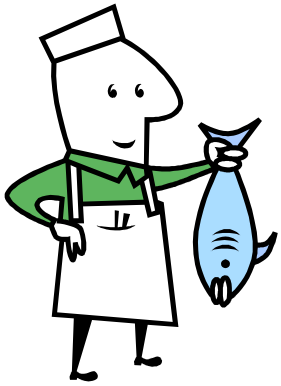
Sustainable Seafood Purchasing at the University of British Columbia – What's the catch?

An evaluation of the sustainability of current seafood purchasing practices at UBC



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INTRODUCTION

Seafood consumption around the world is increasing (FAO, 2004) and seafood is predicted to soon become the fastest growing component of the protein market in the U.S. (SCA, 2006). However, over 75% of the world's fisheries are being exploited at or beyond capacity (FAO, 2004). Aquaculture has been hailed by some as a solution to the depletion of wild stocks (Pauly et al., 2002; Folke et al, 2006). It is one of fastest growing food sectors and supplies over one third of the world's seafood, but it currently comes with its own set of ecological problems (Pauly et al., 2002; Folke et al, 2006). Threats to the world's oceans are widely recognized (Pauly et al., 2002; Myers and Worm, 2003; Kaiser and Jennings, 2002), and a number of groups from international to local scales have begun to take action.

At the University of British Columbia, a multidisciplinary advisory group has decided to examine the sustainability of seafood purchasing on campus and the feasibility of enacting more sustainable buying practices with the UBC Sustainable Seafood Project. This report provides context on:

- sustainable seafood,
- the UBC Sustainable Seafood Project, including its goals and objectives,
- methods for evaluating the ecological sustainability of seafoods,
- results from the first phase of the project, including baseline seafood sustainability ratings for the two main food service providers on campus,
- a discussion of the challenges of the seafood sustainability evaluation process and preliminary recommendations for enhancing sustainable seafood purchasing at UBC, and
- future directions for moving the project forward.

SUSTAINABLE SEAFOOD – A BRIEF HISTORY

Sustainable Seafood – What is it?

Since the publication of the Bruntland Report in 1987 (WCED, 1987), the term "sustainability" has grown to become part of the common lexicon, but what exactly is sustainable seafood? The Monterey Bay Aquarium defines sustainable seafood as seafood "from sources, either fished or farmed, that can maintain or increase production into the long-term without jeopardizing the affected ecosystems" (www.mbayaq.org). Fisheries and Oceans Canada offered a similar definition in 1998, stating "sustainability is understood to mean the harvesting of a stock in such a way and at such a rate that it does

not threaten the health of the stock or inhibit its recovery, thereby maintaining its potential to meet the needs of present and future generations of fish harvesters" (Emmett, 2001, p. 9). Thus, sustainable seafood can be understood as seafood harvested in a way that promotes both ecological conservation and intergenerational equity.

Historically, the world's fisheries resources have been seen as limitless. Increasing attention to the concept of sustainability has spilled over into resource management and fisheries (Roth et al. 2000), resulting in a push for change to more sustainability-oriented management paradigms. At the Great International Fisheries Exhibition in London in 1883, Thomas Huxley was famously quoted as saying:

> "That the cod fishery, the herring fishery, the pilchard fishery, the mackerel fishery, and probably all the great sea fisheries, are inexhaustible; that is to say that nothing we do seriously affects the number of fish." (as cited in Hutchings, 2001)

With the size of the world's oceans and the high fecundity of many commercially exploited fish species, Huxley could not envision a scenario where the fishing methods of his day could risk depleting fish stocks. Over a century later, scientists have proclaimed that the exact opposite is true: fish stocks around the world are facing drastic declines (Pauly et al. 2002; Myers and Worm, 2003).

Main Concerns in Fisheries Today

Why have world fish stocks collapsed? To answer this question, one must consider some of the key threats to aquatic ecosystems:

- **Overfishing:** In 1998, UBC's own Dr. Daniel Pauly introduced the concept of "fishing down the food web," describing the notion that humans have systematically removed the largest predatory fish from the oceans. As these large fish become increasingly scarce, fishers sequentially target smaller species at lower trophic levels, all the way down to invertebrates. The notion that we could soon deplete fish stocks to such low levels that we would have to start fishing species such as jellyfish (Pauly et al., 1998) caught the attention of not only the scientific community, but also the public at large.
- **Bycatch**: Bycatch, or the unintended catch of species not targeted by fishers that are usually discarded in a dead, dying or injured state (Kaiser and Jennings, 2002), is also a prominent concern for marine conservation (Harrington et al., 2005). Annual global discard levels, or the amount of bycatch thrown away, are estimated at 7.3 million tonnes (Zeller and Pauly, 2005). Certain fisheries, such as shrimp, may have especially high bycatch levels (Harrington et al., 2005).
- **Habitat destruction**:
    - **Destructive fishing practices**: Many methods of fishing also destroy aquatic habitats. For example, the effect of towed bottom fishing gear on ocean floor ecosystems is often likened to clearcutting a forest (Kaiser and Jennings, 2002).
    - **Pollution:** Excess nutrients and toxins are often introduced into aquatic systems via land run-off or dumping agricultural chemicals, silt and industrial waste (Folke et al., 1998).

    - **Coastal development:** Growing cities and coastal development are putting increasing pressure on coastal areas around the world (Folke et al., 1998).
- **Poorly managed aquacultural expansion**: The rapid expansion of industrial aquaculture and the disease (Bakke and Harris, 1998), nonnative species introductions, escaped farmed fish, habitat damage and pollution often associated with it is also seen as a threat to aquatic environments (Folke, 1998).

The impacts of all of these factors vary by location, but there is little doubt that humans and fishing have altered marine ecosystems globally (Kaiser and Jennings, 2002). Clearly many of these issues are systemic problems and require increased top-down government regulation and enforcement on regional, national and international scales, for example, in restricting the use of bottom-trawls. However, grassroots actions, through market-driven initiatives, can also complement policy and regulation (Pauly et al., 2002).

The Sustainable Seafood Movement

Consumer-driven actions to address seafood sustainability issues initially took the form of boycotts, public education and publicity campaigns. The first widely publicized consumer-based appeal for more sustainable fishing practices was with dolphin-safe tuna in the late 1980s (Pickering et al., 2002). Public pressure to address the high dolphin bycatch in the tuna fishery resulted in the US government defining and enforcing dolphin-safe tuna fishing legislation (Kaiser and Edward-Jones, 2006). The fact that enacting this legislation was achievable by making minor adjustments to fishing gear and the manner in which fish were caught, and that the animals of concern, dolphins, were highly enigmatic marine mammals likely aided in the success of this public appeal campaign. In 1997, the National Environmental Trust championed the cause of a less attractive, but very popular and expensive, species – the Chilean Sea Bass (a.k.a. Patagonian Toothfish). The "Take a Pass on Chilean Sea Bass" campaign aimed to draw consumer and industry attention to the severely depleted Sea Bass populations (Iles, 2004) as well as the illegal fishing and high levels of seabird bycatch associated with the fishery (Brownstein, 2003). In a similar manner, conservation groups convinced over 700 chefs to boycott swordfish until fishing quotas were reduced in the 1998 "Give Swordfish a Break" campaign (Brownstein et al., 2003). These endeavours targeted primarily consumers as opposed to fishers (Iles, 2004), encouraging them to use their buying power to influence legislation and harvest practices. Consumer education was key to these strategies, allowing consumers to make informed decisions about their seafood purchases.

Ecolabeling and the Marine Stewardship Council (MSC)

Information on many seafood products is typically difficult for consumers to obtain because of the lack of labeling and regulated information transfer in the seafood industry. Seafood products have historically lacked explicit information regarding provenance,

production methods or quality, making it difficult to trace the path of seafood products from "sea to table" (Iles, 2004; Pickering et al., 2002; Thompson et al., 2005). Traceability is the ability to identify what a product is, its history (i.e. where it has been and what has been done to it at all stages of production, processing and distribution), and its application (Archipelago, 2005; Thompson et al., 2005). Also known as chain of custody, traceability is typically lacking in the seafood industry (Thompson et al., 2005). However, increasing international trade and a lack of international standards on traceability labeling and information is spurring consumers, food service providers and retailers to demand more information on the quality, safety and origin of their seafood purchases (Thompson et al., 2005). Increased product information on labels or specifically designed ecolabels to designate an environmentally friendly certification or production method (e.g. organic) can aid consumers in making more informed decisions on their food purchases (Kaiser and Edwards-Jones, 2006). Ecolabels also allow consumers to encourage industries to adopt more environmentally conscious purchasing and production practices (Kaiser and Edwards-Jones, 2006).

The most prominent seafood certification and labeling project began with the creation of the Marine Stewardship Council (MSC) (Kaiser and Edward-Jones, 2006). Some organic guidelines were incorporated into aquacultural product labeling schemes in Europe in the late 1980s (Pickering et al., 2002), but such ecolabeling and certification have thus far been more prevalent in the timber and agricultural sectors (Kaiser and Edward-Jones, 2006). In 1997 however, the world's largest seafood purchasing companies, Unilever, and one of the world's most prominent conservation groups, the World Wildlife Fund joined to form the MSC (Pickering et al., 2002). The MSC aims to certify environmentally friendly fisheries that voluntarily adhere to MSC's fisheries standards (Kaiser and Edward-Jones, 2006). Products from certified fisheries are then labeled with the easily identifiable MSC logo. Currently 11 fisheries worldwide are MSC certified, with 220 ecolabeled products available on the market (Kaiser and Edward-Jones, 2005). Seven more fisheries are under review for certification (Kaiser and Edward-Jones, 2005). In February 2006, the international seafood industry received a surprise when the American retail giant Wal-Mart announced that it would carry only MSC certified seafood in its stores (Wal-Mart, 2006). Wal-Mart's decision to carry MSC certified products exclusively may prove challenging maintain because of the current limitedly selection of certified fishers, fisheries restrictions, and the specific locations of the fisheries in relation to international markets. However, this move by such a large corporation indicates that the idea of sustainable seafood has gained momentum in Europe and North America.

