Sustainable Seafood Practices at McGill University

Research Final Report

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I. Executive summary

Introduction and context

Seafood is a staple of the human diet. However, population growth, increasing demand for seafood, and powerful harvesting technologies mean that formerly plethoric fish stocks are on the brink of collapse. Recently, organizations concerned with promoting sustainability in the seafood industry have emerged. These include the Marine Stewardship Council (MSC), Monterey Bay Seafood Watch (MBASW) and Ocean Wise. However, their legitimacy remains an important question, as past decisions have been controversial, and poor traceability of products along the supply chain means that consumer evaluation may be difficult. Despite these issues, the work of certification bodies, partnership programs and scientific research centers represent an important step in the promotion of responsible fishing practices.

McGill University, an institution that both serves a large consumer base and is environmentally conscious, is well positioned to critically evaluate the seafood served by the McGill Food and Dining Services (MFDS). However, difficulties arise in defining what constitutes sustainable seafood, as well as obtaining and processing product information from McGill's food sources. Therefore, research is necessary to determine how best to collect and evaluate information so that sustainable purchasing decisions can be made.

Research objective and client

The objective of our research is to develop a system that enables McGill Food and Dining Services to make sustainable seafood purchasing decisions. We have defined 'sustainable seafood' as seafood fished or farmed in a manner which does not jeopardize the long-term health of any species in the associated ecosystem, and that is linked to economic harvesting practices that will allow for continued harvesting for generations to come.

Our primary client is MFDS. There are several individuals within and connected to MFDS that serve as liaisons and advisors within the context of this project. These include: Oliver de Volpi, Executive Chef for MFDS; Laura Rhodes, Food Systems Administrator for MFDS; Lilith Wyatt, Sustainability Projects Fund (SPF) Administrator within McGill's Office of Sustainability; and Sarah Archibald, a coordinator of the McGill Food Systems Project.

Methodology

Our initial research objective was derived from information provided to us by our course coordinators, as well as information gathered from the first meeting with our clients. A preliminary analysis of sustainable seafood and certification systems helped us to refine the objective further and consider various strategies to approach our investigation. From this point, initial criteria were developed via group discussion and a literary review, to isolate ten certification and recommendation institutions applicable to the needs of MFDS. Next, open-ended standardized interviews were conducted with: local seafood distributors GFS, Pierre En Gros, and Sysco; other universities similar to McGill; and four certification or recommendation institutions that were deemed most suitable for use by MFDS. An in-depth literary review complemented this data collection stage. The findings of interviews were analyzed through comparison and further literary review. Comparison charts were created for each group of organizations interviewed. The results of this analysis were three products to be provided to MFDS: (1) An in-depth comparison of existing ecolabels; (2) a decision-making utility for purchasing sustainable seafood; and (3) a set of recommendations to facilitate the purchasing of sustainable seafood at the present time and in the future.

Results and discussion

Interviews with distributors allowed the group to discern the status of sustainable seafood in the Montreal market. A lack of consensus within the industry as to the most appropriate ecolabel indicated that extensive research and analysis of all relevant ecolabels was necessary in order to make legitimate recommendations. Those interviews also brought to the group's attention the importance of seasonality when determining seafood sustainability. However, this aspect was not included in the final products because of time constraints and a lack of available information. In addition to providing examples of useful and creative solutions to common problems, the interviews with universities similar to McGill helped our research group to identify the key areas of difficulty universities experience in implementing sustainable seafood purchasing practices. These insights were crucial in shaping our utility.

The group developed three final products from our analysis of data gathered through both interviews and an extensive literary review. The first product is an in-depth comparison of ecolabels. Though our analysis of interviews with certification and recommendation institutions,

Monterey Bay Seafood Watch (MBASW) was deemed the best source of information regarding species ecological status, most sustainable purchasing location within North America, and harvesting method used (for both wild-capture and farmed fish). Marine Stewardship Council (MSC) was determined to be the best certification body for individual wild-capture fisheries and wild-capture products. For any product that was not MSC-certified (be it wild-capture or farmed), Ocean Wise was the next best option as a partnership program.

The utility, our second product, was created using information found on the associated websites for MBASW's seafood-purchasing guide, MSC's certification program, and Ocean Wise's partnership program. It was structured in a colour-coded chart format, so that the user can read information left to right with increasing specificity, ultimately ending in a link to a list of potential regional distributors for that specific product. Although the utility is very straightforward, user-friendly and informative, there are some areas of weakness. These weaknesses include our inability to create a self-updating utility, the lack of sustainable product availability in the Montreal area, our inability to link exact distributor information directly in the utility itself, and the realization that this utility is only as good as the information available to us, as well as the certification or partnership programs it uses. The third product provided to MFDS is a set of recommendations derived from the results of our interviews and utility. These recommendations include: (1) that MFDS should collaborate with distributors in finding suppliers of sustainable seafood products; (2) that planning menus in advance can provide extra time for MFDS to work with their distributors and source sustainable products; (3) that tradeoffs such as allocating more funds to seafood products from another protein groups will help offset the price of sustainable seafood; and (4) that MFDS' best opportunity to implement effective sustainable seafood practices is to institutionalize their practices.

A few challenges were encountered throughout the course of the project. Despite recognizing the importance of seasonality, we were not able to incorporate it into our final utility for MFDS due to time constraints and a lack of information. In addition, we were not able to deliver a decisive verdict about aquaculture. Instead, we recommend that MFDS use aquaculture products sparingly while keeping informed on current aquaculture research, and the development of new aquaculture certification bodies. A final major challenge had to do with the specific context of our research, in particular the state of the seafood market in Montreal, and the

geographic location of MFDS. The market for sustainable seafood in the city of Montreal is not very advanced.

Based on all that we have learned, it is evident to us that MFDS has a critical role to play in the sustainable seafood market in Montreal. MFDS is a very important, influential client for the distributors with whom it interacts. MFDS has the opportunity to serve as a model for integrating sustainable seafood into a university context. We hope our research can help others begin to address this important issue.

II. Introduction & context

Present day seafood consumption is influenced by a historical perception of the ocean as an inexhaustible resource. Seafood, a staple of the human diet, is entrenched in local culture. This is especially true for coastal and developing country populations, for whom seafood is often the primary source of protein (Ziegler, Nilsson, Mattsson, & Walther, 2003). In 2006, fish provided about 2.9 billion people with at least 15 percent of their average per capita animal protein intake (Food and Agriculture Organization of the United Nations [FAO], 2008). However as a result of the steadily increasing human population and corresponding demand for food, formerly plethoric fish stocks are now on the brink of collapse. Catch data shows overall natural stocks of the top ten species of wild fish are either fully or over exploited. As a result, global population sizes (and therefore catch sizes) of these species cannot be expected to increase to past levels or to meet future demand (FAO, 2008). Appendix I shows the initial stock quotas and actual catch numbers for cod, bluefin tuna and crab between the years 1990-2010. From the figures we see that actual catch numbers are almost the same as the entire natural stock estimates. This shows that natural stocks are so depleted and fishing has become so efficient that annual catches nearly entirely deplete global populations of these species year after year.

According to the United Nations and World Bank (2008) report entitled “The Sunken Billions,” global fishing industries lose an estimated $50 billion per year to collapsing fish stocks. The depletion of global fisheries can be attributed to increasing industrial catch efficiencies, as well as poor regulation of actual catch sizes. Modern fishing methods such as bottom trawling, dredging and pelagic longlining, while very effective, are detrimental to natural habitats and produce large quantities of bycatch that do not survive when returned to the ocean.

By destroying benthic habitats, these practices significantly reduce the ocean's biodiversity, healthy functioning and structural integrity. This in turn jeopardizes ecosystem services and long-term stability (Holmlund & Hammer, 1999). Furthermore, relatively low oil prices mean that commercial fishing boats can travel far from shore and over long periods, and store their immense catch in on-board freezers. Furthermore, this increases the ability of commercial fishing vessels to catch large quantities of fish in a short period of time. Lastly, governance of fisheries is largely localized, and catch limits - when imposed - are difficult to enforce. In this context, it is no wonder that fish stocks are collapsing, and industries driven by consumer demand are "fishing down the food chain" as species after species disappears.

In North America, growing concerns about collapsing fish stocks have prompted demands for a more sustainable option (Jacquet & Pauly, 2007). In recent years, a number of organizations interested in promoting public awareness, fishery sustainability, and sustainable seafood choices have emerged. Some of these include seafood purchasing guides (such as MBASW), and fishery certification programs (such as MSC). Other institutions, such as Ocean Wise, partner with sustainable fisheries and fish farms, as well as make purchasing suggestions. Although there are a number of differences between these organizations' criteria for what exactly is "sustainable" seafood or practices, their goal remains consistent; to analyze, evaluate, and certify certain fisheries as sustainable, thereby enabling consumers to make responsible choices. However, there is an important distinction between organizations such as SeaChoice, which produce seafood guides that categorize fisheries by best, worst, and moderate sustainability, and bodies like the MSC, which award wild fisheries and fishery products a 'certified sustainable' eco-label. These labels inform consumers that the products they are purchasing come from a sustainable source, and were caught in an environmentally friendly fashion. Eco-labeling however, must be distinguished from government enforced labeling, as "Canada's seafood-labeling regulations do not require labels to include the country of origin of seafood, whether it is wild-caught or farmed, or whether the product contains colourants or other additives" (SeaChoice, n.d. b).

Although certification bodies provide a more comprehensive analysis of a product's sustainability than government or industry provided information, their legitimacy remains an important question for two main reasons. First of all, past decisions have been controversial. For instance, the MSC certified as sustainable a "US trawl fishery for Pollock… despite the fact that

the spawning of those Pollock fell by 64% between 2004 and 2009" (Jaquet, Pauly, Ainley, Holt, Dayton & Jackson 2010). Secondly, poor traceability (or transparency of production methods) of fish markets means that there is a limited capacity for independent consumer evaluation of these sustainability certifications. It is therefore unclear whether seafood certified as sustainable is truly such (Iles, 2007). Despite these problems, certification bodies represent an important step in the promotion of responsible fishing practices.

McGill University, as an ecologically minded institution within a developed nation, is well positioned to critically evaluate the seafood served by the McGill Food and Dining Services (MFDS). MFDS provides 75% of food available at McGill either on campus or in residences. Through its mandatory meal plans MFDS determines what all students in residences eat. With such a large client base, it is important that the seafood offered not only meets nutritional needs, but that it is purchased responsibly. Aramark, MFDS' primary food services provider, has a commitment to align itself with MFDS goals, and advertises a focus on "caring for the earth and its environment" in its business model (Aramark, 2009). As MFDS controls the food that Aramark supplies on campus, a switch to sustainable food sources may have far-reaching effects; Aramark is one of Canada's largest food services providers, employing 8100 people in Canada (Jermyn, 2010), and bringing in a company total of $12.3 billion in 2009 ("Fortune 500: Aramark," 2010).

In the last year, MFDS has made significant efforts to purchase produce from more sustainable sources by hosting monthly local food days in residence cafeterias and buying from McGill's Macdonald Campus farm. In an important addition to these efforts, Oliver de Volpi, Executive Chef of MFDS, made the commitment to serve only sustainable seafood after September 1, 2010. However, this commitment was made with the caveat that seafood will still be served to meet student demand, even if no truly sustainable option is found. Given the difficulty of defining what constitutes sustainable seafood, as well as obtaining information regarding from McGill's food sources (Knight, Lahey, Leipzig, Macdonald, & Vansintjan, 2009), research is necessary to determine how best to collect and evaluate information so that sustainable purchasing decisions can be made. Clear, to the point and well laid out!

III. Research objective and client

The objective of our research is to develop a system that enables MFDS to make sustainable seafood purchasing decisions. We have defined "sustainable seafood" as seafood fished or farmed in a manner that does not jeopardize the long-term health of any species in the relevant ecosystem, and that is linked to economic harvesting practices that will allow for continued harvesting for generations to come.

Our primary client is MFDS. There are several individuals within and connected to MFDS that serve as liaisons and advisors to this project. Oliver de Volpi is the Executive Chef for MFDS. His experience in the culinary industry has provided us with practical constraints regarding budget and consumer taste preferences, which have helped to narrow the scope of our research. Laura Rhodes is the Food Systems Administrator for MFDS, a new position that was created to assist MFDS in purchasing more local and sustainable food. She has given us a better understanding of how food purchasing at McGill is carried out, and we are hoping to provide her with a tool that will assist her in purchasing sustainable seafood on a daily basis.

