you think it would be useful to the Maine seafood industry to certify other fisheries besides lobster?

8. Do you have any concerns about the MSC certification?

D. Sample Interview Questions for Fisheries Experts

1) HISTORY: Why did your fishery decide to go for MSC certification? Did the industry support the decision?

2) DECISION: Do you think it was a good decision to certify your fishery by MSC? Why or why not?

3) INDUSTRY INVOLVEMENT: What is the attitude in the industry about certification? Were fishermen/ processors involved in and supportive of decision to become certified?

4) CLIENT: Are you happy with the client body that is working with MSC? Do you think it's worked well? What benefits and challenges have they had?

5) PROCESS: Would you suggest the process be handled differently than how it was handled? What are your 5 biggest suggestions for how certification could be managed better?

6) RETURN ON INVESTMENT: Has there been a good return on investment with certification? Has your fishery gained a price premium as a result? Has it opened new markets, or helped preserve current ones? Has it been worth it?

7) LESSONS LEARNED: What lessons learned can you share about the certification process? Do you suggest that other fisheries like Maine Lobster become MSC certified?

8) OWN CERTIFICATION: What do you think about ME Lobster getting its own certification? Rather than spending the money to become MSC certified, why not spend that money to increase their marketing efforts and show that lobster is really sustainable? Do you think that would be a good option?

9) LOSING CERTIFICATION: Many people in the ME industry are worried about becoming certified now and then losing certification in the future because they are unable to meet future conditions that are imposed. They're worried that will hurt the lobster industry more than getting worried in the first place. What are your thoughts about that?

10) RESEARCH: Have you done any research asking consumers about their willingness to pay for lobster, or do you know of any studies (surveys)? Do you know if there's been research done testing whether consumers are willing to trust just any label that says it's sustainable? (like organic, fair-trade, etc.)

11) Can you suggest other contacts for me to talk to about this issue? (Industry, managers, suppliers, etc.)

Appendix 4:
CONSUMER LOBSTER QUESTIONNAIRE

Tell us about your buying and eating preferences for lobster. This 10-15 minute anonymous survey is being conducted by a researcher from Duke University who is studying the sustainable seafood industry. If you would like to participate in the survey please click the link below.

Survey Questions

Definition of Lobster and Seafood: For purposes of this survey, **lobster** refers to American or "Maine" Lobster (with claws, often served as a steamed whole lobster), not Spiny Lobster (has no claws, usually only the tail is served). **Seafood** refers to both fish with fins (like tuna and salmon) and shellfish (like lobster, crab, oysters, and shrimp).

Please check only one answer for each question below unless otherwise stated.

1) In an average year, how often do you eat lobster?
   - ☐ 0 Never
   - ☐ 1 About once a year or less
   - ☐ 2 About 2 to 4 times per year
   - ☐ 3 About 5 to 11 times per year
   - ☐ 4 About once a month (12 times per year) or more
   - ☐ 99 Don't know

[If respondent answers "Never" in question 1, then you they will skip to the end of the survey to a screen that says, "Thanks for your willingness to participate, but unfortunately you do not qualify for this study."]

2) Do you eat lobster more often at home or in a restaurant?
- ☐ 1 More often at home
- ☐ 2 More often in a restaurant
- ☐ 3 Equally at home and in restaurants
- ☐ 4 Eat somewhere else (please specify)____.

3) If you buy lobster from somewhere other than a restaurant, where do you usually by it from?
- ☐ 0 I don't buy lobster from somewhere other than a restaurant
- ☐ 1 From the grocery store
- ☐ 2 From a seafood market
- ☐ 3 Directly from the fishermen (at a coop or at the dock)
- ☐ 4 From somewhere else (please specify)_______________________________________.

4) If you buy lobster to take home and cook, in what form do you most often buy it?
- ☐ 0 I don't buy lobster to take home and cook
- ☐ 1 Whole, live lobster
- ☐ 2 Frozen, cooked lobster meat
- ☐ 3 In some pre-made form (sauce, soup, chowder, bisque, canned, etc.)
- ☐ 4 In some other way____.

5) If you eat lobster at a restaurant, how do you prefer your lobster to be prepared?
- ☐ 1 Steamed, whole lobster, with shell
- ☐ 2 Made in a dish (as a sauce, soup, chowder, salad etc.) with the shell already removed
- ☐ 0 I don't eat lobster at a restaurant

For each question below, please mark how much you know on a scale of 1 to 5 (1- Know nothing at all to 5- Know a great deal) about each subject.

	Know nothing at all 1	2	3	4	Know a great deal 5
6) The positive health benefits of eating seafood	☐	☐	☐	☐	☐
7) The effects from eating certain kinds of unsafe or contaminated seafood	☐	☐	☐	☐	☐
8) The effects of certain kinds of commercial fishing on the ocean environment	☐	☐	☐	☐	☐
9) The effects of certain kinds of fish farming on the environment	☐	☐	☐	☐	☐

For each question below, please mark how important each factor is on a scale of 1 to 5 (1- Not at all important to 5- Very important) when considering whether or not to buy lobster in a store or restaurant.