Seafood Choice Guideline Systems

Some conservation groups have adopted slightly different approaches to increasing consumer awareness and influencing buying decisions by creating purchasing guidelines for making more ecologically sustainable seafood purchases. Developed in the late 1990s, around the same time as the inception of the MSC, these guidelines focused on encouraging consumers to consume seafood sustainability rather than boycott certain seafood products (Iles, 2004). Also, unlike the labeling certification provided by MSC,

these systems put the onus on the consumer to used background information to choose sustainable seafood. Information on the sustainability of different seafoods is often available on the organizations' websites, or as pocket-sized guidelines that consumers can carry with them and easily refer to in a grocery store or restaurant (Brownstein et al., 2003).

Seafood sustainability guideline systems are generally ecologically focused and based on the principles of scientifically evaluating the fishery status, life history characteristics and ecological implications of fishing and farming commonly consumed species (Illes, 2004). Seafoods are ranked based on a variety of criteria in these categories. However, different groups may offer different recommendations on seafood products because methodologies and ranking methods differ slightly between systems, and some organizations may focus their guides regionally (e.g. Europe, Hawaii, etc.). The guidelines may also list the human health impacts of consuming different species (e.g. mercury, PCB, etc. content of the fish) (Iles, 2004), but health impacts are generally not worked directly into the sustainability criteria. The guidelines assume that the most adverse ecological impacts of seafood production happen at the harvesting/production stage (Iles, 2004). Therefore, these systems do not account for environmental impacts associated with seafood processing, transport or refrigeration. Likewise, they do not incorporate economic or social sustainability into their seafood sustainability criteria. Social and ecological sustainability considerations are believed to be more controversial than ecological sustainability (Roth et al., 2000; S.K. Morgan pers. comm.).

There is currently a multiplicity of different sustainable seafood guides. The most prominent seafood evaluation guidelines are the Monterey Bay Aquarium (MBA) *Seafood Watch* program (www.mbayaq.org) and the Blue Oceans Institute (BOI) *Guide to Ocean Friendly Seafood* (www.blueocean.org) (Iles, 2004). Another noteworthy guide is the Environmental Defense Fund's (EDF) Ocean's Alive *Seafood Selector* (oceansalive.org) (Iles, 2004). Locally, the Sierra Club of British Columbia's *Citizen's Guide to Seafood* (sierraclub.ca/bc) and the David Suzuki Foundation's *State of the Catch Report* (still to be published) focus on regionally important species. Key differences among these four seafood guidelines systems can be seen in Table I.

With the abundance of ranking systems and consumer pocket-sized seafood selector brochures, concern has grown over the seafood guidelines' effectiveness: are they educating consumers or confusing them? As a result, the sustainable seafood groups are beginning to consolidate these evaluation schemes in an attempt to present uniform evaluation methods and guidelines (S.K. Morgan, pers. comm.). European groups recently decided on a common continental system, and groups in North America are attempting such as feat as well (S.K. Morgan, pers. comm.). Sustainable Seafood Canada, composed of David Suzuki Foundation, Sierra Club, Living Oceans Institute, Canadian Parks and Wilderness Society, and Ecology Action Centre, is commencing evaluations of Canadian fish populations and hopes to develop common guidelines for Canada (S.K. Morgan, pers. comm.).

Table I. A comparison of different seafood sustainability guideline systems.

MBA refers to Monterey Bay Aquarium, BOI refers to Blue Oceans Institute, EDF is the Environmental Defense Fund and Sierra Club is the Sierra Club of British Columbia. Unless otherwise noted information on each system was obtained from the respective organization's website.

	MBA	**BOI**	**EDF**	**Sierra Club**
Region of Focus	National (mainly the USA but also Canada), West Coast, Hawaii, Southeast, Northeast, Central	Mainly the USA	Mainly the USA	North America, with attention to BC
Method of Seafood Evaluation	To evaluate the sustainability of seafood, the MBA has a multi-step procedure (MBA, 2005). 1.) The MBA identifies seafood for review through market information. 2.) It compiles information on the seafood in question from literature and experts and incorporates the findings into a seafood report that is externally reviewed. The report contains an executive summary, introduction to the seafood, market information, fishery or aquaculture information (depending on the production method), analysis of the sustainability of the seafood according to the sustainability criteria, and a recommendation for listing of the seafood. 3.) After assessing the information in the seafood report against the criteria, one of three potential seafood recommendations is generated. 4.) The MBA seafood report is reviewed by the Seafood Watch Program Manager, a minimum of two external experts and Board of Expert member, and the Seafood Watch Science Manager and Copy Editor and then reassessed in a ranking session. 5.) MBA assigns a sustainability rank in each evaluation category and then decides on an overall listing of the seafood based on these ranks and a consideration of critical conservation factors. 6.) Once a rank is assigned, the seafood status is monitored, evaluated and updated on the website and subsequent pocket guides.	The evaluation procedure used by BOI is similar to that of MBA, with a few key exceptions. Government, scientific, industry and trade reports are all consulted during the evaluation process, but BOI does not require peer-review of its recommendations. BOI assigns points in a variety of evaluation categories, tallies the overall score for each seafood, and then connects the score into a color coded recommendation for clarity. This score is listed in relation to other seafoods already ranked on a gradient scale.	Evaluation considerations are outlined on the website, but exact criteria or points systems for ranking seafoods are not described. Capture fishery and aquaculture considerations are outlined with examples.	The evaluation procedures were not extensively outlined on the website.

	MBA	BOI	EDF	Sierra Club
Rating System	(1) Best choices: The fish are abundant, well managed and produced in an environmentally friendly manner. (2) Good alternatives: The production of these seafoods is subject to some concern over ecological or human health impacts. (3) Avoid: These seafoods are overfished or produced in ecologically damaging manners and they should be avoided.	BOI uses the same three basic categories as MBA on a color coded scale, but also includes additional intermediate categories along the colour gradient: (1) Dark green = Best choices (2) Light green = Best-Intermediate (3) Yellow = Intermediate choices (4) Orange = Avoid - Intermediate (5) Red = Avoid	(1) Eco-Best – Fish that are fished or farmed in ways that produce minimal environmental impacts. (2) Eco-Worst - Fish that have considerable environmental impacts.	Sierra Club uses the same three basic categories as MBA: (1) OK for now (2) Ecological concerns – be cautious (3) Do not eat
Health information	Yes	Yes	Yes	Yes
Strengths	1.) MBA has an extensive website with information on fisheries, aquaculture, marine conservation issues, seafood sustainability reports, and educational materials for retailers, industry and chefs at http://www.mbayaq.org/cr/seafoodwatch.asp 2.) The ranking procedure contains trump cards, or weighted factors of critical ecological concern that may automatically switch a seafood to the "Avoid" list. 3.) MBA produces guides for specific regions. 4.) Its system is thorough, peer-reviewed, and clear. 5.) Outreach materials and explanations of evaluation procedures are readily available on its extensive website.	1.) BOI maintains a website with information on the sustainable seafood. 2.) Because of the point system for evaluating seafoods, proponents of this system claim that it is objective and transparent (Brownstein et al., 2003). 3.) The website offers an explanation of the evaluation procedures (although not as detailed as MBA).	1.) Presents extensive information on contaminants in fish and consumption advisories for different groups (e.g. women, children, etc.).	1.) Includes information on BC seafoods.
Weaknesses	1.) The system has been criticized for the inherent subjectivity in its analysis.	1.) The website information is not as extensive as MBA. 2.) Some concern exists as to whether the relative ranking may skew the perception seafood sustainability in light of shifting baselines and different fisheries status around the world (S. K. Morgan, pers. comm.). 3.) The BOI reports and listings of the seafoods are not peer reviewed.	1.) The website lacks an explicit description of the seafood rating methodology. 2.) Only two seafood rating categories make this system very simple (possibly oversimplified).	1.) The website lacks an explicit description of the seafood rating methodology. 2.) The website lacks detailed information on each seafood species and the reasons for its rank.

Interdisciplinary Sustainable Seafood Coalitions

Interest in sustainable seafood is not limited to conservation groups; it has been gaining support from government, industry and community organizations. A number of interdisciplinary stakeholder coalitions have recently formed to promote sustainability in the seafood industry. For example, the Seafood Choices Alliance in the United States connects over 30 non-governmental conservation organizations and 2000 producers, wholesalers, retailers, foodservice groups and chefs (Brownstein, 2003). The BC Seafood Alliance is another example of an interdisciplinary coalition. A non-profit organization representing 90% of British Columbia's fishers, aquaculturists, seafood processors, marketers and exporters, it has espoused conservation and sustainable management as its key guiding principles (BC Seafood Alliance, undated). These multi-stakeholder groups are indications that not only scientists and conservationists, but also the seafood industry is concerned with the sustainability of seafood.

THE UBC SUSTAINABLE SEAFOOD PROJECT

UBC and Sustainability

The study described in this paper took place at the University of British Columbia, a university with a history of attention to sustainability related activities. Over 45, 000 students, faculty, staff and visitors from all over the world access the Vancouver campus (UBC, 2005). The university is the third largest employer in Vancouver and is recognized as one of Canada's largest and most prominent post-secondary institutions (UBC, 2005). UBC is one of over 300 signatories on 1990 Talloires Declaration, a 10-point plan for integrating sustainability into higher education (UBC, 2006). In 1997, it demonstrated its commitment to becoming a sustainability leader as the first Canadian university to adopt a sustainable development policy and open a campus sustainability office (UBC, 2006). The university's recent vision statement known as *TREK 2010* strongly emphasizes the concepts of sustainability, research and global citizenship (UBC TREK, 2005). Academically, UBC is home to world renowned scholars in various areas of sustainability, including ecological footprinting, community planning, globalization, biotechnology and fisheries (UBC, 2006). The university offers over 300 sustainability-related courses (UBC, 2006). Since the beginning of the UBC Food System Collaborative Project in 2002, students, faculty and staff have also been researching, developing and implementing sustainable community food system practices on campus, such as student run natural food cooperatives, composting programs, and fair-trade coffee buying policies (Bouris, 2003). As part of the ongoing food system evaluations at UBC, the unpublished *Inspirations and Aspirations: The Sustainability Strategy 2006-2010* plan for achieving the TREK 2010 vision highlights developing sustainable seafood purchasing policy for the UBC food service providers as one of the main action plans for achieving the goal of conserving biodiversity (UBC, 2006). Thus, establishing sustainable seafood purchasing policy is a crucial step in advancing ongoing sustainability research and implementation on campus.