Other stakeholders interested in this research project include Lilith Wyatt and Sarah Archibald. Ms. Wyatt is the Sustainability Projects Fund (SPF) Administrator within McGill's Office of Sustainability. The SPF, created in 2009, aims to generate "opportunities for the McGill community to actively engage in sustainability initiatives on campus and in their research" (McGill University Office of Sustainability, 2010). Ms. Wyatt is the steward of the SPF Working Group, a committee that provides feedback on project applications sent to the SPF. This project aligns well with the goal of the SPF as it is helping to build a culture of sustainability at McGill. Sarah Archibald is one of the coordinators of the McGill Food Systems Project (MFSP), a "university supported, student run initiative, whose goal is to examine and revitalize the university's relationship with the food it consumes" (Belanger, De Panicis, Moreau, Pelland, Scott, Smith, Theriault, & Westlake, 2009). The MFSP has previously collaborated with MFDS to evaluate other food purchasing practices, so this group will be informed by and will be building upon work that they have undertaken.

IV. Methodology

Following are the sequential steps made throughout this research project. This section is solely descriptive of the process undertaken; a detailed analysis for each stage of the project will be provided in the proceeding sections.

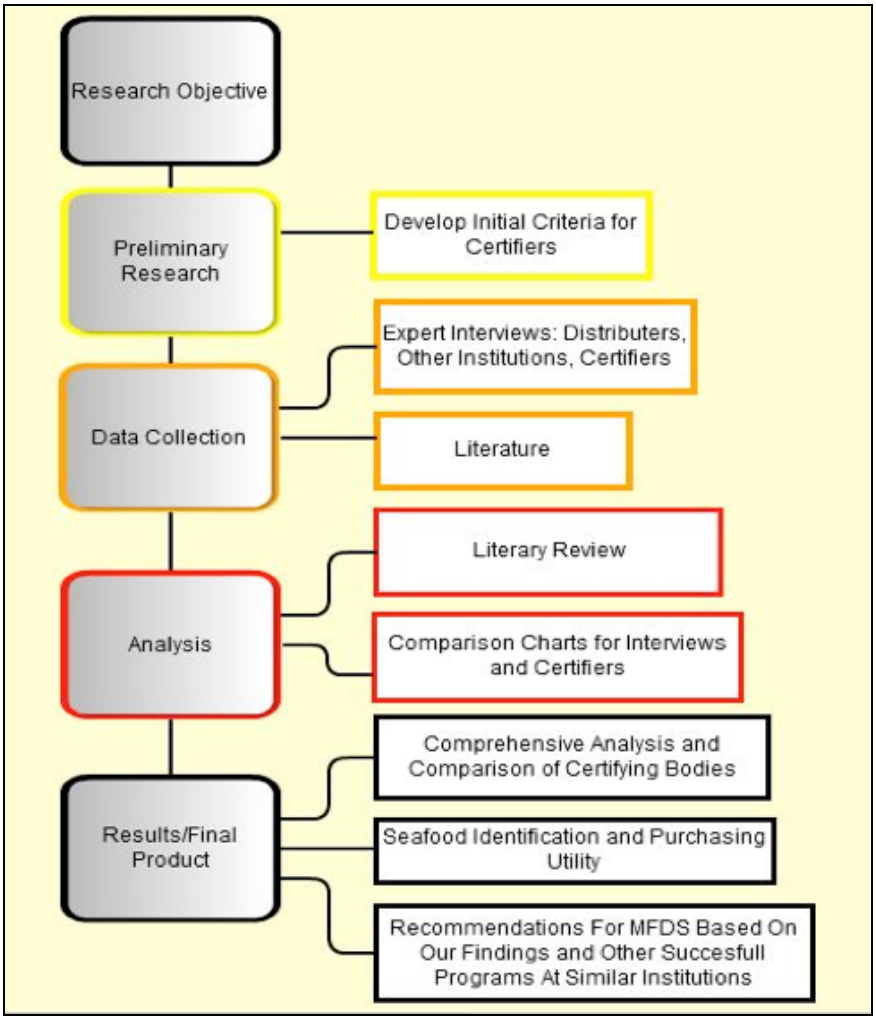

Figure 1. A simplified flow chart showing our methodology.

IV.I. Determining our objective

The first step was to define the purpose of the project by determining our objective. Our initial research objective, stated above, was derived from information provided to us by the predetermined project outline and first meeting with our clients. This meeting clarified the basics of seafood purchasing at McGill, including what seafood was being purchased at the time,

and what certification bodies or other eco-labels were being used. At this stage only a preliminary objective was formulated; a more detailed final objective was determined subsequent to our preliminary research.

IV.II. Preliminary research

Having determined our initial research objective and taken into account the needs of MFDS concerning seafood purchasing, a preliminary investigation was conducted for the purpose of gathering information on sustainability within the context of the North American seafood industry. This included any relevant sustainability-promoting organizations, other universities, and experts in the field. The process enabled us to refine our original objective. It became clear from an early stage that a complete knowledge of existing ecolabels and other certification or scientific institutions was going to be a major component of this project. However, there are hundreds of global ecolabels and seafood guides, many of which are not applicable to MFDS and the context in which it operates. To help orient and refine the remaining research, some initial criteria were generated to discern ten certifiers and recommendation institutions from which to base the construction of our final products. These initial criteria will be discussed in more detail in the "Ecolabel Comparison" section, and can be found in Appendix II.

IV.III Data collection

Data was collected from research on all aspects relevant to sustainability within the MFDS purchasing system and North American seafood industry. Three types of institutions were classified as most applicable to our objective and the needs of MFDS. These institution types operated in three areas of the supply chain: (1) distributors of seafood; (2) retailers of seafood (such as MFDS); and (3) certification or recommendation bodies (ecolabels). To obtain information on these three groups, three types of data collection were used: (1) open-ended standardized interviews; (2) web searches; and (3) a literature review.

Open-ended standardized interviews were conducted on individuals representing the three institution types. The first group to be interviewed was local distributors, MFDS' primary suppliers of seafood. The second group consisted of representatives from other consumer-based retailing institutions similar to McGill. These included other Canadian universities as well as select American universities similar in size to McGill. Finally, representatives from a number of

ecolabels most applicable to MFDS were interviewed. To decide which were most applicable, we drew from the preliminary research and interviews with distributors and other retailers.

Interviews were conducted with the intent of procuring certain pieces of standardized information that would allow for cross-reference and comparison between interviewed subjects. These individual representatives were first invited to an interview via e-mail. Upon their acceptance, interviews were conducted through a conference call. It is important to note that this method of data collection may introduce a form of bias. When conducting open-ended interviews, the interview often became conversational and moved away from a set dialogue; in this way, certain interviews gave slightly different information for each standardized information point. Similarly, some interviews yielded a greater or lesser depth of information, depending on how they were conducted. Another point to note is that the 'expert representatives' interviewed may not have been accurate representatives of their respective institutions.

These interviews were complimented with an in depth literature review of both academic and gray literature containing information on each institution group described above.

IV.IV Analysis

With the data collected, in-depth analysis and interpretation could proceed. The analysis primarily consisted of two parts: (1) comparison and interpretation of interview findings; and (2) further literary review. Comparison charts of the standardized information obtained from each institution type were compiled. These charts allowed for quick comparison of information amongst institutions in each group; they will be described in more detail in the "Results and discussion" section, and may be found in Appendices III, IV, and V.

The comparison charts were complimented with another more specific literature review, much like the one conducted during the initial data collection. The interpretation of these results and subsequent analysis were a major component in the formulation of our three products to be provided to the client, and will be discussed in later sections.

IV.V Results and final products

Upon completion of group's analysis and interpretation of the data, three final products were compiled for submission to MFDS. The first product was an in depth comparison and analysis of available certification and recommendation institutions, which also included the respective interview comparison charts. The second product was a sustainable seafood

identifying and purchasing utility. This utility was built in a standard Microsoft Excel program and was designed to help MFDS to identify sustainable seafood products and local suppliers who may carry those products. The last product that was created was a set of recommendations to MFDS based on the research objective and findings of this project. The details of these three products and exactly how they were produced will be discussed in later sections.

V. Results and discussion

A large sum of information was gathered from primary literature research and by conducting interviews with industry representatives. These representatives included local distributors of seafood in the Montreal area, other university retailers of seafood, and ecolabel institutions. From interpreting this information, and by eliminating ecolabels deemed as unfit or inappropriate for this project and for the needs of MFDS, several ecolabels were chosen for inclusion in our utility. These include: Monterey Bay Aquarium Seafood Watch (MBASW), Marine Stewardship Council (MSC) and Ocean Wise. This section discusses the decision-making process, which was achieved primarily through group discussion and a thorough comparison of all relevant ecolabels.

Although the preliminary ecolabel comparison and literary review were taken into consideration throughout the data collection process, these results will be described in detail in the "Ecolabel comparison" section of this report. Interviews with experts were a critical supplement to this information.

V. I. Interviews with experts

V. I. I. Distributor interviews

Three major Montreal distributors of seafood were interviewed. Those distributors interviewed were the three suppliers currently used by MFDS, and as such were of most interest to our study. The interviews were conducted in an open-ended standardized format, and did not adhere to a set dialogue. However, key pieces of information were drawn from each interview so as to allow for interpretation and comparison. This standardized information was input into a spreadsheet for the convenience of comparison and analysis, and can be seen in Appendix III.

These interviews had implications throughout the study and were useful from our preliminary research to our final analysis. Distributors provided a source of information on the seafood market in Montreal and Canada as a whole, and aided the preliminary research by illustrating where MFDS fit into the larger seafood purchasing system. These interviews also gave a good indication of the current market for sustainable seafood and whether MFDS was reasonable in demanding such products. Furthermore, the interviews gave us a useful understanding of the stance that distributors take on the concept of sustainable seafood and whether they saw it as a viable product to stock. On the whole, discussions with the suppliers gave extensive insight into the monetary dimensions of sustainable seafood and certification.

Gordon Food Services (GFS)

A sales representative from GFS, Francois Savard, was interviewed on November 3, 2010 (see Appendix III). GFS is a major supplier to MFDS and is a large company that operates throughout Canada and the U.S., supplying various institutions with food and catering supplies. GFS's primary customers are either larger franchise institutions or smaller "street" restaurants throughout Montreal (F. Savard, personal communication).

Mr. Savard had the least comprehensive understanding of sustainable seafood out of all distributor representatives interviewed. He was familiar with SeaChoice's guide system but had no real grasp of the larger certification industry. Demand for such products from GFS is low (F. Savard, personal communication). The first client to demand sustainable seafood was the Queen Elizabeth Hotel. GFS' other clients tend to be driven by the economic factors such as price, rather than the more qualitative values of products marked as sustainable. Mr. Savard believed the market for sustainable seafood in Montreal was still small and emerging but showed enthusiasm to be a part of it. In addition, he explained that the traceability of GFS's system is fairly high but is set up for the purpose of tracing poor quality products back to the producer. The system is motivated by health and safety concerns; how the product was produced or where it was harvested is of little significance. From the interview we concluded that GFS saw limited use in discerning the sustainability of a product.

Pierre En Gros

A sales representative and manager from Pierre En Gros, Francisco Peixoto, was interviewed on November 3, 2010 (see Appendix III). Pierre En Gros is small distributor of seafood products that operates solely in Montreal. Pierre En Gros has many clients in Montreal. The largest of these is the Queen Elizabeth Hotel, which is one of the few customers demanding sustainable seafood products. Pierre En Gros claims to be constantly educating it customers in an attempt to generate awareness of the benefits of purchasing sustainable seafood. Mr. Peixoto expressed his opinion that education is an integral part of generating demand for sustainable seafood products and he is seeing substantial increases in this demand throughout Montreal (personal communication).

Pierre En Gros is aware of the certification industry and preferentially uses Ocean Wise to label much of its stock. Mr. Peixoto preferred this ecolabel because he believes that it is more scientific in nature and that it is more accountable (personal communication). Ocean Wise is thought to be the most accountable system because it requires more complete knowledge of the fishery's practices, and implements a follow up process to verify what methods of capture the fisheries are using. Mr. Peixoto emphasized this process as an advantage because it provides a method of monitoring fisheries to make sure their harvesting practices do not change after the Ocean Wise recommendation is awarded. Upon an interview with Ocean Wise that was conducted after this interview, it was found that the extent to which Mr. Peixoto's statements are true varies; this will be discussed in detail later. However, the fact that much of the information acquired here is not entirely the case shows that there are many knowledge inconsistencies as to what certifiers are and how they operate.

Pierre En Gros, as a smaller distributor, often has more manageable and intimate ties with its producers and suppliers. To obtain the information required to "recommend" their stock, representatives from Pierre En Gros often visit and talk to fisheries directly. When Pierre En Gros locates fisheries or seafood producers that meet Ocean Wise's requirements, they often purchase enough stock to satisfy their clients for a year. This is an important business strategy, as it guarantees the price for their customers; Pierre En Gros has found that many fisheries increase prices upon receiving a recommendation from Ocean Wise. Ultimately, their business process illustrates a fairly transparent and clear supply chain. This is achievable because of Pierre En Gros' small size, intimate relationship with its suppliers, and commitment to

sustainable seafood. It also shows very proactive attempt in marketing, selling and participating in sustainable and certified seafood.