	Not at all Important 1	2	3	4	Very Important 5
10) Price	☐	☐	☐	☐	☐
11) Health benefits	☐	☐	☐	☐	☐
12) The possibility of contamination with mercury or harmful chemicals	☐	☐	☐	☐	☐
13) Taste	☐	☐	☐	☐	☐
14) Freshness	☐	☐	☐	☐	☐
15) Whether lobster is overfished, that is catching so many that the species is being depleted	☐	☐	☐	☐	☐
16) Recommendation by waiter or seafood counter employee	☐	☐	☐	☐	☐
17) Whether the lobster is caught in a way that may harm the ocean environment	☐	☐	☐	☐	☐
18) Where the lobster was caught (which state, country, etc.)	☐	☐	☐	☐	☐
19) How far the lobster was shipped to reach your plate	☐	☐	☐	☐	☐

20) Are there any other important factors not listed above that you consider when deciding whether or not to purchase lobster in a store or restaurant? If so, please specify. ____________________________

____

21) ***[In online survey use drop-down menu]*** Below are the factors listed in the questions above. Please choose **the most important** factor that you take into account when purchasing lobster.

☐ 1 Price
☐ 2 Health Benefits
☐ 3 The possibility of contamination with mercury or harmful chemicals
☐ 4 Taste
☐ 5 Freshness
☐ 6 Whether lobster is overfished, that is, catching so many that the species is being depleted
☐ 7 Recommendation by waiter or seafood counter employee
☐ 8 Whether the lobster is caught in a way that may harm the ocean environment
☐ 9 Where the lobster was caught (which state, country, etc.)
☐ 10 How far the lobster was shipped
☐ 11 Other (specified above in question 20)________________________________

22) Would you be willing to pay more for lobster that has a consumer information label on it showing that it came from a well-managed and sustainable fishery?

(**Definition of a sustainable lobster fishery for purposes of this survey**: A fishery that can maintain or increase the catch now and in the future without having adverse effects on the lobster species population or the surrounding ocean ecosystem.)

☐ 1 Yes
☐ 0 No ***[skips to question 24]***
☐ 2 It depends on whether I'm familiar with the label or not
☐ 99 I don't know

23) How much more would you be willing to pay for sustainably labeled lobster than for lobster without a label certifying it as sustainable, if all other factors (taste, freshness, origin, etc.) between the two types of lobster are the same?

☐ 1 Between 1 and 10 cents more per pound
☐ 2 Between 11 and 50 cents more per pound
☐ 3 Between 51 cents and $1 more per pound
☐ 4 More than $1 more per pound
☐ 5 Another amount more per pound (please specify):____________________________

24) American Lobster is caught in Atlantic Ocean waters from the east coast of Canada down to North Carolina. When you buy lobster from a store or restaurant, do you have a preference for where the lobster that you buy was caught?

☐ 0 No, I do not have a preference for where the lobster is caught. ***[skips to question 26]***
☐ 1 Yes, I do have a preference for where the lobster was caught.

25) If you answered Yes in question 24, then please specify below from where you would prefer your lobster was caught (**you may mark more than one**):

[CODE: 0= no preference; 1-12=state chosen]

- ☐ 1 Canada
- ☐ 2 Maine
- ☐ 3 New Hampshire
- ☐ 4 Massachusetts
- ☐ 5 Rhode Island
- ☐ 6 Connecticut
- ☐ 7 New York
- ☐ 8 New Jersey
- ☐ 9 Delaware
- ☐ 10 Maryland
- ☐ 11 Virginia
- ☐ 12 North Carolina

26) Of the different types of product labels listed below, please mark all labels that you actively seek out when purchasing products at the grocery store or for your home. You may mark more than one. If you have not heard of a label listed below or do not actively seek to purchase items with a label listed, then please do not mark it.

- ☐ 1 Fair-trade certified
- ☐ 2 Bird-friendly coffee
- ☐ 3 Certified Organic
- ☐ 4 Marine Stewardship Council
- ☐ 5 Grass-Fed beef
- ☐ 6 rBGH or hormone-free (for dairy products)
- ☐ 7 local or regional label (for produce, seafood, or meat produced in local area)
- ☐ 8 Country of original label (gives location where seafood is caught, processed and packaged)
- ☐ 9 Eggs labeled as Cage-free, free range, or free roaming
- ☐ 10 Energy Star certified appliances
- ☐ 11 % of recycled content (for paper or other products)
- ☐ Other________________________

27) What is your age?

- ☐ 1 18-29
- ☐ 2 30-39
- ☐ 3 40-49
- ☐ 4 50-59
- ☐ 5 60+

28) What was the last level of schooling you completed?

- ☐ 1 Less than high school graduate
- ☐ 2 High school graduate
- ☐ 3 Some college
- ☐ 4 College graduate
- ☐ 5 Post graduate

29) In which of the following ranges does your total household income fall?

- ☐ 1 $11,999 & below
- ☐ 2 $12,000-$19,999
- ☐ 3 $20,000- $29,999
- ☐ 4 $30,000- $39,999
- ☐ 5 $40,000- $49,999
- ☐ 6 $50,000- $75,000
- ☐ 7 Above $75,000

30) Please list the city, state, and country where you live. ________________________________

<u>This marks the end of the survey. Thanks for your willingness to participate in this study!</u>

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