Project Description

Goal

The primary goal of the UBC Sustainable Seafood Project is to lay the foundation for ecologically, socially and economically sustainable seafood purchasing and education at UBC.

Objectives

The specific objectives of the UBC Sustainable Seafood Project's work are to:
1.) Create links and dialogue among food system actors involved in seafood purchasing and consumption at UBC.
2.) Reach out to community groups whose influence on seafood is important to sustainability. This includes opening discussions with extractors', processors' and suppliers' associations as well as with non-governmental organizations and government agencies linked through seafood chains of custody.
3.) Document current seafood purchasing and consumption practices at UBC.
4.) Assess the inferred ecological sustainability of UBC's seafood sourcing under existing sustainable seafood choice programs.
5.) Incorporate considerations of social and economic sustainability, and as necessary develop new analytical tools to assess seafood sustainability at large institutions.
6.) Produce a report with recommendations for improving the sustainability of seafood purchasing on campus.
7.) Develop and implement plans for sustainable seafood education and outreach on UBC campus.

Phase One Project Focus

The first phase of the project, carried out as a directed studies project between January and April 2006, has focused on primarily on Objectives 1, 3, 4 and 6. In setting up the project, Objective 2 was addressed in a preliminary fashion. Future phases of the project will address Objectives 5, 7 and a revised Objective 6.

Project Partners

The UBC Sustainable Seafood is an interdisciplinary collaborative effort among five main project partners: Project Seahorse at the UBC Fisheries Centre, the Sustainability Office, the Faculty of Land and Food Systems (formerly the Faculty of Agriculture) and the two main UBC food service providers, AMS Food and Beverage and UBC Food Services. The different project partners all contribute skills and expertise in various fields related to seafood, food service and sustainability.

- Dr. Amanda Vincent is the director of Project Seahorse and the Canadian Research Chair in Marine Conservation, providing the group with insight into marine ecology and conservation. She also supervises student work on the project.
- Brenda Sawada is director of the UBC SEEDS program at the Sustainability Office and helps to coordinate project partners.
- Dr. Brent Skura represents the Faculty of Land and Food Systems, and adds insight into food systems, food science and processing and aquaculture.
- Nancy Toogood is the General Manager at AMS Food and Beverage, contributing and understanding of food service provision.
- Andrew Parr (Director) Dorothy Yip (General Manager), and Piyush Sahay (Executive Chef), represent UBC Food Services and offer insight into various aspects of food services on campus.
- The project is coordinated by Anna Magera, a directed studies student in the Faculty of Land and Food Systems specializing in marine ecology and conservation. Anna organized project partner meetings, researched seafood sustainability, gathered data on seafood purchasing at UBC, analyzed the data and compiled the information to produce this report.

Certain project partners have worked together on past UBC food system evaluation projects to help create a better connected and more responsible food system at UBC. Both AMS Food and Beverage and UBC Food Services have participated in the UBC Food System Collaborative Project since its inception. They also work closely with the Campus Sustainability Office and the Faculty of Land and Food Systems on a number of campus projects (Bouris, 2003).

Communication among the different elements of the UBC Sustainable Seafood Project Advisory Group was essential in the seafood evaluation. The UBC Sustainable Seafood Project Advisory Group met monthly for updates on the project progress, discussions on the notion of sustainable seafood, selection of seafood classification guidelines, and assessment of the feasibility of different project directions. The partner meetings allowed for important question and discussion time between group members, which proved very useful given the very different occupational backgrounds of the project partners in this interdisciplinary project. I prepared presentations for group meetings in consultation with my supervisor, Dr. Vincent. I also met with separately with the food service providers to obtain records, supplier contacts, sourcing information, etc. The food service providers were also able to clarify industry terms used in purchasing reports that I did not recognize. All project partners were very enthusiastic and willing to assist where needed in the project, and the group dynamic was very open and cooperative.

UBC Food Service Providers

The seafood purchasing practices of two UBC food service providers were the focus of this study, so it is useful to understand the nature and scope of each business.

The smaller of the two operations is AMS Food and Beverage. AMS is owned by the UBC students' union, the Alma Mater Society (UBC). AMS Food and Beverage employs over 400 students and operates a range of businesses in the Student's Union Building including Bernoulli's Bagels, AMS Outdoor BBQ, Blue Chip Cookies, The Pit Burger Bar, The Gallery Lounge, The Honour Roll, The Moon, The Pendulum, Pie R Squared, The Pit Pub, and Snack Attack. They also have a catering service (AMS undated).

UBC Food Services, the main food service provider on campus, employs over 400 students and union members at its 20 operations. It runs restaurants, snack bars, coffee bars, cafeterias and catering services on UBC campus targeted at a number of different consumer groups. A few notable locations include Sage Bistro (fine dining), 99 Chairs (casual dining), the Trek Express and Pacific Spirit Cafeteria (both fast food style cafeteria operations). In addition, it services two junior undergraduate residences on campus – Place Vanier and Totem Park (UBC undated).

Seafood Evaluation Guidelines in the UBC Sustainable Seafood Project

The UBC Sustainable Seafood Project partners met in February 2006 to discuss what seafood evaluation systems would be used in campus seafood assessments. After weighing the merits and drawbacks of different systems the project partners agreed that seafood evaluation at UBC should amalgamate the recommendations of a variety of seafood guides for the time being to provide for the most appropriate and comprehensive evaluation process. The two main systems used in the evaluation were the Monterey Bay Aquarium (MBA) and Blue Oceans Institute (BOI) systems. These systems were favored because of their detailed, comprehensive guidelines and the clear explanations of their methodology. Although the pocket guide layout for the BOI system, with its gradation of colour-coded seafood choices, was favoured by the group for its visual appeal, the MBA system was praised for its extensive websites and thorough evaluation scheme. The EDF guidelines were also considered. However, because of its simplified ranking system (with only Best and Worst categories, and no Intermediate category) and lack of detailed explanation of the ranking methods, EDF was not seen as being as thorough as MBA and BOI's systems. The Sierra Club of BC's guide was considered as an option for providing additional information on local BC species, but its classification methodology was not outlined clearly on its website.

The group deferred a decision on choosing just one evaluation system, so I assessed seafood products in this study according to the four aforementioned sustainable seafood guideline systems. After study of their different ranking methodologies, the scope of products assessed and the availability of information on each product, I decided to use the MBA guidelines a standard guideline system in my evaluation. BOI was also considered because it provided detailed information on many seafood products, some of which were not listed under MBA (e.g. purse-seine caught tuna). EDF and Sierra Club guidelines were also used to offer insight into more local products or discrepancies in the MBA and BOI product classifications. After I evaluated the seafood products according to these four systems, I generated an amalgamated overall product ecological sustainability rating.

Methods

Analyzing the purchasing practices of a business requires collaboration and transparency on the part of the researcher and the participating business partners. To begin my evaluation, I first requested and obtained seafood purchasing records from the two main UBC food service providers. Critical information for evaluating the ecological sustainability of the seafood products included:

(1) A seafood product description (including common or Latin species name and product code);
(2) The weight of the product ordered (with appropriate measurement units);
(3) The provenance of seafood (i.e. the location where the seafood was caught/farmed as well as where it was processed, if available);
(4) Whether the seafood was farmed or wild; and
(5) If it was wild, how it was caught (e.g. troll, longline, etc.).

Items 1 and 2 could often be obtained from "velocity reports" (i.e. annual purchasing volume reports broken down by product) or purchase reports, however I had to collect additional information from wholesalers on for items 3, 4 and 5 for most products.

The UBC Food Service providers along with their suppliers (also referred to as wholesalers in this document) helped to provide me with the additional product information I needed to conduct the seafood sustainability analysis. After examining the velocity or purchasing reports, I developed a list of remaining questions (based on the five critical areas of information listed about) for each product and either: (1) asked the food service provider to forward the questions to their supplier contacts, or (2) obtained supplier sales department contacts from the food service providers and contacted the supplier companies via telephone and/or e-mail with my questions. In the second case, I made sure to ask permission from the food service providers before contacting the suppliers. AMS and UBC contacted their suppliers to inform them of the research project and assure them that they could provide me with purchasing information. Including product codes for the items in question allowed the suppliers to research the questions more easily.

Information was requested for the past 5 years minimum to allow for trend detection in purchasing practices, but neither of the food service providers in this study had records for this entire time period. AMS had records available for two of its suppliers (Nishimoto and Blundell) for the two years preceding the project. Records for the third AMS supplier (Sysco) were available for only from July 2004 to the end of January 2006. UBC on the other hand had velocity reports for the three year period between 2003-2005.

Working with the different food service providers' purchasing documentation systems proved challenging. Collecting seafood purchasing data from AMS was especially difficult because (1) only one of its wholesalers (Sysco) supplied electronic purchasing records while the other two (Nishimoto and Blundell) supplied only paper copies, and (2) the electronic and paper purchasing records offered different temporal information. Sysco's velocity reports for 19 months prior to the time of study did not list product volumes by shipment, month, or clearly identifiable annual periods. To remedy this

problem, the researcher used a simple calculation to estimate the seafood purchases over a more standard time period of 12 months: [(kg seafood purchased)/19months]*12 months. The two other suppliers, Blundell and Nishimoto, provided only paper records to AMS. This made it difficult to obtain product and quantity information. Upon speaking with representatives from both companies, the researcher was able to obtain some general product and quantity information, but it was not sufficient to conduct the seafood evaluation. These two suppliers also indicated that their systems were not set up to produce electronic purchasing reports for AMS. As a result AMS allowed me to examine purchasing records in their offices. Generally, paper purchasing records are accessible on file at AMS for a 2 year period. I went through paper purchasing records, tallying product quantities and recording product information. Adding up these quantities by hand may have induced some error into the product amount calculations, especially for the Nishimoto products which were listed with many other Japanese food products. Data collection from UBC was comparatively simple because of the availability of velocity reports listing all the seafood products purchased.

To assess seafood purchasing behaviour at the food service providers, I examined the weight of seafood purchased in three different ways. First, I compared each item by weight purchased to determine which products were purchased in the highest volume by each business. This required standardizing all units of measurement to kilograms. The seafood items were then ranked by mass to indicate the most purchased items by weight over the data time period. Second, in cases where similar products were listed under a variety of product codes (e.g. smoked farmed salmon, farmed salmon filets, farmed salmon steaks), I grouped these similar items (e.g. all farmed salmon) to produce a list of seafood categories that would more accurately reflected species specific purchasing. Some categories were more general than others due to differing levels of information that were available on the various products. These new categories were then ranked. Finally, overall purchasing volume in each year was also tabulated.