Sysco Corporation

A protein specialist and sales representative from Sysco Corporation, Denis Charron, was interviewed on November 8, 2010. Details of the interview can be found in Appendix III. Sysco is the largest food distributor in North America, serving a wide variety of customers. Many of these customers are large institutions such as MFDS (Sysco Canada, 2010).

Mr. Charron demonstrated extensive knowledge on many certifiers in the industry. This knowledge resulted from a concerted effort to research sustainable seafood products in order to address the queries of MFDS. Through his own research of various institutions Mr. Charron found that there were a few "workable" certification systems amongst a larger array of "bogus" systems (personal communication). Mr. Charron concluded that Sysco's most preferred certifiers are those that involve a third party audit to ensure that standards are being maintained; an example given of such a certifier was MSC. This type of certification system was preferred over a label or recommendation institution. MSC was also considered reputable with minimal gaps in information flow and the highest degree of transparency. Sysco is particularly concerned with traceability along the supply chain. Mr. Charron claimed to only purchase from credible companies that frequently check their stock with audits to ensure its quality and correct labeling. In this instance larger companies can be held more credible due to their greater resources and need to maintain reputation (personal communication).

Mr. Charron went on to voice concerns over the issue of seasonality, which he and Sysco as a whole were very aware of when buying and selling products. Contradicting Pierre En Gros, he did not believe that fish could be stocked for the year, and that discerning which fisheries have stock that is in season is integral in providing truly sustainable seafood.

Ultimately this interview illustrated the lack of consensus over the most appropriate ecolabel and that seasonality of fish species was an issue that had not yet been fully addressed. Most importantly for MFDS, Sysco, like other distributors, showed enthusiasm to participate in the emerging market for sustainable seafood.

Distributor interview analysis

There are several key points derived from the interviews that aided the group in its decision on how next to proceed. Firstly, it became evident that the market for sustainable seafood in the greater Montreal area is small, still emerging, and catering to a very niche market. Products labeled as sustainable are often not readily available. This may prove to be a barrier to MFDS' access to a supply of affordable sustainable seafood products. However, all of the distributors interviewed showed significant interest in providing sustainable seafood products and demonstrated their desire to meet any demands of this market. Since MFDS is a fairly large client, it may be able procure sustainable products more easily than some other smaller institutions. Secondly, we found that there was no industry consensus on the most appropriate ecolabel or certification system. It appears that distributors sell whatever "sustainable" seafood is available and demanded by consumers. Although each contact was familiar with his preferred certification or recommendation system there was little understanding of the general certification community, its weaknesses, and how many certifiers operated within the larger seafood system. A third significant theme of the interviews was the variable of seasonality; Mr. Charron from Sysco made it clear that it is a major factor discerning business practices. During certain times of the year these products are either hard to come by or considered less sustainable. This variable was previously unconsidered, and a major finding of these interviews. In response, the group addressed seasonality in the literature review and incorporated it into expert interview discussions throughout the remaining data collection and analysis. However, lack of extensive data as to the availability and sustainability of fish species at different times of the year prevented us from thoroughly incorporating this aspect into the final utility further than what the certifying bodies themselves already incorporate in the certification process.

The interviews presented several implications for the completion of the research objective. Firstly, we concluded that the current availability of certified products must be taken into account when deciding on the most appropriate certification label for MFDS. Although our preliminary research ensured that all ecolabels considered were relevant to the Canadian context, the interviews highlighted that some are not yet established in the Montreal area and of little significance to MFDS. Secondly, the fact that suppliers are willing to expand into the sustainable seafood market is encouraging. We are confident that if MFDS demands a greater variety of sustainable seafood products, suppliers will be capable and willing to meet this

demand. Thirdly, the lack of industry consensus on the most appropriate ecolabel illustrated the need for analysis of specific ecolabels. It was decided from these interviews that further research and analysis of certification systems was necessary to determine the value of existing ecolabels to both consumers and MFDS. The interviews also demonstrated that an understanding of how certifications operate within the larger seafood industry was necessary to determine which institution is most appropriate for use by MFDS. We approached these tasks by interviewing experts from the applicable certification bodies – a process discussed in the upcoming "Ecolabel comparison" section.

V. I. II. Interviews with universities

Nine food services staff members at seven universities were interviewed to provide insights on how other retailing institutions are choosing to institutionalize sustainable seafood purchasing. As with the distributor interviews, an open-ended standardized interview format was chosen, allowing for additional information to be shared. The standardized information is presented in the comparison chart (see Appendix IV); all interviews were conducted between November 2 and November 12, 2010.

The universities selected were chosen for their relative comparability to McGill (for instance, most are relatively large, research-intensive institutions), their geographic location (we focused on Canadian institutions but included institutions from different regions), and leadership in sustainable purchasing (drawing on previous student research conducted in collaboration with the McGill Food Systems Project). The selection of universities allowed us to understand a diversity of approaches and institutional constraints. Laura Rhodes and Oliver de Volpi for MFDS were asked the same set of standardized questions to ensure comparability of results between other universities and McGill. McGill's answers are excluded from the analysis below but are included in the comparison chart. These interviews provided information about how other universities are implementing sustainable seafood purchasing practices and assisted us in designing our utility.

University Interview Analysis

Several conclusions from the interviews aided our research. Firstly, lack of consensus between universities regarding which certification system to use affirmed the importance of conducting this research. Secondly, the interviews provided useful context regarding the strengths, weaknesses, successes, and challenges experienced by other universities, allowing us to learn from their experiences when designing a system for McGill. Thirdly, the interviews provided insights into the importance of the universities' relationships with their suppliers.

Choice of certification or sustainability guidelines

There was no consensus between universities concerning which certification system is most appropriate for the university context. Of the universities contacted, four had no formal system or policy for seafood purchasing; UC Berkeley and the University of Toronto rely on Monterey Bay Aquarium Seafood Watch guidelines, while Dalhousie relies on a distributor with strong relationships with local fisherman and is considering both SeaChoice and the Marine Stewardship Council (MSC). Three universities used a formalized system; UBC and the University of Winnipeg use Ocean Wise, while the University of Notre Dame uses MSC. Within these systems, most universities are avoiding serving seafood on the "red" or "avoid" lists, while some are also avoiding "yellow" or "caution" lists. Within the chosen system, food services units sometimes specify their own level of commitment to sustainable seafood purchasing; for instance, University of Toronto Executive Chef Jaco Lokker serves only "green" list fish in the unit he manages (Hart House), but other units are not as ambitious. Some universities add more sustainable procurement processes; coastal institutions UC Berkeley, UBC, and Dalhousie all spoke about the importance of finding local seafood where possible and appreciated their proximity (both geographic and through the supply chain) to regional fishermen. All universities recognized that they could not serve a perfectly sustainable menu, particularly given the constraints of price, university capacity to conduct research and follow up with suppliers, and suppliers' degree of knowledge and flexibility; universities expressed the intention to stay as up-to-date as possible and make decisions based on the best information available.

Strengths of university sustainable seafood purchasing programs

When asked to identify the strengths of their current systems, university representatives focused on the reliability of the information on which they are basing their decisions, accountability, ease of use, and feelings about "doing the right thing." The universities using a formal system for seafood purchasing all articulated that having the necessary research conducted by a reliable third party is a crucial strength, due to lack of capacity to conduct this ongoing research within the university food system. The University of Notre Dame expressed satisfaction that MSC has a rigorous standard that manages the whole chain of custody and that suppliers can provide MSC documentation to the university.

While both UBC are the University of Winnipeg identified the accountability of being an Ocean Wise partner as a strength, the degree of trust in Ocean Wise varied. The experts interviewed at the University of British Columbia were much more skeptical of the rigor of the Ocean Wise system than the chef interviewed at the University of Winnipeg. Accountability to diners was important to universities such as the University of Toronto and UBC who identified consumer demand as a reason for their implementation of sustainable seafood purchasing practices. UBC values Ocean Wise's clear branding for its menus as a way to communicate with consumers, while University of Toronto's Executive Chef Jaco Lokker placed greater emphasis on the idea that implementation of MBASW standards requires them to know what they are serving, which in turn facilitates answering students' questions and being able to back up their answers. Four universities (University of Toronto, UBC, UC Berkeley, and Dalhousie) articulated that an institutional framework with a broader sustainability agenda influenced their shift to sustainable seafood purchasing.

Less tangible strengths were also identified. Numerous interviewees expressed that their system made them feel as though they were doing their best to "do the right thing". UC Berkeley, the University of Winnipeg, and the University of Toronto felt that they were making the best choices by avoiding "red-listed" fish, while UBC was more skeptical that this standard was sufficient but recognized that this was currently the most feasible for their food system. Dalhousie, UC Berkeley, and UBC appreciated the efforts of their suppliers to work directly with fishermen (recall that this is not necessarily applicable to McGill, given that these institutions are much closer to coastal fisheries).

Weaknesses of university sustainable seafood purchasing programs

When asked to identify the weaknesses of their current systems, university representatives focused on the concerns about certification credibility, poor information flow from distributors, decreased menu flexibility, lack of formal certification and/or purchasing policy, and difficulty selling an increase in price to consumers. While some universities expressed satisfaction with the rigour of the guidelines provided by ecolabels and certifiers, others were concerned that some were not sufficiently researched or monitored. UBC suggested that Ocean Wise standards may not be sufficiently context-specific to support true sustainability, taking into account local ecosystems and different fishing methods, and recognizing that many species are currently controversial in British Columbia, including wild salmon, prawns, and various forms of aquaculture. UBC also noted that Ocean Wise does not sufficiently address concerns about sustainability for human systems, and tradeoffs between food security and ecological impact.

Lack of information or poor flow of traceable information from distributors presented a major frustration to several universities. Particular dissatisfaction was felt with big suppliers such as GFS and Sysco, who, in the words of the University of Toronto's Jaco Lokker, "don't know what they're selling." Universities who had more success in getting the information they desired were primarily coastal institutions using distributors who pay particular attention to making relationships with regional fishermen (UBC, Dalhousie, and UC Berkeley). However, the University of Winnipeg also expressed satisfaction with its suppliers, indicating that its role as a relatively large purchaser made its suppliers willing to the extra work to satisfy the university's expectations.

Most universities mentioned that there has been some reluctance to institutionalize sustainable seafood purchasing due to the constraints it places on menu flexibility. Several universities regretted that they could no longer reliably serve salmon (a consumer favourite) due to the expense of sustainable salmon. The University of Toronto noted that it now serves only about seven species of fish, and instead must provide variety by altering the way it is prepared. Beyond the restrictions of not serving "red-listed" fish, the University of Notre Dame is constrained by its use of MSC, since MSC does not cover farmed seafood. Similarly, use of a formal certification process is likely to exclude some smaller suppliers without the resources to provide sufficient information, documentation, or certification fees. The additional cost of

sustainable seafood was also a generally acknowledged concern, but universities seemed committed to finding creative ways of making their purchasing economically feasible. The University of Notre Dame identified the cost of the auditing process required by MSC as an additional weakness of their current system.

Some universities identified a lack of a formal certification system or an institutional sustainable purchasing policy as a weakness. Dalhousie regretted not having a formal mission statement outlining specific criteria, and UC Berkeley and the University of Toronto noted that their system might have been stronger if they used a formal certification system; however, this seemed to stem largely from the fact that it would be easier to communicate to students and may have been biased by the questions we asked. One of the experts from UBC felt that sustainable seafood purchasing would be enhanced by a formal university-wide policy mandating criteria for sustainable seafood purchasing.

Purchasing responsibility

One important outcome of the interviews with university experts was discovering who is responsible for seafood sourcing and purchasing at each institution. At several universities, the head chef works directly with distributors, sometimes with support from other chefs. The chefs who expressed the most satisfaction with their current system were generally those for whom the distributors did much of the leg work (at Dalhousie, University of Toronto, and the University of Winnipeg). UBC, however, has their purchasing department do much of the research and make recommendations based on Ocean Wise standards; management of the food outlets then makes the final decision. The University of Toronto however, does follow up with its suppliers regarding documentation.

Barriers

During the interviews, several barriers to effective implementation of sustainable seafood purchasing policies at universities were identified. First, many universities felt that they lacked knowledge about the different certifications and the current research in seafood sustainability. UBC, while committed to Ocean Wise, joined other universities in finding it difficult to stay abreast of all emerging research in the field.

Second, many universities expressed frustration that distributors didn't know enough about sustainable seafood guidelines and certifications or where to source sustainable products and do not make sufficient time to investigate. This was particularly true in regard to larger distributors, such as Sysco, GFS, and US Foods, who university purchasers found to be concerned only with cost. Some universities, such as Dalhousie, UC Berkeley, and UBC, have relationships with smaller-scale distributors with greater knowledge of sustainable seafood sourcing; it is obvious that this may be easier given these universities' proximity to the ocean. However, the University of Winnipeg also had few problems with availability, which they attributed to having considerable purchasing power and their local distributors being willing to do the leg work to source sustainable products. Lack of distributor awareness and ability to provide traceable information combines with confusion about different certifications and guidelines to make the task of managing sustainability information a daunting one, particularly if the purchaser desires to make context-specific decisions. Some universities are able to wield enough purchasing power that their distributors do this legwork; this seems to be more successful for universities who work with smaller scale distributors and who are closer to the ocean.

Third, often due to lack of distributor knowledge, some universities indicated that availability of sustainable seafood posed a significant challenge. McGill has found that even those distributors who are aware of sustainable seafood standards may only carry a few products, making it more time-consuming to find distributors who can provide all the different products desired, and may not be able to reliably provide the desired volume of fish.

Fourth, several universities commented that consumer beliefs about what they are willing to pay posed a barrier. The University of Winnipeg believes that their clientele simply doesn't understand how much it costs to provide quality sustainable food. Some universities, notably coastal institutions such as Dalhousie and UBC, credited their clientele with having high standards for seafood (although often this is more to do with freshness than sustainability). Contrastingly, McGill finds that students are the driving force behind the move to sustainable seafood; being able to demonstrate student support for MFDS' sustainability initiatives is very important, and thus student turnover is a concern.

Fifth, the lack of an official mandate or policy regarding sale of sustainable seafood puts the burden of meeting self-imposed criteria within budget constraints solely on the food providers. At UBC, UBC Food Services is trying to champion the value of Ocean Wise to the

administration to convince them it is worthwhile; this creates additional pressure to make sure that they are still running a financially successful business. All university food providers need to provide food that is relatively affordable for students. Several universities lamented that certain sustainable species, particularly wild salmon, are outside of their price range.

Tradeoffs and solutions

University experts identified several tradeoffs they have made in order to implement sustainable seafood purchasing practices. First, time limitations have lead some universities to go with the easiest, most accessible certification option regardless of its rigour. Second, tradeoffs have to be made when shifting to accommodate more expensive sustainable fish. The University of Toronto compensates by decreasing the portion of fish but getting more creative with the way it is cooked so it is still appealing to their clientele. Dalhousie explains that you can save money in other areas of the budget, for example by buying less processed and prepared products (the less prepared it is, the cheaper it is), and re-allocating that money to something that is prioritized in their budget, potentially sustainable seafood. Third, agreeing to sustainability criteria for seafood purchasing means a lesser variety of species can be included in the menu. The University of Toronto sets its menu early enough to source a product in advance; they then use up to seven sustainable species that they know their distributors can reliably source, and creates variation through different methods of preparation.

In sum, the interviews with university experts provided a wealth of practical information. In addition to providing examples of useful and creative solutions to common problems, these interviews helped our research group to identify the key areas of difficulty universities experience in implementing sustainable seafood purchasing practices. These insights were crucial in shaping our utility, and we hope that this section of our report will provide further suggestions and guidance to MFDS.

V. II. Product 1: Ecolabel comparison

The first stage of the ecolabel comparison process consisted of our preliminary research. We compiled a list of existing ecolabels, seafood guides, and recommendation institutions through a preliminary web search. Existing ecolabels that were considered for recommendation to MFDS had to first meet a set of basic criteria. These criteria included dealing specifically with seafood products, having objectives based on sustainability and conservation, being relevant to the Canadian context, being oriented toward the consumer level of purchasing, and having been established for more than a year. Next, ecolabels that were found to be inappropriate for MFDS were eliminated from the list. From our preliminary list of ten ecolabels including MSC, Ocean Wise, SeaChoice, Global Aquaculture Alliance, Lenfest Ocean Program, Blue Ocean Institute, Environmental Defense Fund, MBASW, Friend of the Sea, and Aquaculture Stewardship Council, we decided that only MBASW, MSC, and Ocean Wise should be considered for our project. This was determined through extensive group discussion considering aspects such as traceability, monitoring and auditing, applicability and availability in Canada, credibility, ecolabel criteria for "sustainability" (including various environmental parameters such as size of stock, method of capture, ecosystem damage), and method of operation.

V. II. I. Ecolabelling programs that were eliminated from the preliminary list

A number of seafood ecolabels were reviewed for the purpose of this project, and through investigation and discussion a number of them were ruled out as being insufficient for purposes relevant to the MFDS. Those seafood ecolabels are listed below, each with a brief summary and explanation for why they were not relevant to the project objective. The tool that assisted this process may be found in Appendix II.

Global Aquaculture Protection Index (GAPI)

John Volpe was our contact for the Global Aquaculture Protection Index (GAPI), and was interviewed on November 8, 2010 (See Appendix V). GAPI is a research group that deals specifically with the sustainability of aquaculture practices in the seafood market. GAPI was discovered through preliminary research on the Lenfest Ocean Program. The fact that GAPI dealt specifically with farmed finfish made it worthy of further investigation; there are not many research groups who look solely at aquaculture practices. That being said, Mr. Volpe emphasized that GAPI is a research body that assesses farms against a rigorous and perhaps unrealistic standard – zero ecological impact. The index is targeted toward policy makers at the national level, and is meant to give an overall picture of aquaculture practices worldwide. It is not created to guide individual consumers in their seafood purchasing, nor is it applicable to the certification of seafood products (J. Volpe, personal communication). Therefore, it was decided that GAPI was not an ecolabel suited to the needs of MFDS.

SeaChoice

SeaChoice is a consumer-related seafood-purchasing guide that bases its suggestions on information from the MBASW (SeaChoice, n.d. a). As SeaChoice does not conduct its own research, it was decided that it would be advantageous for MFDS to eliminate SeaChoice as the middleman, and go straight to the underlying research institution. This way, potential delays in information concerning ecological status, or best capture and farming methods can be avoided. Thus, we found it more appropriate to use the MBASW as our purchasing guide.

Global Aquaculture Alliance (GAA)

Global Aquaculture Alliance is a certification body dealing specifically with aquaculture. As of December 2010, their “Best Aquaculture Practices” standards are only in use for feed mills, processing plants and farms that raise shrimp, tilapia, channel catfish, and *Pangasius.* The certification is targeted at the individual consumer rather than a larger institution like McGill, and is sold through retail grocery stores. Furthermore, it is not widely available in Canada (GAA, 2010). Due to these limitations, it was decided that GAA does not meet the requirements to be used in the purchase of MFDS’ farmed seafood.

Friend of the Sea

Friend of the Sea is a non-governmental organization that certifies both fisheries and aquaculture. The auditing process is conducted by independent international certification bodies, and follows FAO guidelines for the ecolabelling of fish and fishery products (Friend of the Sea, n.d.). The certification process seems quite rigorous and transparent, with audit reports displayed clearly on their website. However, Friend of the Sea certified products are not widely available in Canada and therefore was not a good candidate for MFDS to utilize for regular seafood purchasing.

Environmental Defense Fund (EDF)

Much like SeaChoice, the EDF is a consumer-oriented seafood- and sushi-purchasing guide that is based on information provided by the MBASW (EDF, 2010a). The EDF also prioritizes helping troubled fisheries improve their management efficiencies and increase sustainability and long-term international ratings (EDF, 2010b). For the same reasons as SeaChoice, EDF was not chosen; its information might be slightly delayed as opposed to using MBASW directly as our purchasing guide.

Blue Ocean Institute

Blue Ocean Institute has been in operation since 2003, and publishes a seafood analysis and ranking methodology entitled *Guide to Ocean Friendly Seafood.* The publication considers rigorous criteria for both wild-caught and farmed fish. However, it is not a certification body; rather, it is a ranking system that assigns a score from 0-4 depending on the sustainability of the species in question (Blue Ocean Institute, n.d.). Because it is a ranking guide rather than a complete certification system, and because it refers potential purchasers to fisheries recommended by the Marine Stewardship Council, it was decided that Blue Ocean Institute was not an appropriate and time-efficient choice for MFDS.

Aquaculture Stewardship Council (ASC)

The ASC was founded in 2009 by the World Wildlife Fund and Dutch Sustainable Trade Initiative. The ASC is a global organization working with aquaculture producers, seafood processors, retail and food service companies, scientists, conservation groups, and the public to promote best environmental choice in farmed seafood (ASC, n.d.). However, the ASC is expected to be fully operational by mid-2011, and therefore is not a possible option for use by MFDS at this time. We recommend that MFDS consider ASC as a certification system for its farmed seafood purchases – for more details, see the "Research challenges" and "Future research and outlook for MFDS" sections.

V. II. II. Monterey Bay Aquarium Seafood Watch (MBASW)

The MBASW is a seafood-purchasing guide that was founded in 1999. It helps consumers and businesses become advocates for ocean-friendly seafood by recommending sustainable seafood choices. Its goal to "help sustain wild, diverse and healthy ocean ecosystems that will exist long into the future" (Monterey Bay Aquarium Foundation [MBAF], 2010d) demonstrates the conservation objectives inherent to the institution. The MBASW investigates all crucial areas necessary for evaluating the sustainability of a given species, including the fishery, habitat, species, and management. Its recommendations include criteria for both wild-caught seafood and farmed seafood (MBAF, 2010d). Thus, MFDS can refer to MBASW for any products they wish to serve on their menus. Sustainability information is available to the public. Since MBASW considers seafood harvested in Canadian waters and works with Canadian organizations such as Ocean Wise, their recommendations are relevant to the Canadian context. Thus, MBASW conforms the group's definition of sustainable seafood when making its seafood recommendations, and meets all the preliminary criteria for use by MFDS.

The guide provided by MBASW is straightforward, transparent, and extensive. The organization is credible for many reasons, including its reputable scientific background working out of the Monterey Bay Research Institute and extensive partner list. Recommendations are developed in conjunction with scientific government reports, white papers, the primary literature, and experts in the field. In addition, MBASW develops in-depth reports discussing its seafood

recommendations, which are reviewed by an expert panel consisting of members from the government, academia, and the seafood industry (MBAF, 2010d).

MBASW's recommendations are made available through printed or electronic guides. Their extensive list of recommendations can be accessed online, and includes a detailed analysis of each species. For each recommended species, the following information is provided: A summary of the species, a three-tier sustainability rating (Best Choice, Good Alternative, or Avoid), where and how that species is caught, fish species alternatives in the event that no Best Choice or Good Alternative options are available, market names, consumer notes about the species, and available cooking recipes for that species (MBAF, 2010c). A breakdown of each sustainability rating is as follows. "Best Choices" species are abundant, well managed, and caught or farmed in an environmentally friendly way; "Good Alternatives" present some concerns with the harvesting method or the health of the habitat due to other human impacts; and the "Avoid" species should not be consumed due to low stocks and detrimental harvesting methods (MBAF, 2010b). In addition, the "Super Green List," contains wild and farmed seafood that promotes good health and can be harvested in a highly sustainable fashion. Also listed in their guide are tools for chefs, including a culinary buyer's guide, and chart of seafood alternatives (MBAF, 2010a). These tools may be useful for chefs working for MFDS.

It is important to have a detailed framework for developing seafood recommendations. MBASW's framework is thorough and emphasizes continual monitoring and follow-up, which ensures that information is up to date (MBAF, 2010d). MBASW was chosen for our sustainable seafood purchasing utility because it is the most extensive informative guide, with the most rigorous scientific basis for recommendations when compared to other guides. During our own research it came to our attention that the MBASW is the industry standard for ecological status of North American fish stocks, and that many major ecolabels consult them during their own recommendations or certification protocol. No other guide provided as much detail, or scientific background for their information. Their success provides the basis for our recommendation of this guide to MFDS, as well as the incorporation of this guide into our decision-making utility.

Interview with MBASW

Katie Pofahl, a representative from the MBASW, was interviewed on November 23, 2010. A detailed account of the questions asked and answers received can be found in Appendix V. Questions were developed for the purpose of obtaining general information regarding motives, research protocol and sustainability standards; the interview proved that these were both thorough and legitimate. Ms. Pofahl was able to explain in detail MBASW's definition for sustainable seafood, which as explained above, is very similar to that decided upon by the group. In addition, Ms. Pofahl suggested that we examine MBASW's five main criteria regarding the evaluation of ecosystem health. Criteria applicable to wild fish populations include overfishing, illegal fishing, habitat damage, bycatch, and management (MBAF, 2010e). Criteria specialized for farmed fish populations include wild fish (used as feed in fish farms), pollution and disease, escapes, habitat damage, and management.

Four staff researchers, as well as a manager and coordinator act as the primary researchers for determining the up-to-date status of current fish stocks and sustainability of fishing practices (K. Pofahl, personal communication). Generally each species is updated every five years, or sooner in the event of any substantial changes in stocks. For example, if a salmon farmer reported utilizing a new harvesting technology, MBSW would immediately include this information in reports, and update the species status if required. Updates also occur in the event that scientific reports suggest that the sustainability status of any natural or farmed fish stocks should be changed (K. Pofahl, personal communication).