Seafood sustainability classifications were assigned to seafood products on three different levels: (1) individual seafood products, (2) seafood categories, and (3) the food service provider overall. Instances where additional information was needed to accurately classify the seafood products were noted. Consumption advisories relating to PCBs, mercury or other toxins were also recorded for each seafood product and category. The individual product sustainability ratings were used to generate an overall ecological sustainability rating for each food service provider based on the percentage the total quantity of seafood purchased that was listed in one of six sustainability categories. The six sustainability classifications used in this study were:

(1) **Avoid**, for items clearly listed as items to Avoid in seafood choice guidelines;
(2) **Avoid-Intermediate**, for items that were either (a) listed on some guideline systems as Avoid and Intermediate on others, or (b) data deficient so I was unable to classify clearly as either Avoid or Intermediate;
(3) **Intermediate**, for items clearly listed as Intermediate choices in seafood choice guidelines;

(4) **Best-Intermediate**, for items that were either (a) listed on some guideline systems as Best and Intermediate on others, or (b) data deficient so I was unable to classify clearly as either Best or Intermediate;
(5) **Best**, for items clearly listed as Best choices on seafood choice guidelines;
(6) **Undetermined**, for items that either had (a) no guideline ratings or (b) were data deficient and could not be classified accurately in any of the other sustainability categories without more information.

Sales personal, managers and chefs at the food service providers were also consulted with regards to the uses for the different seafood products to determine if the products were used mainly in fine dining locations, student residences, catering, or cafeteria-style operations.

Main Assumptions

The main assumptions in this evaluation process are that:
(1) Information from wholesalers on the sourcing of seafood products was accurate and not over-generalized, and
(2) The seafood guideline systems were reliable and accurate in their scientific evaluation of the ecological impacts of different seafoods.

Other more detailed assumptions can be found in the Appendix A. All of these assumptions should be challenged and explored in subsequent work.

Results

Comparison of UBC Food Services and AMS Food and Beverage Seafood Purchasing

Seafood is a relatively minor part of both of the main food service providers' businesses, but by comparison, UBC Food Services (UBCFS) purchases more seafood than AMS Food and Beverage. An assessment of the amount of seafood used by both food service providers in 2005 indicated UBCFS purchased 18,228 kg of seafood, 112% more than AMS at 8590 kg. Project partners at both food service providers indicated that seafood use typically varied over the course of the year, being used frequently for catering banquets, conferences, weddings and other events in the summer months. However, a rough calculation using the 2005 purchasing volume estimates indicated that on average UBCFS used approximately 50kg of seafood per day while AMS used 24kg daily.

AMS Food Services

AMS had three main seafood suppliers: Sysco, Blundell Seafood and Nishimoto. According to AMS staff, their seafood is used mainly for the Honour Roll's sushi (Nishimoto products) and catering. A smaller portion of seafood products were used in restaurants such as The Pendulum and for sandwich fixings at locations such as Bernoulli's Bagels. By analyzing the seafood purchases over an estimated 12 month period in 2005 I found that Nishimoto supplied the largest amount of seafood to AMS, following by Blundell and Sysco (Fig. 1).

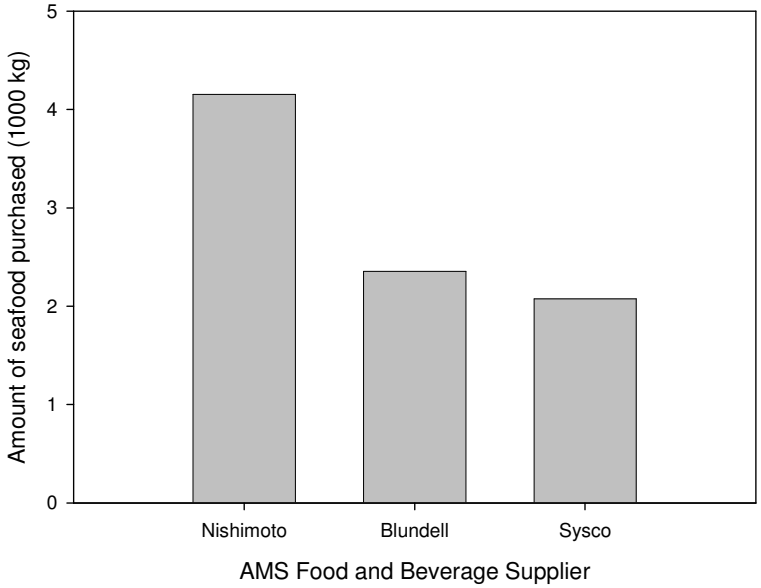

Figure 1. Comparison of the amount of seafood supplied to AMS Food and Beverage by its three suppliers in 2005

The 19 months of records available revealed that AMS purchased 10 main categories of seafood products. These product categories are listed in order of most to least purchased by weight in Table II. More detailed information on AMS seafood products is also available in Appendix C

Table II. AMS Food and Beverage seafood purchases between July 2004 and January (end) 2006 and inferred sustainability ratings The products are listed by decreasing weight purchased. Italicized numbers indicate estimates for the 2005 year, calculated as a proportion of the 19 months of records to give a more standard time period for evaluation.

Product	*Amount (kg)*	*Supplier*	*Time Period*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
POLLOCK TOTAL	6429.5 ***4060.7***	Nishimoto, Sysco	19 months ***12 month estimate***	Wild	Alaska, USA, other?	seine, other?	Best	
TUNA TOTAL	4014.4 ***2535.4***	Blundell, Nishimoto, Sysco	19 months ***12 month estimate***	Wild	Western Pacific, Alaska, Canada, other?	seine, troll, other?	Variable	Yes
Farmed Salmon Total	1077.5	Blundell, Nishimoto	19 months	farmed	Canada, other?	n/a	Avoid	Yes
Wild Salmon Total	1065.4	Blundell, Nishimoto, Sysco	19 months	Wild	Alaska, Canada, other?	troll, seine, other?	Best-Intermediate	
SALMON TOTAL	2142.9 ***1353.4***		19 months ***12 month estimate***	Both			Variable	
SHRIMP TOTAL	515.3 ***325.4***	Blundell, Nishimoto, Sysco	19 months ***12 month estimate***	Both	China, Vietnam, Atlantic Canada	n/a	Variable	
STEELHEAD/ TROUT TOTAL	263.6 ***166.5***	Nishimoto, Sysco	19 months ***12 month estimate***	Farmed	Chile, US, Canada	n/a	Best	
UNAGI TOTAL	125.0 ***78.9***	Nishimoto	19 months ***12 month estimate***	n/a	n/a	n/a	n/a	
FRESH CRAB TOTAL	54.5 ***34.4***	Nishimoto	19 months ***12 month estimate***	n/a	n/a	n/a	Best-Intermediate (anywhere but Russia)	
TOBIKO TOTAL (flying fish roe)	18.5 ***11.7***	Nishimoto	19 months ***12 month estimate***	n/a	n/a	n/a	N/A	
SCALLOPS TOTAL	15.9 ***10.0***	Nishimoto, Sysco	19 months ***12 month estimate***	Wild (maybe both)	North Atlantic, other?	n/a	Best-Intermediate	
MUSSEL TOTAL	4.5 ***2.9***	Blundell	19 months ***12 month estimate***	n/a	P.E.I.	n/a	Best (farmed)-Intermediate (wild)	

Pollock was the seafood product purchased in the largest volume. The Alaska pollock fishery is MSC certified (Kaiser and Edward-Jones, 2006) and pollock is judged to be a Best seafood choice. Pollock was used mainly as imitation crab at the Honour Roll sushi restaurant, but a lesser amount was also used as pollock fillets. Although sourcing information from the main pollock supplier was not available, most pollock does come from Alaska (Marsh, 2005).

Tuna was purchased in the second largest quantity by AMS. Overall, the tuna purchased appeared Intermediately sustainable. This amount was made up of approximately equal portions of canned tuna (mainly yellowfin, skipjack or bigeye tuna) and albacore tuna cuts. Most of the canned tuna was seine caught in Alaska, leading to an Intermediate sustainability classification. A small portion was caught in the western Pacific, resulting in an Avoid-Intermediate rating. The albacore tuna cuts we reported by the supplier to be mainly troll caught in Alaska, resulting in a Best-Intermediate rating.

Salmon ranked third in terms of mass purchased. Salmon products as a whole were awarded a 50% Avoid rating for the farmed salmon and a 50% Best-Intermediate rating for the wild salmon. Approximately equal amounts of farmed and wild salmon were purchased over the study period. Atlantic farmed salmon typically receives an Avoid rating. The wild salmon included all five Pacific salmon species. I included two Pacific salmon products that lacked sourcing information in this category because most farmed salmon is Atlantic, and the only known farmed products ordered by the same supplier over the study period were Atlantic. Most of the salmon products that had sourcing information were from Alaska, but a large portion were also from the Canadian Pacific. The Alaska salmon fishery is MSC certified (Kaiser and Edward-Jones, 2006) and Alaska salmon is typically rated as a Best sustainability choice. Other wild Pacific salmon however are typically given an Intermediate rating. Thus overall the wild salmon was given a Best-Intermediate rating.

The fourth most purchased seafood by mass, shrimp or prawns, was also divided approximately 50/50 along sustainability rating lines. About half of the shrimp and prawns used by AMS was imported from Asia, and thus received an Avoid rating. I had to estimate the weight for a portion of these imported shrimp/prawns by approximating prices because the purchasing documents sometimes only listed product by pieces as opposed to by weight. Thus, the weight for these items is a rough estimate. The other half of the shrimp purchased by AMS however was caught in the Gulf of St. Lawrence, and thus received a Best-Intermediate rating.