Our investigation of MBASW established that it is active partners with Ocean Wise. Ms. Pofahl explained that although MBASW realizes that Ocean Wise is not the most rigorous *source* of sustainability information, they support that Ocean Wise provides recommendations for products at all stages of the supply chain and for all types of consumers. Ms. Pofahl also emphasized that Ocean Wise is a resource that is reliable and trustworthy by MBASW's standards (K Pofahl, personal communication).

MBASW works directly with other non-profits such as the Environment Defense Fund and SeaChoice. Ms. Pofahl also expressed that MBASW thinks highly of the Marine Stewardship Council, stating that they provide a much-needed aspect of traceability, something that is lacking in most other ecolabels. With this traceability, it becomes possible for the public

to follow exactly how a species travels through the long supply chain from where it is caught or produced, to the time it reaches the table.

Funding for their research comes mainly in the form of grants and support through the Monterey Bay Aquarium, a public tourist destination in California. MBASW does not profit from the pocket guides they distribute in paper and online, which are also used by 180 organizations to date in the United States (MBAF, 2010c).

V. II. III. Marine Stewardship Council (MSC)

The Marine Stewardship Council (MSC) was formed in 1997 in London, England with the mission of "contribut[ing] to the health of the world's oceans by recognizing [sic] and rewarding sustainable fishing practices [sic], influencing the choices people make when buying seafood, and working with our partners to transform the seafood market to a sustainable basis" (MSC, n.d. a). MSC bases their certification on three principles:

> Principle 1: Sustainable fish stocks
>
> The fishing activity must be at a level that is sustainable for the fish population. Any certified fishery must operate so that fishing can continue indefinitely and is not overexploiting the resources.
>
> Principle 2: Minimising [sic] environmental impact
>
> Fishing operations should be managed to maintain the structure, productivity, function and diversity of the ecosystem on which the fishery depends.
>
> Principle 3: Effective management
>
> The fishery must meet all local, national and international laws and must have a management system in place to respond to changing circumstances and maintain sustainability (MSC, n.d. b).

MSC is the only true certification system for wild fish and fisheries. Aside from certifying fisheries themselves, they also certify what they call the "Chain of Custody (CoC)," which is the movement of a certified product along the supply chain. Independent third party auditors carry out these certifications. Auditors are regulated by international certification

governing bodies. The certification process can take years, and once certified, audit reports include conditions upon which the certification was awarded (i.e. areas of improvement for the fishery or CoC). The process of becoming fully MSC-certified is extremely transparent, with information from the process itself being made available to the public. It actively engages all stakeholders affected by a particular fishery. A team of scientists reviews the process and report, offering their expertise prior to publication. After the publication of the report, credible environmental organizations, scientists, and researchers have a period of 21 days to make objections to the fishery being certified. Such appeals are presented to a judge who then objectively decides the outcome of the process (MSC, n.d. c).

The certification process is robust, with a passing score of 60 out of 100. Because of this scoring regime, some fisheries may have more exemplary scores than others. For those with lower scores, timed measures embedded in the certification must be undertaken by the fishery to maintain the certification. Third-party auditors check that certified fisheries are maintaining the same practice standards by way of yearly announced and unannounced visits. All certified fisheries must repeat the full re-certification process every five years (MSC, n.d. c).

In order to accommodate increasing demand for sustainable seafood and the institution's growing size, MSC recently introduced standardized scoring trees that will maintain consistency between different independent auditing bodies. All documents released throughout the certification process are available online. The documents are organized by fishery, resulting in a highly transparent system through which the certified fish and fish products can visibly be traced down the supply chain.

Interview with MSC

Mark McPherson, a representative of MSC, was interviewed on November 15. The interview is detailed in Appendix V. MSC is a market-driven program that rewards sustainable practices. It is currently working with major North American retailers, such as Wal Mart. Before the MSC gained such influence throughout the fishing industry, the organization actively sought out fisheries to certify. However, as MSC has gained recognition as the leading sustainability standard throughout the world, and demand for sustainable seafood increases, more fisheries take the initiative to apply for certification. From this interview it was discovered that the MSC operates with two types of certification standards; that of the fishery, and that of the

CoC. The CoC certification is a traceability standard that separately audits suppliers and distributors that handle the harvested fish as they leave the wharf. Both the fishery and CoC certifications are performed by a different set of third party auditors, which are further overseen by an international governing body (M. McPherson, personal communication).

While an MSC certificate is offered for a period of five years, surveillance audits are conducted annually. The process for initial certification of a fishery is quite extensive. MSC's audits are peer reviewed by the scientific community, which creates an opportunity to question anything stated in the report. The auditors then must respond to these questions and incorporate them into a final report. If questions and comments of the scientific community are not adequately addressed in the final report, a formal objection can be filed, and an independent adjudicator is brought in to settle the issue. Annual surveillance audits look at new scientific data to make sure that particular fish stocks are still sustainable.

CoC auditors visit suppliers and distributors to conduct spot-checks, where auditors ask for ordering forms and other documentation from a certain date. The unannounced requests for documentation ensure that CoC standards are being upheld consistently. Auditors of fisheries will consider the biomass of the fish harvested, stock left over, the impact of the fishing technology on the marine ecosystem, and bycatch associated with the fishery. Additionally, the management system of the fishery will be taken into account to ensure that factors such as spawning rates and seasonality are considered when determining harvest levels. As fishing stocks naturally increase or decline, MSC attempts to make sure that harvest levels are adjusted accordingly – auditors will consider the conditions to which the fishery was first given the MSC certification, and make sure that progress is being made by the fishery toward meeting these conditions.

Mr. McPherson also addressed the recent controversy over MSC's certification of the declining Alaska Pollock fishery as a sustainable source of seafood. This issue was of significant concern to the group as it called into question the strength and integrity of MSC's certification process, and was a common criticism of the institution that surfaced in the preliminary literature review. However, in a more detailed account of the certification processes, Mr. McPherson was able to satisfy our questions on this issue. When fisheries such as the Alaska Pollock are certified with a borderline score, conditions are written into the certification. These are timed measures that must be undertaken by the fishery to maintain this certification. Although some

environmental groups take issue with these borderline certifications, the MSC stands by the decision since the fishery has gone through the extensive, robust processes that are described above. That such criticisms are so public speaks to the participatory nature and transparency of MSC as a certification system.

With a huge growth in scale over the past 5 years, MSC has encountered new difficulties. The CoC component is quite straightforward, and is easily maintained and managed. The fisheries certification, however, has proved to be more difficult, especially when well-known organizations like the WWF and the Suzuki Foundation protest certification decisions. However, MSC considers and takes steps to address all concerns raised by these legitimate bodies. They have introduced standardized scoring trees for auditing purposes, to answer criticisms regarding their auditing consistency. It is also important to note, to the credit of MSC, that as they progress as an institution, they are faced with the certification of more tenuous, difficult areas; the clearly sustainable fisheries have already been assessed.

Another challenging area for MSC has been that their standards are not yet applicable to more small scale developing world fisheries. The fisheries that are engaged with MSC represent only about 12% of the world's fisheries. Much of the remaining 80-90% of fisheries are found in the developing world. MSC recognizes that their current standards are geared toward industrial, developed world fisheries, but that these only account for a small percentage of the total world market. To address this concern, teams at MSC are currently trying to adapt their standards to work in a credible way for these developing world fisheries. The extension to developing world fisheries would involve moving towards a risk-based, rather than a fact-based audit because the fisheries science and management data is not available in these areas; there are lots of small boats, and little record keeping. MSC also points out that there are many foundations that could assist developing world fisheries in paying for MSC certification.

Lastly, Mr. McPherson explained that MSC and the MBASW have a very healthy relationship, and their standards are generally aligned. However, there are some slight differences in their processes and criteria, which ultimately lead to different outcomes for certain fisheries. For example, in contrast to MSC, MBASW has an in-house team of scientists that do their auditing. They also evaluate against slightly different features which means that an MSC certified fishery might end up on the MBASW yellow list. These types of contradictions lead to

consumer confusion. To alleviate some of these issues, MSC and MBASW plan to standardize their criteria in the future (M. McPherson, personal communication).

V. II. IV. Ocean Wise

Ocean Wise is a conservation-oriented ecolabel created by the Vancouver Aquarium with the goal to educate and empower consumers about issues surrounding sustainable seafood. They use information gathered by researchers at MBASW to make recommendations for sustainable seafood choices. With funding from the Vancouver Aquarium Conservation Program, Ocean Wise offers a credible recommendation system for use in purchasing decisions, and publishes easily accessible information on sustainable seafood choices, transparency, and sustainability guidelines. Unlike other organizations, which offer a certification system, Ocean Wise's system recommends seafood products; rather than certifying the entire fishery and chain of custody as MSC might, fisheries, suppliers, retailers, and restaurants can become Ocean Wise partners.

Ocean Wise aims to promote sustainability at every level in the seafood supply chain and recommends products that are widely available to the Canadian public. Ocean Wise works directly with restaurants, markets, food services and suppliers to ensure that they have the most current scientific information regarding seafood. This information is used to help partners make "ocean-friendly" buying decisions. If a partner sells a product that meets Ocean Wise's (and therefore the MBASW's) recommendation criteria, that option may be labeled (on a menu, display case, etc.) with the Ocean Wise symbol, making it easier for consumers to make sustainable seafood choices. Ultimately, the product is not 'certified sustainable' as is the case with MSC, but is 'recommended' by Ocean Wise as probably sustainable, according to standards generated by the MBASW and information provided by the Ocean Wise partner.

The main strengths of the Ocean Wise program are its relevance to the Canadian context, growing consumer recognition, and its inclusion of a large number of important sustainability variables. Their criteria for sustainability include consideration of overfishing, bycatch, habitat damage, different harvesting methods, fishing techniques, and aquaculture. Many other certifiers and guides disregard various variables, and it is for that reason that we have chosen Ocean Wise as one of our ecolabels for inclusion in the utility.

Furthermore, the definition of sustainability created by our research group is consistent with Ocean Wise's definition. They define sustainable seafood as "species that are caught or

farmed in a way that ensures the long-term health and stability of that species, as well as the greater marine ecosystem." Ocean Wise's recommendations for seafood choices are based on four different criteria. Fisheries should be: (1) Abundant and resilient to fishing pressures; (2) well managed with a comprehensive management plan based on current research; (3) harvested in a method that ensures limited bycatch on non-target and endangered species; and (4) harvested in ways that limit damage to marine or aquatic habitats and negative interactions with other species. These criteria are viewed to be necessary and crucial to cover all factors needed to consider a species sustainable by our standards.

It is difficult to examine the credibility of any certification system, due to biases in the media and interviews. The organization has a clean record in the media regarding sustainable seafood recommendations. Additionally, Ocean Wise has an extensive list of partners, which demonstrates their extensive reach into all aspects of the sustainable seafood market. Their partners include a wide variety of institutions, universities, markets, restaurants, suppliers, culinary schools as well as a sports and entertainment arena. They are making a difference by getting numerous partners involved with sustainability. There are over fifty universities that serve Ocean Wise on campus including Compass Group Canada, the independently run University of British Columbia Food Services, University of Winnipeg Diversity Food Services, and Bamfield Marine Science Centre (Vancouver Aquarium, n.d.). Ocean Wise has also won "Supplier of the Year" in 2009 and has a cookbook. They also have many community events that can be found throughout the media, such as the "Ocean Wise Chowder Chowdown" in Toronto and Vancouver.

The major weakness found within the Ocean Wise system is the degree of leniency when assigning its recommendation. Giving approval involves strict evaluation, but it is not possible to see the level of stringency through public outlets. It is only known that the public has put trust in Ocean Wise, although no audit reports are available. Online, only the evaluation process for restaurant certification can be found. Similarly how information on certain participators - producers, distributors or retailer for example- is collected is not fully understood. This central flaw in the recommendation system is largely why it is used in our utility only in instances where an MSC certification is not applicable (See "Product 2: Utility" section).

Despite this weakness, Ocean Wise is a well-publicized recommendation system that provides a large amount of clear and concise information about how and why it certifies. Their

tie with Monterey Bay Aquarium Seafood Watch is a further indicator that they are a system that should be used. It is easily understandable, and has a larger range of available suppliers than other less popular guides or certification systems.

Interview with Ocean Wise

For our interview with Ocean Wise, we spoke with representative Teddie Geach, the Ocean Wise Eastern Coordinator, on November 9, 2010. She first explained the ideology behind their recommendation system as one that was not driven solely by conservation or sustainability, but is really going for the big picture. Ocean Wise was formed with the primary goal of improving the health of the oceans by influencing consumers to choose more sustainable seafood options. Their definition of sustainable means caught or farmed in such a way that the population is able to be maintained for health and for growth, and to preserve the surrounding marine environment. Ocean Wise does not generate their own research, but stays informed on the ongoing research from the larger scientific community. Most of their recommendations are based on the research carried out by the Monterey Bay Aquarium. When they work with fisheries or farms on an individual basis, they may be able to investigate that operation more specifically.

From this interview and the interview with Pierre En Gros, we understand that there is a communication pathway that is established between Ocean Wise and their business partners. In some cases, they work with seafood producers more directly than with fishermen. Although they work with everyone along the supply chain, the bulk of their partners are restaurants. However, Ocean Wise's work with suppliers resulted from the restaurants starting sustainable seafood initiatives. There is an auditing system in place where partners of Ocean Wise must have specific documentation that identifies where their seafood is coming from, and how it is caught. This process aims for good traceability along the supply chain. The audit is carried out every year so to ensure that their partners are keeping up with their end of the deal by following the Ocean Wise standards; and there are repercussions if these standards are not met.

Ms Geach helped elucidate the process by which Ocean Wise works with their partners. When an establishment, such as a restaurant, wants to serve sustainable seafood, Ocean Wise first provides them with their master seafood list. When the chefs design their menus, they can consult the master list, and then they are able to communicate with Ocean Wise to get more

specific recommendations based on what they would like to serve. Ocean Wise is also able to provide the restaurant with a list of suppliers that they work with, which will have all the recommended items that a supplier is able to provide. In this way, Ocean Wise is able to not only make recommendations, but they can also facilitate the process of sourcing seafood.

Because Ocean Wise may work with any institution along the supply chain, they will not in all cases be able to identify or communicate directly with the source of a particular seafood product. In other words, they are not always working with fishermen. There are situations that arise when a supplier that Ocean Wise works with may get a stock of fish in and make the connection that it is recommended by Ocean Wise. However, the fishery from which it originated may not be aware of this. The suppliers, potentially without the knowledge of the fishery, might be gathering the relevant information, whereby Ocean Wise can say that the particular product is a good or bad choice, and (potentially) meets their criteria. If the fishery then finds out that they have a product that can be formally recommended, they can approach Ocean Wise and also become a partner. With limited resources, there is only so much Ocean Wise can do to ensure that their partners are following their rules. While their auditing of documentation process is in place, they recognize that it is fairly easy for people to cheat the system. While they do their best to maintain traceability, Ocean Wise does not have the organizational capacity to actually be with the fishermen on the boat, or make sure that suppliers are sending legitimate documentation. They rely on the fact that establishments are soliciting them to become partners, so there is usually a genuine desire to buy into this system of sustainable seafood. The voluntary nature of partnering with Ocean Wise is based on trusting that people will not cheat the system; however, there is no sure way to validate the information coming from participants of the Ocean Wise system.

V. II. V. Ecolabel comparison conclusions

The results of our interviews and research on relevant ecolabels indicated that MBASW should be utilized as our source of information regarding species ecological status, most sustainable purchasing location within North America, and harvesting method used for both wild-capture and farmed fish. Once the MBASW was confirmed as the best source for information regarding species-specific sustainability characteristics, it was necessary to establish what certification body or partnership programs were appropriate for each individual species.

From our extensive research and discussion, it was found that for wild-capture products MSC was the best certifying body, and for any product that was not MSC-certified (be it wild-capture or farmed), Ocean Wise was the next best option as a partnership program. We concluded that MSC is a better ecolabel than Ocean Wise for ensuring the sustainability of seafood products, however as MSC only pertains to wild-capture fisheries, it is not available to be used for farmed products. Ocean Wise endorses both wild-caught and farmed products and fisheries, and therefore is recommended for all farmed products as well as some wild products not available yet by MSC. The results of this ecolabel comparison were used as the basis for a decision-making utility to assist MFDS in making sustainable seafood purchases.

V. III. Product 2: Utility

V. III. I. Purpose

We envisioned the end product of this research project to be a fully functional tool that would enable the MFDS to make sustainable seafood purchases. Ideally we wanted this tool to be user friendly to the point that typing in the common name of a fish product would yield all the information needed to purchase that product, including most sustainable options and where it could be found locally. Unfortunately we were not able to create a tool as user-friendly and functional as this. However, we were able to compile an informative purchasing guide in the form of a Microsoft Excel spreadsheet. This guide, with the help of information provided by MBASW, will allow MFDS to purchase products certified by MSC or recommended by Ocean Wise's partnership program.

V. III. II. How it was made

Once all relevant information on the appropriate certification institutions was determined, our next task was to connect this information in the form of an organized tool. Our early vision of a functional computer program for making purchasing decisions was not pursued due to a lack of programming experience within the group. The scope of expertise needed for such an endeavor exceeded the goals of our project objective. Instead, we found that the best alternative was to compile all the information MFDS needed to purchase sustainable seafood into a user-friendly spreadsheet. This spreadsheet allows the user to take very basic information (such as the

common name of a fish), and reading from left to right, determine: the exact species desired; the suggested geographic location and method of capture; the recommended certifier or partnership program; and a link to regional distributors of that product. Additional space is provided for the user to input distributor contact information, last quoted price for that product, and last quantity purchases. This spreadsheet tool is a better option than our early vision because it functions clearly and is customizable to any user. It can be easily adjusted to reflect changes in MFDS purchasing strategy or personnel structure. That the spreadsheet tool is technologically basic allows it to be resilient and land long lasting. Its user-friendly design, straightforward layout, and compilation of all valuable information make it exceptionally suited for use when purchasing sustainable seafood.

The utility was created in accordance with information found on the associated websites for MBASW's seafood-purchasing guide, MSC's certification program, and Ocean Wise's partnership program. It was structured in a colour-coded chart format, so that the user can read information left to right with increasing specificity, ultimately ending in a link to a list of potential regional distributors for that specific product.

Microsoft Excel was used because it is a standard program for making spreadsheets and works on both Macintosh and Windows operating systems. A black border separates each entry in the chart so that entries can be easily distinguished from adjacent ones. Each entry is linked to an MBASW information page in the second column entitled "Common Name (+ other)". This link directs the user to the corresponding page in the MBASW database that lists location, farming method, and sustainability option. In addition, each entry is linked to the corresponding MSC page (or Ocean Wise where MSC is not applicable) in the "Certification/Partnership and Corresponding Info" column. These links were included for the purpose of providing the user with our source of information regarding the sustainability of each species included in the utility. In addition, it allows the user to check for any future updates regarding species, capture, or farming method information.

Below the main chart is a step-by-step instruction guide, a list of relevant links, terms and abbreviations utilized, as well as a list of items that may be of concern to MFDS. Basa fish is simply European catfish which is indistinguishably different from North American catfish and so for consistency, Basa that is listed in MFDS' existing purchasing tool, has been replaced with catfish in the new utility. Imitation crab and smoked salmon, products also listed in the existing

purchasing tool, are not included in our utility as they are processed items that are not addressed in MBASW's, MSC's, or Ocean Wise's analysis of sustainability. In addition, seasonality of fish species is not addressed in this tool. Unfortunately, this issue came to our attention late in the semester, and due to a lack of available information, was not included in the utility.

As explained previously, the MBASW was chosen as our source for information regarding ecological status, most sustainable fishing or farming methods, and most sustainable geographic region for purchase. Thus, the first 5 columns are grouped under the "Seafood Guide (MBASW)" main heading and "Species" and "Sustainability" subheadings. These columns include seafood common (+ alternate) names, species and Latin names, fishing or farming methods, geographic location, and what type of choice ('Best' or 'OK'). Only MBASW 'Best' and 'OK' options were included in the utility, as we feel the 'Worst' options should be avoided at all times. Each entry in these four columns is linked to an appropriate MBASW information page.

Each desired species with its method of harvest corresponds to a specific fishery or product either certified by MSC or recommended by Ocean Wise. Since MSC was selected as the most rigorous program suited to the needs of MFDS, only when an MSC-certified product is not available will an Ocean Wise-recommended product be listed. These options are listed under the "Certification/Partnership And Corresponding Info" heading. Listed under the "Link to list of Producer/Distributors" heading are links to MSC's "Find a Supplier" search engine, and Ocean Wise's "Suppliers" list. These are direct links to information pertaining to the whereabouts of MSC-certified and Ocean Wise-recommended suppliers.

The three columns that follow are allocated for the input of user-related information, such as distributor contact information, last quoted price for that product, and last quantity purchased. Since the utility is made in Excel, any information in the utility is fully customizable. This is important because it allows the user to modify the utility according to his or her needs, as well as update it with new information as it becomes available.

V. III. III. How it works

Since the utility was designed in such a way that product details become increasingly specific as the user advances from column to column, consulting the information provided by the

MBASW at the far left side of the chart is the first step in using the utility. This is important because it allows the user to discern between 'Best' and 'OK' options for a given species within seafood type, before consulting a certification or partnership program. Listed in the far left column are the common names of most species relevant to the food industry, and to MFDS' desired product list provided by Executive Chef Oliver de Volpi. Just by glancing at the left side of the chart, the user gets a visually clear representation of how many 'Best' and 'OK' options are available for each main type of seafood. Latin names for each species are listed to give the user extra information for conducting his or her own research and for using the MSC distributor search engine. Once a decision is made as to the exact product that is desired, a list of distributors with either an MSC-certified or Ocean Wise-recommended product fitting that description is available by clicking on the links provided under the "Link to list of Producer/ Distributors" heading.

A step-by-step instruction of how to use the utility is as follows:

1. Users should locate the desired fish species by first locating that seafood common name (i.e. Salmon) in the far left column, then determining what species in particular (i.e. Pink salmon) is most desirable.
2. Once the particular species is decided, a regional source and fishing/farming method pertaining to that species will be chosen, depending on that choice's associated level of sustainability.
3. Finally, the user should use the links provided for a list of local MSC or Ocean Wise distributors under the 'Link to list of Producer/ Distributors'.

A non-functioning depiction of the utility, along with its instructions, can be found in Appendix VI. Figure 2 illustrates how the utility may be used to find a (sustainable) 'Best' option for catfish. By looking at the chart we see that 'USA Farmed (Closed) Catfish' is listed by the MBASW as a 'Best' option, with the most appropriate certification or partnership program related to that product being Ocean Wise.

	Seafood Guide (MBASW)					
	Species		Sustainability		Certification / Partnership And Corresponding Info	Link to list of Producer / Distributors
Type of Seafood	Common Name (+ Other)	Latin Name	Fishing Method & Loc.	Option		
CATFISH	***Channel Catfish***	*Ictalurus punctatus*	USA Farmed (Closed)	Best	Ocean Wise Partner Aquaculture	O. W. Supplier

Fig. 2 Example of a MBASW 'Best' option for catfish.

V. III. IV. Weaknesses

Although the utility is very straightforward, user-friendly and informative, there are some areas of weakness. These weaknesses include our inability to create a self-updating utility, the lack of sustainable product availability in the Montreal area, our inability to link exact distributor information directly in the utility itself, and the reality that this utility is only as good as the information available and the certification or partnership programs it uses.

The information used to create this utility was found online at the respective MBASW, MSC and Ocean Wise websites during the period from September-December 2010. This information will likely need to be updated due to changes in ecological species status, sustainable fishing or farming methods, and certification or partnership policy. This utility does not have the capability of updating itself. However, with the help of the provided links as well as the customizable interface, users can input this information with relative ease. That being said, this utility and the information therein could be used as a building block for the creation of a self-updating computer program – a task that was not within the scope of this project.

One significant weakness with this utility is that although all listed products are either certified by MSC or available through an Ocean Wise partnership program, those exact products may not be available in Montreal. The seafood industry is not as advanced in the Montreal area as it is in most maritime cities. In order to make these products more available in Montreal, increasing local interest in sustainable seafood is needed. At the present time, certain products may need to be shipped from other locations. MFDS should expect to work in close partnership with its suppliers to find affordable and sustainable seafood options. Our interviews with GFS, Pierre En Gros, and Sysco, discussed above, prove that these companies are open to this partnership.

Although not necessarily a weakness in design or function, finding local distributors with specific products using this utility may be a laborious process. A detailed inquiry as to local distributors with MSC-certified products can be made through the MSC distributor search engine, however Ocean Wise does not provide such a comprehensive listing. Instead, Ocean Wise provides only a general listing of all of their partnership institutions, including producers, distributors, and restaurants. This general list will require a preliminary consultation in order to

find distributors in the Montreal area. A geographical map is provided to make locating those institutions easier.

Finally, the degree of sustainability associated with products listed in this tool ultimately depends on the accuracy of the information provided by the MBASW, as well as legitimacy of MSC's and Ocean Wise's sustainability protocol. We have rigorously investigated the sustainable seafood market to determine the best seafood-purchasing guide (MBASW), the best overall certification body (MSC), and the best partnership program (Ocean Wise) at the present time. Those choices are subject to change as business policies and practices change.