The fifth most commonly purchased items were steelhead or trout, which were lumped together into one category in this study. Both fish belong to the same species, *Oncorhynchus mykiss*, and in the MBA seafood guideline systems steelhead and trout were listed synonymously. One item in this category was listed as salmon/trout by the supplier but did not have any accompanying information. I decided that it likely referred to steelhead/trout and classified it as such because steelhead are sometimes referred to as steelhead salmon or steelhead trout (Stevens, 2003b). According to the MBA consultants, most trout on the seafood market are farmed (Stevens, 2003b). Moreover, unlike farmed

salmon, trout are typically raised in land-based enclosed raceways, minimizing the negative effects ecological associated with net-pen ocean aquaculture such as escaped fish and disease transmission between farmed and wild stocks (Stevens, 2003). There is no commercial fishery for steelhead in BC or the USA (N. Bajkov, pers. comm.; Stevens, 2003). Consequently, farmed trout are typically given a Best choice rating.

The next three items, unagi (freshwater eel), tobiko (flying fish roe) and crab lacked sourcing information. I could also not find classification information for unagi or tobiko in the sustainability guidelines. Thus, I was not able to rate these items. Further research is needed to classify them. No accompanying species, source or catch method information was available for the crab, but as long as it was not king crab from Russia it would have a Best-Intermediate rating.

Scallops were the ninth most purchased product by weight, and most were wild caught, giving them an Intermediate rating. Some of the scallops did not have sourcing information, but if farmed, they would receive a Best rating. Thus, scallops as an overall category received a Best-Intermediate rating.

Finally, one order of mussels was purchased, and these were listed as Best-Intermediate because more information was needed to classify them definitively as Best (farmed) or Intermediate (wild).

An overall sustainability rating was generated for AMS Food and Beverage (Fig. 2). AMS had 1/10th of its seafood by mass listed as Avoid and none with an Avoid-Intermediate rating. The main items of ecologically sustainability concern were farmed salmon and shrimp/prawns. A fifth of the seafood purchased were listed as Intermediate, and the same proportion was listed was Best-Intermediate. Over half was listed clearly as Best by weight in 2005. 16% of the seafood could not be classified due to lack of information.

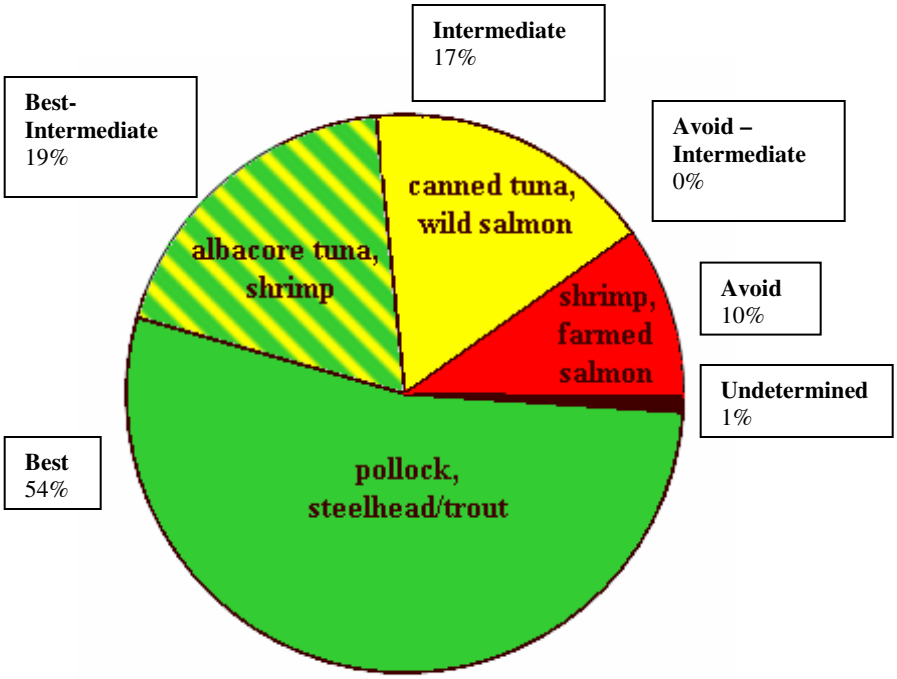

Figure 2. Overall inferred sustainability of AMS Food and Beverage seafood products by weight (July 2004- end of January 2006)
Avoid indicates items clearly listed as items to Avoid in seafood choice guidelines. **Avoid-Intermediate** denotes items that were either (a) listed on some guideline systems as Avoid and Intermediate on others, or (b) data deficient items that I was unable to classify clearly as either Avoid or Intermediate. **Intermediate** indicates items clearly listed as Intermediate choices in seafood choice guidelines. **Best-Intermediate** refers to for items that were either (a) listed on some guideline systems as Best and Intermediate on others, or (b) data deficient items that I was unable to classify clearly as either Best or Intermediate. **Best** indicates for items clearly listed as Best choices on seafood choice guidelines. **Undetermined** items that either had (a) no guideline ratings or (b) were data deficient and could not be classified accurately in any of the other sustainability categories without more information. Product names within the pie graph provide examples of products that substantially contributed to the category.

UBC Food Services

Like AMS Food and Beverage, UBC Food Services also had three main suppliers: Albion, Neptune and Sysco (Fig. 3). Albion supplied most of UBC's fresh and frozen seafood (D. Yip, pers. comm.). Many prepared products, such as battered cod, were purchased through Neptune, which sources the products mainly from Highliner and FPI (D. Yip, pers. comm.). Canned goods were largely purchased through Sysco (D. Yip, pers. comm.). Between 2003-2005, there was a decrease of approximately 41% in the amount of seafood purchased.

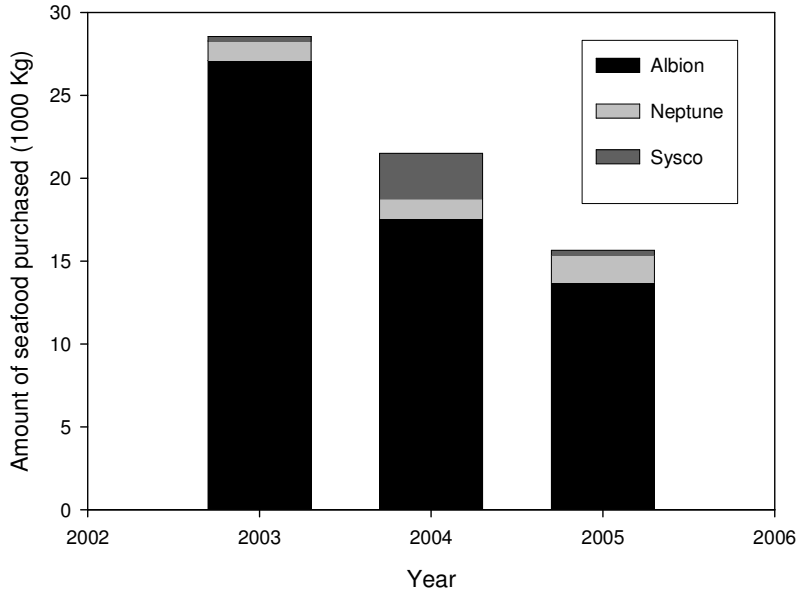

Figure 3. Quantity of seafood purchased by UBC Food Services between 2003-2005 from its three suppliers

The three years of velocity reports listed 152 seafood items purchased by UBC. I condensed these items into 41 seafood categories according to species (if possible) or a combination of suitable identifying characteristics that would aid in sustainability classification (e.g. species and fishing method). The quantity of seafood purchased in each of these categories and the relative rank in terms of weight purchased can be seen in Table III.

The relative ranking by weight of different seafood products varied by year. Most notably, an exceptionally large quantity of halibut, 7379kg, was purchased in 2003 compared to the 1520kg in 2004 and 658kg in 2005. This high year contributed to halibut's overall rank as one of the most purchased fish. In addition, relative proportions of farmed and wild salmon fluctuated over the time period. Wild salmon was the second most purchased fish in 2003, but UBC bought increasing volumes of farmed salmon in the following to make it the most purchased fish between 2003-2005. Over the entire three year period, UBC staples included: farmed salmon, wild salmon, halibut, tuna, prawns/shrimp, scallops, various types of cod, clams, crab, sole and pollock (Fig. 4). For more information and notes on classification information and sustainability ratings for UBC's products please see the Appendix D.

Table III. UBC Food Services seafood purchases and their inferred sustainability ratings 2003-2005
(listed in alphabetical order for ease of reading)

Species Category	*Rating*	*Health Concerns*	*Amount 2003 (kg)*	*Amount 2004 (kg)*	*Amount 2005 (kg)*	*Amount 3 Year (kg)*
Anchovies	**Best**		100.0	90.0	0.0	190.0
ARTIC CHAR TOTAL	**Best**		250.0	229.0	47.0	526.0
Catfish	**Best**		1.0	0.0	0.0	1.0
Caviar (lumpfish Black)	**N/A**		0.0	1.0	1.0	0.1
Caviar - sevruga	**Avoid**		1.2	0.0	0.1	1.3
CLAMS TOTAL	**Intermediate (most wild), Best (some maybe if farmed)**	Yes (if wild)	591.5	916.2	305.0	1812.7
Black Cod	**Best-Intermediate**		719.0	90.0	86.0	895.0
GREY COD FILLETS TOTAL	**Intermediate**		173.0	0.0	48.0	221.0
COD (UNCLASSIFIED) TOTAL	**Best-Intermediate (likely)**	Yes (if Atlantic)	704.5	990.9	954.5	2649.9
LING COD TOTAL	**Intermediate**		12.0	0.0	703.0	715.0
CRAB- DUNGENESS TOTAL	**Best**		156.0	250.0	166.0	572.0
CRABMEAT (UNCLASSIFIED) TOTAL	**Best-Intermediate (Avoid king from Russia)**		176.0	4.0	16.0	196.0
King Crab	**Intermediate (likely if Alaska)**		23.0	26.0	0.0	49.0
SNOWCRAB TOTAL	**Best (Can) - intermediate (US)**		723.0	110.0	79.0	912.0
Eel	**n/a**		9.0	0.0	5.0	14.0
HALIBUT TOTAL	**Best-Intermediate**	Yes	7379.0	1520.0	658.0	9557.0
Herring	**Best**		130.0	0.0	223.0	353.0
LOBSTER TOTAL	**Variable**	Yes	87.0	26.0	42.0	155.0
Mackerel	**Best**	Yes (some)	0.0	51.0	0.0	51.0
MAHI MAHI TOTAL	**Best**		0.0	169.0	0.0	169.0
Monk Fish	**Avoid**		5.0	66.0	18.0	89.0
MUSSELS TOTAL	**Best**		11.0	0.0	69.0	80.0
OYSTERS TOTAL	**Best (assume all farmed)**		8.2	12.2	34.7	55.1
Pickerel	**n/a**			0.0	0.0	0.0
POLLOCK TOTAL	**Best**		216.0	200.7	255.5	672.2
PRAWNS/SHRIMP (IMPORTED) TOTAL	**Avoid**		1027.4	1762.6	1713.7	4503.7
SHRIMP (LOCAL) TOTAL	**Best-Intermediate**		7023.3	1863.5	1278.7	10165.5
WILD SALMON TOTAL	**Intermediate (some Best)**		3389.0	5158.0	5286.0	13833.0
FARMED SALMON TOTAL	**Avoid**	Yes	1065.0	2992.8	1470.2	5528.0
SALMON? TOTAL	**Variable**		50.0	120.0	225.0	395.0