VI. Product 3: Recommendations

VI. I. Suggestions from interviews

In the interviews with distributors, it became clear that there were varying degrees of awareness and knowledge about sustainable seafood and ecolabels. However, all distributors were receptive to the idea of incorporating sustainable seafood into their available products. This openness suggests that suppliers are willing to work with MFDS in developing new avenues to procure these products. One of the biggest concerns that distributors expressed was traceability and the difficulty of providing products that meet MFDS' demands using a supply chain with such little transparency. MFDS might be able to collaborate with distributors in finding suppliers of sustainable seafood products, and will also be able to inform them about traceability and how best to ensure that these products arrive along a documented, transparent pathway. The interview with Sysco made it apparent that MFDS has a significant influence over the knowledge of its suppliers and should use its influence to the greatest extent possible when procuring sustainable seafood. These distributors cater to the demand of their clients – MFDS is one of the first large clients to demand sustainable seafood in Montreal, but as the market expands in years to come, it will be easier to obtain transparent sustainable seafood.

Our interviews with various universities yielded many suggestions that are directly applicable to the MFDS context. Planning menus in advance provide extra time for MFDS to work with their distributors and source sustainable products. This will help them ensure that they have sustainable products in season to offer on their menus as much as possible. Another consideration MFDS might make is limiting the number of species purchased, and instead

finding more creative ways to prepare and serve them. If MFDS can establish fewer, but reliable, transparent pathways to obtain key species that they regularly use, this will decrease the amount of work that is required each time they need to order. One concern that MFDS expressed earlier in this process is the fact that sustainable seafood products might cost more than mainstream products. Several university interviewees described the option of making tradeoffs within their budgets in order to maintain that serving sustainable seafood on their menus remained a priority. Some tradeoffs that they suggested include allocating more funds to seafood products from another protein group. Another possibility for transferring funds from one area to their seafood products is purchasing less prepared food because it often comes at a lower cost. MFDS might use the funds saved in this area of their budget and direct it towards their seafood purchasing. Universities that had the most comprehensive and consistent sustainable seafood practices were ones that had formal policies. These also tended to be the ones that had general sustainability as a key point on their school-wide agenda. These findings suggest that MFDS' best opportunity to implement effective sustainable seafood practices is to institutionalize their practices. This will help to safeguard the current efforts by MFDS against becoming phased out in the future by more transient changes in administration or business arrangements. This top-down effort, combined with a bottom-up educational outreach component to both the student populations and staff, will give these policies the best chance at longevity.

Interviews with representatives of ecolabels suggested that more educational outreach is necessary to promote the purchase of sustainable seafood and expand the Montreal market. Initiatives to promote sustainable seafood should involve students in what food is served. Promoting the importance of sustainable seafood may give students more ownership of the food they consume. For example, if MFDS is considering a new fish species to serve on its menus because it is more sustainable, a sample could be given out in cafeterias, accompanied by an opinion survey. In addition, floor fellows could promote the importance of sustainable seafood, and events hosted in cafeterias could educate diners of human impacts on the oceans. Although students may have to pay more for sustainable seafood, an understanding of why this extra cost is necessary will make students more willing to pay.

VI. II. Research challenges

Our group encountered several challenges throughout the duration of this research project. First of all, our research was pioneering in the sense that there was no existing academic literature that evaluated the validity of ecolabels from which our inquiries could evolve. We were essentially starting from scratch in this foray into the evolving domain of ecolabels. There was no analysis from the literature, or from the interviews, that assessed the strengths and weaknesses of the multitude of ecolabels. As such, there was no consensus on which ecolabel was the most scientifically valid. One particular weakness of many ecolabels that we examined is in the area of their enforcement capabilities. Many of these organizations do not have the financial resources or infrastructure that would allow them to ensure that clients maintain and adhere to their standards.

Another difficulty we faced is that for MSC, the CoC certification is a separate entity from their fisheries certification. A seafood product may change hands many times along its pathway from ocean or farm to consumer, and it is difficult to ensure total validity of information transfer along this supply chain. It is possible for MSC to certify this pathway through their Chain of Custody documentation. However, because CoC is a separate certification process, this means that while a particular fish product might be certified by MSC, the pathway by which it reaches the distributor or retailer may or may not be certified by MSC as sustainable. This distinction is important to bear in mind.

The dimension of seasonality became important in the later stages of our research. Seasonality deals with buying seafood products at certain times of the year, depending on the life cycles of the fish. The distributors with whom we spoke were very much aware of this dimension as they have first hand experience with the difficulty obtaining a certain seafood product depending on the time of year. Despite recognizing the importance of seasonality, we were not able to incorporate it into our final utility for MFDS. Aquaculture posed another area of difficulty on which we are not able to make firm recommendations. Aquaculture received very mixed reviews from the literature, which sometimes deemed it a sustainable supplement to wild stocks, while others describes it as ecologically and environmentally destructive. This reflects a general confusion in the industry, and a lack of scientific consensus on the benefits and disadvantages of farmed fish. As such, we were not able to deliver a decisive verdict about

aquaculture, and instead, recommend that MFDS use aquaculture products sparingly while keeping informed on current aquaculture research.

A final major challenge had to do with the specific context of our research, in particular the state of the seafood market in Montreal, and the geographic location of MFDS. The market for sustainable seafood in the city of Montreal is not very advanced. As sustainable seafood products are not currently in high demand by restaurants and other establishments, suppliers and distributors are still learning how to source and obtain these sustainable products. This fledgling Montreal market may be due, in part, to its geographic location. Proximity to the ocean is critical in determining the type of seafood products that are most readily available, and also the pathway by which these products reach the consumer. For example, as a contrast to the situation of MFDS, purchasers at Dalhousie University work with one local individual as their primary supplier. Due to their coastal location, he has direct access to their fish source, and gets the freshest, most sustainable seafood products that the purchasers are requesting. Dalhousie has no need to seek the MSC CoC certification because their pathway is short and completely transparent. Their circumstances and constraints are very different from those that MFDS must work with in Montreal. Thus, Dalhousie's situation highlights the strong impact of geographic context.

VI. III. Future research and outlook for MFDS

The goal of this research was to provide MFDS with a tool and various recommendations to facilitate their purchasing of sustainable seafood. While we accomplished these goals, there remain a few areas of future research, both in the field of sustainable seafood in general. First of all, the purchasing utility must be reviewed and updated on a regular basis, preferably every 6 months to a year. This periodic updating is necessary because the statuses of fish stocks are quite variable; this might impact the recommendations of ecolabels. It may also be advantageous for MFDS or a future undergraduate research group to undertake the task of integrating seasonality into the utility. The inclusion of this component would enhance the comprehensiveness of the utility and ensure that any seafood purchases are in fact sustainable. In addition, it is important to note that MSC and MBA are working together to standardize their criteria in an effort to reduce some of the confusion amongst consumers. Ultimately, this partnership will decrease many of the contradictions between the products that are MSC certified

and the products that are recommended by MBA. MFDS should be aware of these changes and ready to update the utility if necessary. Lastly, the Aquaculture Stewardship Council (ASC), a counterpart to the MSC, should be fully operational by the end of 2011. The ASC may provide useful information on the sustainability of aquaculture products that is not included in the Ocean Wise recommendations listed in the utility at the present time.

Based on all that we have learned, it is evident to us that MFDS has a critical role to play in the sustainable seafood market in Montreal. MFDS is a very important, influential client for the distributors with whom it interacts. With this weight, MFDS may be able to pressure their distributors to consider the MSC CoC certification. Although it may take some legwork on the part of MFDS, in working with their distributors they may be able to establish sustainable pathways to receive their seafood products. By establishing the pathways and relationships by which these products become more readily available, we hope that MFDS will pave the way for others in the Montreal market. We hope this research will build awareness of these products among other Montreal consumers, including restaurants and other large-scale food purchasers, and will ultimately boost the demand for sustainable seafood. Lastly, we would like to share these findings with all stakeholders, including our interviewees, who were extremely integral to our research. MFDS has the opportunity to serve as a model for integrating sustainable seafood into a university context. We hope our research can help others begin to address this important issue.

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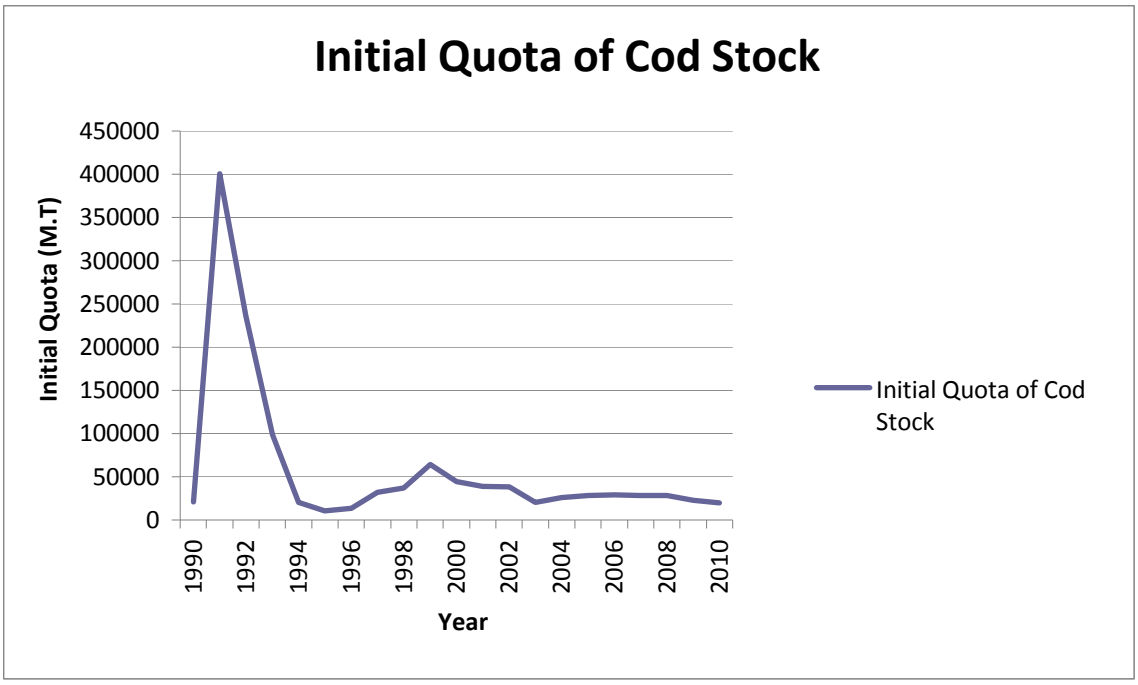
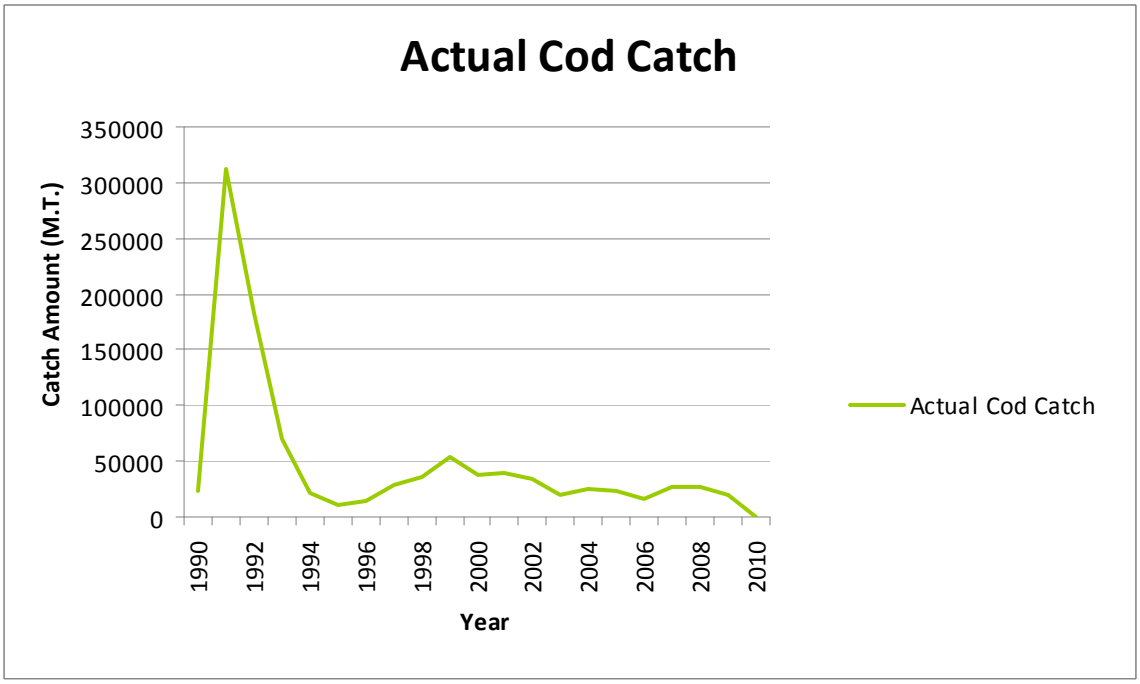
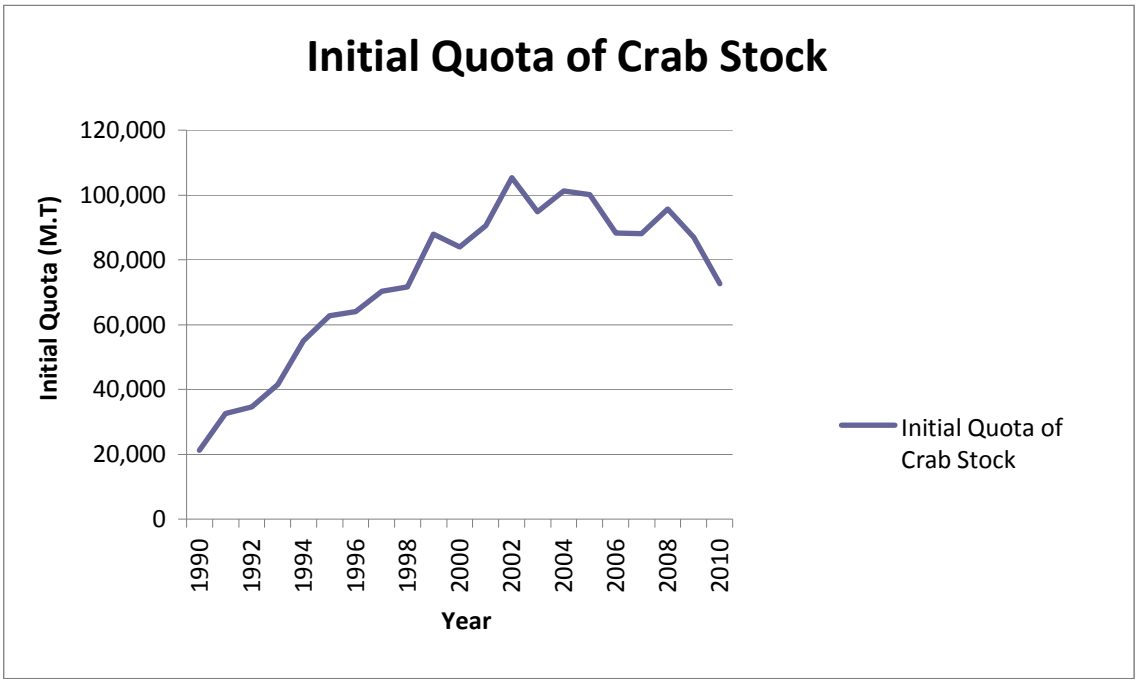
Appendix I: Decline of Cod, Crab and Tuna
All data was retrieved from Fisheries and Oceans Canada