Species Category	*Rating*	*Health Concerns*	*Amount 2003 (kg)*	*Amount 2004 (kg)*	*Amount 2005 (kg)*	*Amount 3 Year (kg)*
STEELHEAD/TROUT TOTAL	**Best**				12.0	12.0
Sardine	**Best**		470.0	0.0	0.0	470.0
SCALLOPS TOTAL	**Variable**		3122.0	609.0	450.0	4181.0
Sea Bass	**Variable**		0.0	1160.0	357.0	1517.0
Skate	**Avoid**			0.0	0.0	0.0
Smelt	**N/A**		78.0	0.0	229.0	307.0
SNAPPERS TOTAL	**Intermediate-Avoid**	Yes	65.0	50.0	350.0	465.0
SOLE TOTAL	**Intermediate (Pacific)- Avoid (Atlantic)**		272.7	588.1	456.4	1317.2
SQUID TOTAL	**Best-Intermediate**		0.0	0.0	114.0	114.0
TUNA TOTAL	**Intermediate-Avoid**	Yes	3013.0	2634.5	2575.1	8222.6
SWORDFISH TOTAL	**Intermediate-Avoid**	Yes	0.0	0.0	0.0	0.0

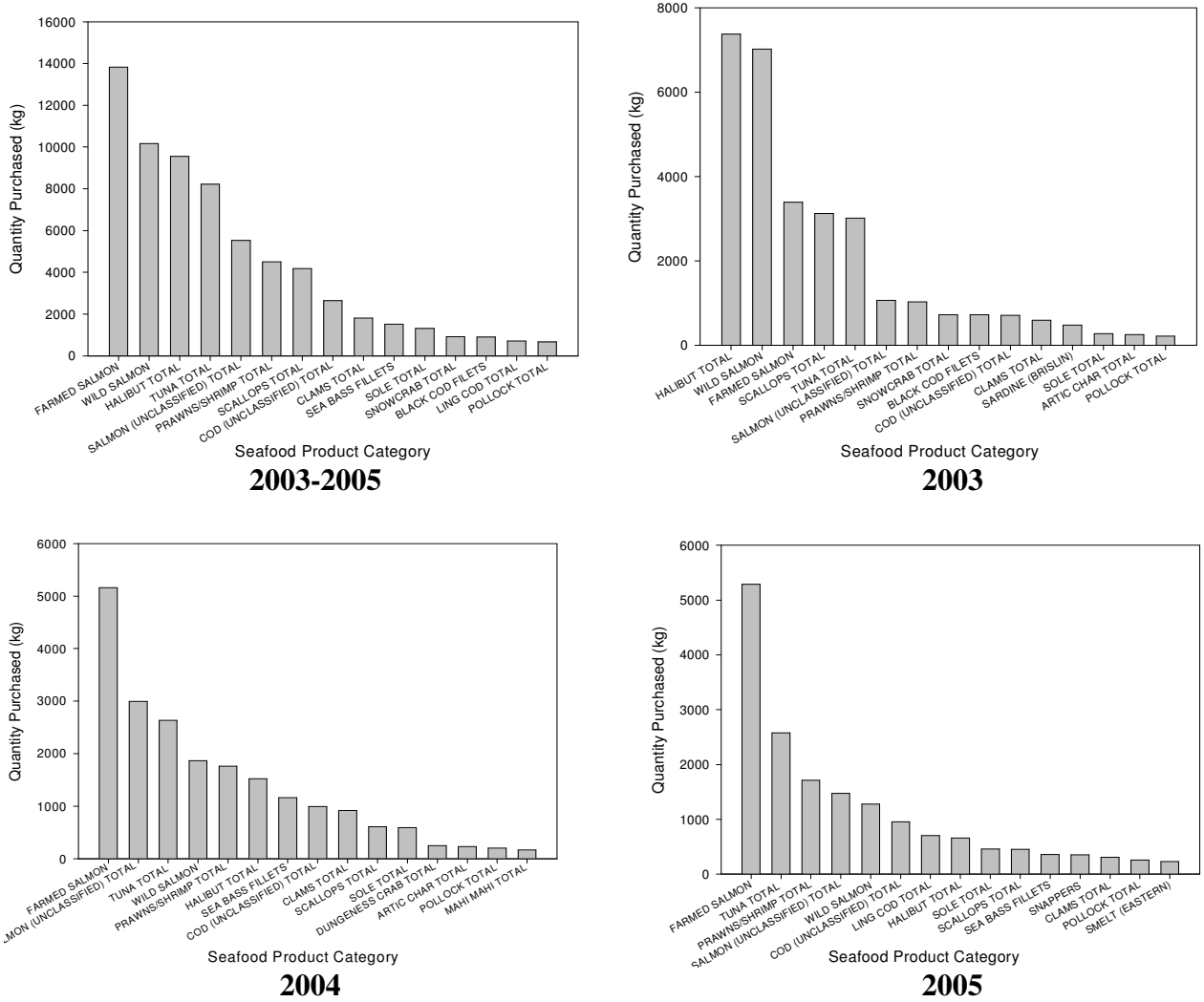

Fig. 4. Main seafood product categories purchased by UBC Food Services (by weight) between 2003-2005
The number below the graph indicates a time period or year for the graphed data.

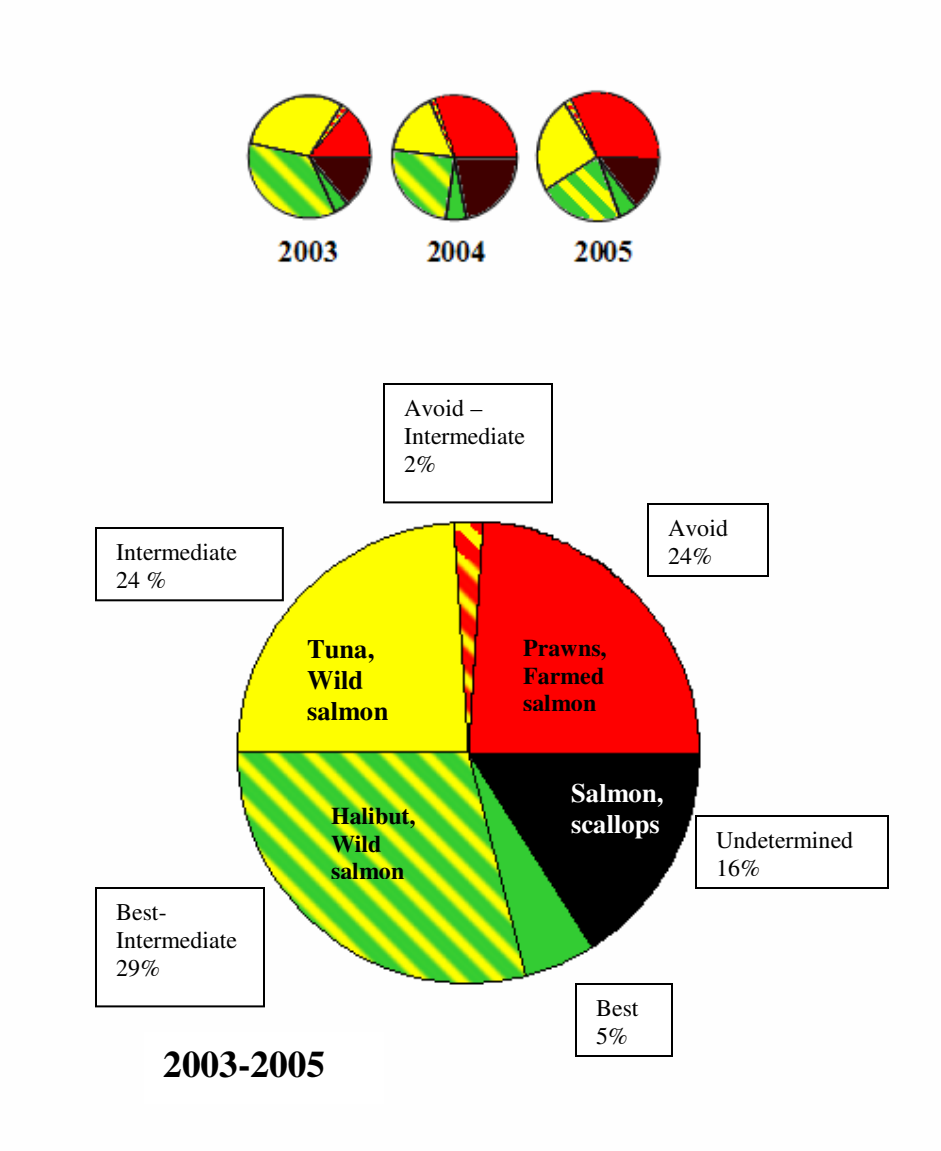

Figure 5. Sustainability ratings of UBC Food Services' seafood purchases 2003-2005
Avoid indicates items clearly listed as items to Avoid in seafood choice guidelines. **Avoid-Intermediate** denotes items that were either (a) listed on some guideline systems as Avoid and Intermediate on others, or (b) data deficient items that I was unable to classify clearly as either Avoid or Intermediate. **Intermediate** indicates items clearly listed as Intermediate choices in seafood choice guidelines. **Best-Intermediate** refers to for items that were either (a) listed on some guideline systems as Best and Intermediate on others, or (b) data deficient items that I was unable to classify clearly as either Best or Intermediate. **Best** indicates for items clearly listed as Best choices on seafood choice guidelines. **Undetermined** items that either had (a) no guideline ratings or (b) were data deficient and could not be classified accurately in any of the other sustainability categories without more information. Product names within the pie graph provide examples of products that substantially contributed to the category.

An overall sustainability evaluation was produced for UBC Food Services (Fig. 5). Over the period of 2003-2005, UBC Food Services had 1/4th of its seafood listed as Avoid, and a minimal amount listed as Avoid-Intermediate. The main items of concern listed as Avoid or Avoid-Intermediate were farmed salmon, imported prawns/shrimp, monk fish, internationally-sourced longline caught tuna, snapper, imported swordfish, skate and

sevruga caviar. A fourth of the products were listed as Intermediate, 1/4th as Best-Intermediate, and 5% were listed clearly as Best in terms of ecological sustainability by weight.

A sustainability rating was generated for 84% of UBC Food Services' seafood. Ecological sustainability classifications were difficult to produce for 16% of the UBC seafood products. Where possible, I made the most likely classifications possible. However where I did not feel that I could adequately categorize the seafood products because of a lack of classification guidelines or sourcing information, products were classified as "Undetermined"(16% of the total UBC seafood purchases). For example, no sourcing information was available on the eel, lobster, scallops, sea bass or unclassified salmon (i.e. salmon not listed as farmed or wild). Sustainability classifications for these seafoods can vary greatly depending on the species, where they are from, whether they are farmed or wild and/or how they are caught. In addition, no sustainability classification information was available in any of the guides for pickerel, smelt or lumpfish caviar.

UBCFS operates a number of food service outlets and services targeting different consumer groups, and the viability of menu changes often depends on the consumer group that uses the food service outlet. To determine which seafoods are typically used in which types of food service operations, I consulted with the executive chef at UBC who is involved in menu planning and purchasing. The results from conversations with the chef and an examination of catering menus are listed in Table IV. Knowing which types of seafoods are typically served in which type of food service operation can aid in making strategic decisions on the feasibility of modifying current seafood purchasing practices.

Table IV. Types of seafood currently used at different UBC Food Service Operations

Food Service Operation	*Seafood Commonly Used*
Catering[1]	Black cod, clams, cod, crab (king, snow), halibut, lobster, oysters, salmon (farmed and wild), shrimp, snapper, trout, tuna
Pacific Spirit Cafeteria (fast food)	Mock crab, cod, shrimp, canned tuna
Sage Bistro[2] (fine dining)	Mostly exotics and higher end seafood items
Totem Park and Place Vanier Residences (budget student dining)	Cod (battered and other), ling cod, mock crab, salmon (farmed), shrimp (rare), sole (rare), canned tuna
99 Chairs (casual dining)	Cod/halibut (fish and chips)

[1] UBC Food Services partners also indicated that the amount of seafood used per year can vary greatly depending on the number of special events that book catering at UBC.
[2] The chef remarked that Sage Bistro is mainly autonomous in its meal planning, but UBCFS still can influence its purchasing decisions.

Challenges and Recommendations

The seafood sustainability evaluation lead to the identification of three main challenges in establishing sustainable seafood purchasing practices at AMS Food Services and UBC Food Services: (1) the Avoid listed products that are currently purchased at AMS and UBC, (2) the lack of traceability of seafood products, and (3) the gaps in the current sustainable seafood guideline systems. The following section outlines these challenges and preliminary recommendations for addressing them.

Challenge 1 – The Avoid List Products

The main Avoid listed products in the sustainable seafood evaluation were similar for both food service providers and the purchasing practices for of these items need to be addressed to improve seafood sustainability at UBC. Imported shrimp/prawns and farmed salmon were the primary products of concern. Shrimp trawling in tropical waters is renowned for its high bycatch levels and its destruction of bottom habitats (Harrington et al., 2005; Kaiser and Jennings, 2002). Moreover shrimp farming, especially in Asia and Latin America, is linked to destruction of important mangrove ecosystems and spawning and rearing habitat for many marine species (Folke et al., 1998). Most farmed salmon is raised in high densities in net pens, and this type of aquaculture is criticized for its negative ecological effects such as pollution of surrounding benthic habitats and disease transmission to wild population (Bakke and Harris, 1998; Folke et al., 1998; Goldburg and Naylor, 2005).

UBC Food Services also purchased small quantities of other products listed as Avoid. Notably, internationally-sourced longline tuna was classified as a product to Avoid, but similar options, such as domestically source tuna, were typically rated as Intermediate. Another product of concern was snapper. The general market term "snapper" can apply to a number of fish species on both the east and west coasts of North America. Although some of these species are listed as Intermediate choices, many are listed as Avoid, including Pacific rockfish (Stevens, 2003).

Recommendation: To avoid the ecological problems caused by these Avoid products, the food service providers could either stop buying these products altogether or look for more ecologically friendly seafood options. The Avoid list products (**bold type**) documented in this study and a selection more sustainable alternatives (regular type) is provided below:

- **Large prawns/shrimp** - BC trap caught spot prawns
- **Farmed salmon** - Alaska wild salmon or farmed rainbow trout
- **Sevruga caviar** – farmed caviar (including sturgeon and paddlefish)
- **Snapper, monk fish, skate** – black cod, tilapia, farmed catfish, wreckfish, farmed char, white sea bass, Pacific halibut
- **Internationally-sourced longline caught tuna** – troll/pole caught tuna
- **Exotics such as swordfish (internationally sourced)** – mackerel or mahi mahi

A list of more general recommendations for improving seafood purchasing sustainability is available in Appendix B.

In speaking with members at both food service providers, some of the items listed as Avoid will be more difficult to substitute or eliminate than others, and the feasibility of these changes may be affected by the food service operation where the seafood is used and the target consumer base. Specifically, large imported prawns or shrimp are popular items without a readily available alternative source or substitute at an equivalent price. BC trap caught spot prawns may be substituted in situations where consumers may be willing to pay more for their seafood, such as at catered functions. Moreover, the UBC food service provider partners indicated that farmed salmon is commonly used in a wide variety of their operations (especially by UBC Food Services) partly as a cost-effective measure. At this point in time, wild salmon, especially from Alaska, is listed as more sustainable choice, and both UBCFS and AMS staff indicated that at catered functions they typically offer clients the option of choosing wild salmon instead of farmed salmon at a marginally higher price. The UBC food service providers reported presently having more flexibility in changing or substituting banquet catering items than items used in residences or other food service outlets because of the differences in the consumers' willingness to pay for the different food services. However, UBC Food Services reported that students in residences may be more easily redirected to sustainable seafoods in some cases as they are restricted to the dining room meal selection in what they eat. In the long term, more attention will need to be given to whether wild salmon stocks can support increased consumer demand. Discussions will need to take place over possibly planning for decreasing seafood consumption and promoting land-based protein sources (either vegetable or animal, such as chicken) to allow for the recovery and maintenance of marine ecosystems. This is an especially challenging problem that will require debate.

Challenge 2: Traceability of Seafood Products

Traceability is a concern in the seafood industry as a whole. Legislators are beginning to enact traceability legislation around the world, most notably in Europe, in attempts to create greater consumer confidence in the food supply (Thompson et al., 2005). Chain of custody knowledge allows one to track food through production, distribution and sales (Thompson et al., 2005). It can provide consumers with information about the product's nature and origin and inform their purchasing decisions (Thompson et al., 2005). Traceability is essential for seafood sustainability ratings because they often hinge on a combination of knowing the exact species, method of production (fishing/farming), method of capture, and source region for the product. Requirements for seafood traceability vary by seafood, production system and region (e.g. farmed vs. wild) (Archipelago, 2005; Thompson et al., 2005) making it often difficult to ensure information flow between companies in different seafood sectors and areas around the world (Thompson et al., 2005). Reliable product traceability requires strong relationships between all member of a food supply chain and information sharing through vertical integration (Thompson et al., 2005).

Obtaining sufficient product sourcing information from the two UBC food service providers proved to be difficult in this study, but this problem is part of the larger issue of lack of information on chains of custody in the seafood industry. During data collection, I

discovered that the two food service providers both had a limited period of records available, making seafood purchasing trend detection and behaviour difficult to decipher.

More standardized record keeping systems would aid in the traceability of the seafood products. The different purchase record filing systems used by UBC and AMS made it necessary to use a diversity of data collection and analysis approaches. While UBC was able to provide me with velocity reports from its computer-based records, AMS Food Services did not have a centralized computer database of all of its purchases. The two AMS suppliers that provided only paper purchasing records, Blundell and Nishimoto, appeared reluctant to provide computerized records to AMS for reasons that were not clear to me. Moreover, the lack of information needed to assign clear sustainability rankings on purchasing and velocity reports also made sustainability assessments difficult. Because seafood was a relatively small part of both AMS Food and Beverage and UBC Food Services' businesses, employees often had a difficulties estimating product volumes; records were the best way to approximate the weight of seafood purchased by each business.

A number of noteworthy examples from the purchasing reports, velocity reports and wholesaler information examined in this study indicate gaps in traceability in the seafood industry. In the food service providers' purchasing and velocity reports, indications of the source region of the seafood items were rare. Sometimes the reports had indications of whether the items were wild or farmed, but information on how the seafood was caught and where it was caught was virtually non-existent in the reports. Typically common names that were descriptive enough to identify a seafood accurately were included in the purchasing reports. However, in some cases, very general names such as "cod," "shrimp" or "snapper" were too ambiguous to make accurate sustainability classifications in the absence of the other sourcing information. Latin names were not used on purchasing reports. Moreover, canned goods and especially prepared food items such as battered cod portions typically exhibited variation in how their weight was listed, making calculations of product weights time consuming and sometimes confusing. Because seafood traceability information was not readily available on the purchasing sheets, the information had to be obtained from the wholesalers. From conversations with the wholesalers and examination of purchasing records, I believe that this product information was often generalized, which may have resulted in some inaccurate grouping of seafood products in this evaluation; a few inconsistencies in the suppliers' answers to my questions were noted. For example, one supplier labeled their halibut products as Pacific halibut (a best sustainability choice) but gave the Latin species name for Atlantic halibut (*Hippoglossus hippoglossus*). However, since the supplier information was the best available, I recorded inconsistencies in the data and/or situations where more information and investigation was needed. Obtaining information from the suppliers, although highly feasible and useful, did take time (even months), reminders, and multiple rounds of questions. Standardization of information required on purchasing reports to include answers the following four questions would have provided most of the information needed to conduct sustainability evaluations in this study:

1.) What species is it?
2.) Where is it farmed/caught?
3.) Is it farmed or wild?