Initial Quota of Crab Stock
Initial Quota (M.T)
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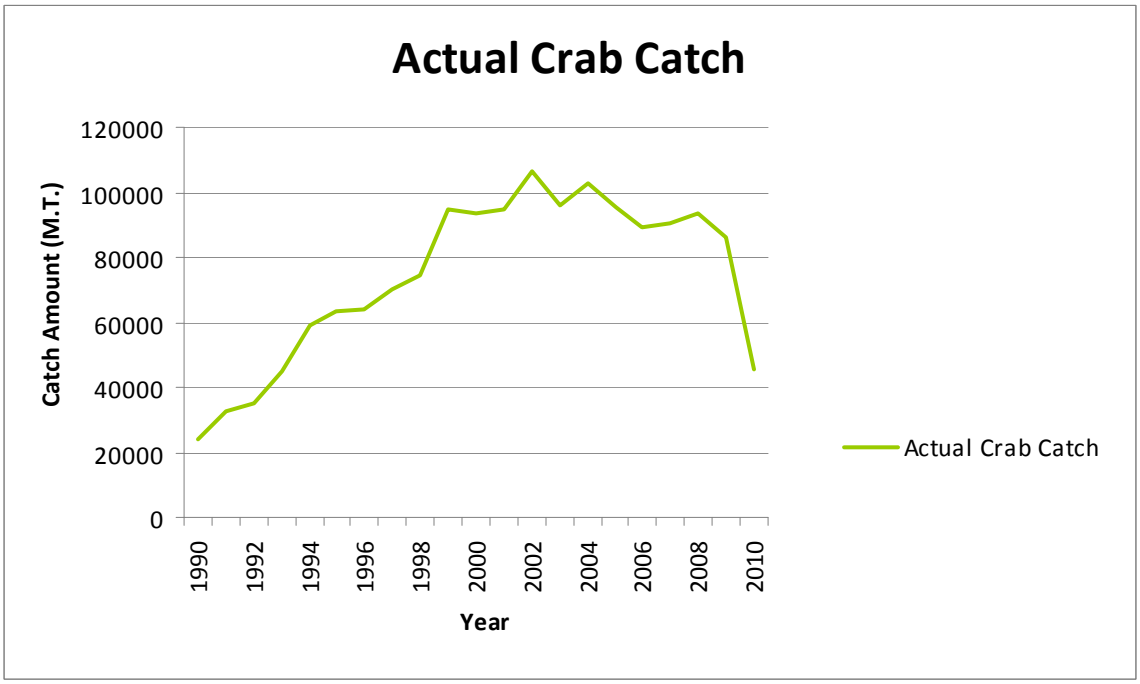
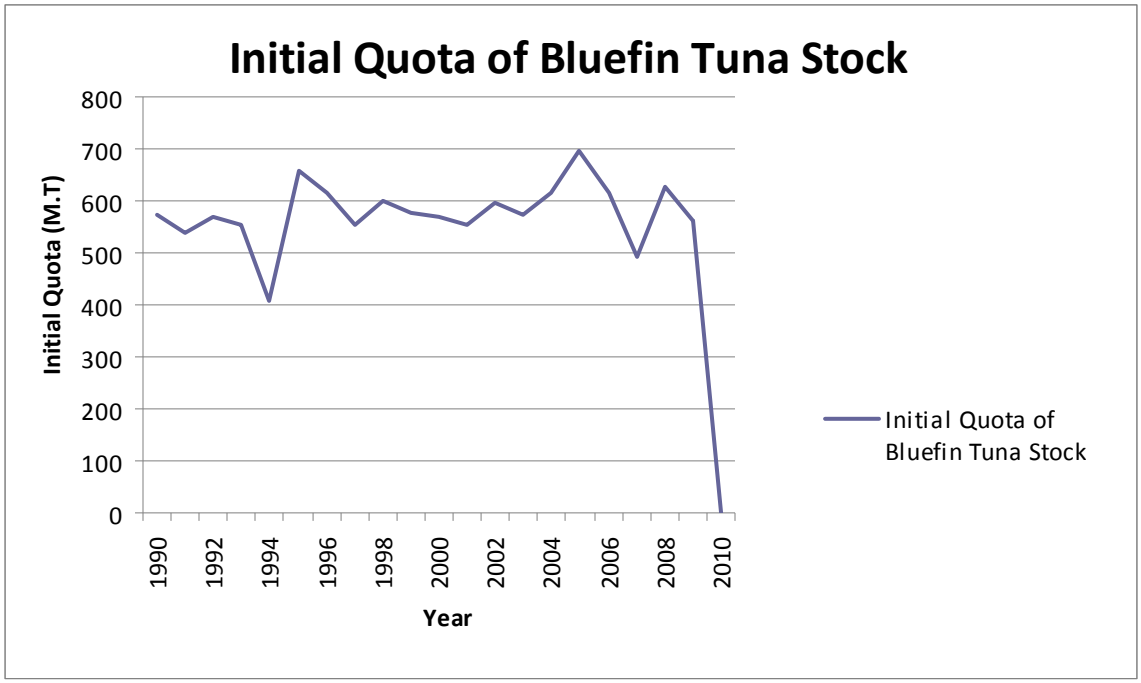
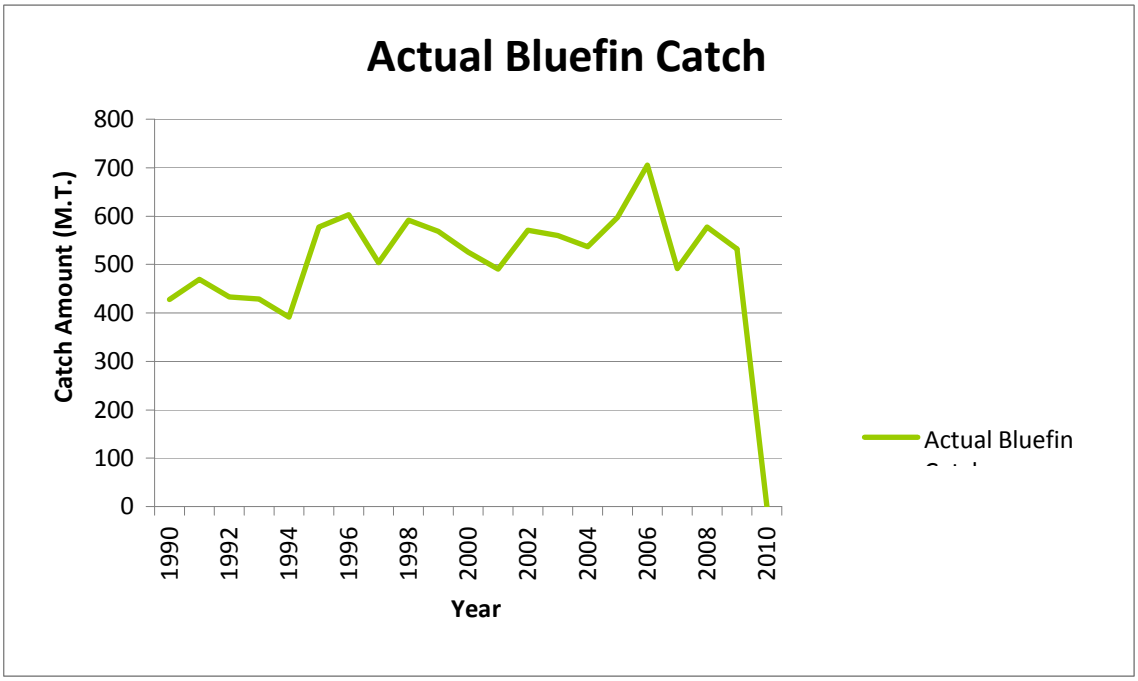
100,000
80,000
60,000
40,000
20,000
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year
Initial Quota of Crab Stock


Actual Crab Catch
Catch Amount (M.T.)
120000
100000
80000
60000
40000
20000
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year
Actual Crab Catch


Initial Quota of Bluefin Tuna Stock
Initial Quota (M.T)
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year
Initial Quota of Bluefin Tuna Stock


Actual Bluefin Catch
Catch Amount (M.T.)
800
700
600
500
400
300
200
100
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Year
Actual Bluefin

Appendix II: Preliminary Ecolabel Comparison Chart

Certification	Criteria					NOTES
	Certifier of Seafood Products	Objective is Sust. Seafood	Applicable for US/NA/CAN	Consumer Oriented	In ops 1 year?	
Marine Stewardship Council	Yes	Yes	Yes	Yes	Yes- since 1997	For wild fisheries not aquaculture
Ocean Wise	Unclear if they certify themselves	Yes	Yes	Partly	2005	Press Release- Ocean Wise wins Supplier of the Year 2009
SeaChoice	No, they're simply a guide	Yes	Yes	Yes	Since at least 2004 if not before that	
Global Aquaculture Alliance	Yes	Yes	Yes	Unclear…	1997	"GAA also works to improve production and marketing efficiencies, and promote effective, coordinated regulatory and trade policies." "The Global Aquaculture Alliance exists to advance environmental and social responsibility throughout the raising, processing and distributing of aquaculture products. "
Lenfest Ocean Program	No- does research	Sort of	Yes	No	est 2004, GAPI report was 2010	Global Aquaculture Performance Index (GAPI) http://web.uvic.ca/~gapi/ Could prove VERY useful in developing our criteria of what a sustainable fishery is
Blue Ocean Institute	No- ranks them	Yes	Yes- NE US (SUNY)	Yes	2003	comprehensive seafood analysis and ranking methodology
Environmental Defense Fund	No- makes guide in collaboration with Monterrey Bay	Yes	Yes	Yes	1967	The Seafood Selector stands apart from other seafood guides because Environmental Defense Fund (EDF) works with troubled fisheries to improve management and conservation, which can improve their ratings over the long run.
Monterey Bay Aquarium Seafood Watch	No- creates guides of recommended fish based on sustainability criteria	Yes	Yes	Yes	1999	Pocket Guides by US Region
Friend of the Sea (ISO)	Yes	Yes	Yes		2006	
Aquaculture Stewardship Council	Aquaculture products	Yes	Yes	Yes	2011	Founded in conjunction with WWF. Up and coming. For aquaculture only.

Appendix III: Distributor Interview Comparison Chart

"Final Comparison Charts.xls"

Appendix IV: Retailers Similar to McGill University Interview Comparison Chart

"Final Comparison Charts.xls"

Appendix V: Certification and Recommendation Institutions Comparison Chart

"Final Comparison Charts.xls"

Appendix VI: Utility

"MFDS Sustainable Seafood Purchasing U