4.) How is it farmed or caught?

The UBC food service providers along with wholesalers echoed the sentiment that accurate sourcing information is difficult to acquire in the seafood industry. Lee Donnelly, an Albion sales representative, reported that his company had already taken steps to increase traceability in its business by requiring more accurate product information from its business partners (L. Donnelly, pers. comm.). He was also aware of seafood guideline initiatives such as MBA's Seafood Watch. As with Albion, sales representatives from two other suppliers in this study reported being very progressive in terms of their fisheries and sourcing standards. Only one supplier was very skeptical of the motives behind requests for sourcing information and was reluctant to answer sourcing questions. He also had not heard of the MBA or BOI sustainability guidelines.

The food service providers and wholesaler representatives were very cooperative and understanding of the reasons behind my requests for additional product information; they offered additional insight into the reasons behind the lack of traceability for certain seafood products. First, certain types of seafood have better traceability than others because they currently have better tracking and labeling practices and regulations currently in place (L. Donnelly, pers. comm.; Archipelago, 2005). Industries with relatively good traceability include farmed salmon, wild bivalve (Archipelago, 2005), farmed shellfish and halibut (L. Donnelly, pers. comm.) because of the current industry and government regulations on these products. In general, most wild fisheries, such as B.C.'s wild salmon industry, have fewer regulations and lack verifiable landings data and documentation procedures (Archipelago, 2005). Squid and exotic fish species were also mentioned by the Albion sales representative as being difficult to track (L. Donnelly, pers. comm.). Second, the food service providers' staff and Mr. Donnelly indicated that wholesalers may frequently switch their sources on certain products to provide their clients, like UBCFS and AMS, with constant supplies of seafood (L. Donnelly, pers. comm.). For example they may buy Chinook salmon fished using a gillnet on the BC coast one regularly, but then switch to buying Chinook from Alaska caught using purse-seines when their regular product is not available for their client. Clients such as UBC Food Services typically do not provide specifications for sourcing in these cases (L. Donnelly, pers. comm.). From this information, one can infer that as the seafood industry improves the traceability and transparency seafood products sourcing, seafood sustainability assessments such as this one should become easier to conduct and consumers will be able to make more informed choices about their purchases.

<u>Recommendations:</u>

1.) Seeing that both the wholesale suppliers and the UBC food service providers are currently attempting to develop better seafood tracking systems, it is logical that the parties continue to work together to develop purchasing records that include the type of information required for seafood ecological sustainability assessments. Interactions between food service providers, wholesalers and myself were generally positive and cooperative. This project established closer knowledge sharing ties between different elements of the seafood supply chain and there is tremendous opportunity for collaboration

to increase the traceability, transparency and ecological sustainability of seafood purchasing.

2.) Internal seafood recording at the UBC food service providers can be reformed with a seafood tracking system to ensure that seafood sustainability information is accessible and updated on a regular basis. Until more detailed information is routinely available from wholesalers on purchasing reports, the UBC food service providers could request detailed product reports every 6 months or annually. Using the existing tracking system templates developed by in this study, they could then track the sustainability rating of seafood purchases. Given that this is extra work, the food service providers could hire a work studies student to perform this task. Continuing to monitor seafood purchasing and seafood sustainability guideline changes is critical to the successful implementation of more responsible seafood sourcing at UBC. The partners may need to pursue discussions to negotiate a transfer to computerized purchasing reports with two of AMS's suppliers, Blundell and Nishimoto.

Challenge 3: Gaps in Current Seafood Guideline Systems

Over the course of the project, a number of discrepancies and gaps in the different seafood sustainability guideline systems were noted. Sustainability classification guidelines are being constantly re-evaluated and consolidated, so monitoring of seafood sustainability is required. It is a dynamic process. However three areas of concern were identified:

1.) Minor differences were observed in the rating of certain items. For example, sometimes items listed as best choices on one system were listed as intermediate on another. The use of multiple seafood guideline systems was an attempt to purposely capture these differences as a precautionary measure. MBA was typically found to be the most thorough system in its listings and methodology, so it was typically used as a standard.

2.) The guideline systems did not have classifications for certain items purchased by the food service providers. For instance listings were unavailable for lumpfish caviar, tobiko (flying fish roe), and unagi (freshwater eel).

3.) Overgeneralization of certain categories was a concern, especially with three seafood products: (a) wild Pacific salmon, (b) farmed salmon and (c) steelhead/trout.

Wild Pacific salmon (from everywhere but Alaska) is generally rated as an Intermediate sustainable seafood choice, but lack of distinction between the status of different populations and stocks of salmon is a concern in the guideline systems. There are five different species of Pacific salmon (chinook, chum, coho, pink and sockeye), and each species is composed of a number of populations and separate spawning stocks (Ebbin, 2002). However, while certain population levels are healthy, others are severely depleted. Three populations of Pacific salmon are even listed as endangered in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (DFO, 2006).

Farmed salmon constitute a large portion of aquaculture products around the world (Naylor et al., 2005), but overgeneralization of the sustainability rating for this product is a concern. Most farmed salmon is raised in net pens in coastal areas of the ocean (Naylor et al., 2005), and they are consistently listed as a species to Avoid for reasons such as concerns over pollution, environmental degradation around the farms, escaped fish, disease transfer to wild fish (Mazurek and Elliot, 2004). However, there are some operations that are more environmentally friendly than others, most notably land-based operations (Hamouda et al., 2005). The blanket Avoid category for farmed salmon does not do justice to these salmon farms.

Similarly, a degree of ambiguity was encountered in the listing of steelhead and rainbow trout. As previously mentioned, these fish belong to the same species (*Oncorhynchus mykiss),* they have different life cycles. In the wild, steelhead spend part of their lifecycle in freshwater and part of their lifecycle in the ocean, while rainbow trout live exclusively in freshwater (Stevens, 2003b). Farmed rainbow trout are widely touted in seafood guidelines as Best choices because they are typically raised in land-based raceways, thus avoiding many of the negative environmental impacts associated with net-pen raised farmed salmon (Stevens, 2003b). However, it was unclear from the seafood guideline literature whether steelhead is raised in the same manner as farmed salmon or whether it is raised in the same way as trout. This is a problem because the two receive opposite sustainability ratings. Also, this issue may be confused if the two names are used interchangeably in marketing. In this study, both farmed trout and steelhead were classified together as a Best choice, but more investigation is required into labeling guidelines.

Recommendations:

1) The partners could contact seafood guideline systems (e.g. MBA, BOI) and encourage the development of guidelines for unlisted products (e.g. unagi).
2) The partners could investigate ambiguities and suspected overgeneralizations in the seafood ratings (e.g. wild Pacific salmon). When the David Suzuki Foundation and Sustainable Seafood Canada guidelines are completed, I recommend also consulting these for more Canadian species sustainability ratings.
3) UBC Food Services could also request additional information from their suppliers on the sourcing of on lobster, scallops, prepared cod products and sea bass, which were not able to be classified in this study.

Future Directions

To address the recommendations of this study, the partner group agreed on a plan of action in the April Partner Meeting. Between 2006-2007, the partner group will:

1.) Try to stop buying certain Avoid list products, including monkfish, wild caviar, imported swordfish and internationally-sourced longline tuna at UBC Food Services.
2.) Conduct detailed analyses of the shrimp, salmon, steelhead/trout and snapper/rockfish purchases. Either the partner group or directed studies students will assess the sourcing of the different products, communicate with the suppliers, and assess the feasibility of switching from specific Avoid list products.

3.) Discuss and plan the establishment of a seafood tracking system at UBC, including the criteria needed to set up the system and a strategy for maintenance of the seafood purchasing records.
4.) Hold monthly or bimonthly meetings to continue work on the project.

Future student projects could also address other areas of seafood sustainability, including:

- gaps in seafood guideline systems,
- assessment of seafood purchasing at St. John's and Green College (the other two UBC food service providers),
- the feasibility promoting reduced seafood consumption overall at UBC,
- economic, social and other aspects of ecological sustainability (e.g. waste from processing, etc.) associated with seafood,
- sustainable seafood education and awareness at UBC.

CONCLUSION

This initial study of the ecological sustainability of seafood purchasing at the University of British Columbia has produced a baseline evaluation of the two major food service providers at UBC which can help to inform and evaluate future seafood purchases. This report has indicated the annual volumes of seafoods being purchased and products of concern. The study has also highlighted an opportunity for the UBC Sustainable seafood project partners to help influence development of better seafood tracking systems by working with wholesalers. The creation of an internal seafood tracking system is recommended in the mean time to help ensure progress towards more sustainable seafood purchasing. Moreover, this investigation has also highlighted that UBC can to play a role in influencing the development of better sustainable seafood guideline systems. The baseline purchasing sustainability analysis and recommendations in this report can act as a catalyst to move UBC towards more sustainable seafood purchasing and continue the tradition of ecological responsibility and sustainability leadership at UBC.

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APPENDICES

Appendix A – Other seafood assumptions

Other Assumptions pertaining to this seafood sustainability evaluation include:

- All sockeye salmon is wild. I assumed this because sockeye is a species that is not farmed in BC (DFO, 2006).
- All pollock is from Alaska. I assumed this because over 93% of pollock landings in the US come from Alaska (Marsh, 2005) and all the pollock products that had sourcing information were from Alaska.
- Kamaboko (fake crab) is pollock. I assumed this because the UBC food service providers and the MBA aquarium literature support this notion (MBA; A. Parr, N. Toogood, and D.Yip, pers. comm.).
- Steelhead and trout were both farmed, and farmed in the same way (land based). MBA indicates that most rainbow trout are farmed (MBA). Please see the Challenges and Recommendations section in the main report for more information on this assumption.
- Sole and unclassified cod products were from the Pacific. I did this because of UBC's proximity to the Pacific and because Atlantic sole and cod populations are heavily depleted (MBA).
- None of the king crab in this study was from Russia. Russian kind crab is one type of crab listed on MBA's Avoid list (MBA), and I assumed that it would be highly unlikely that UBC would obtain crab from Russia as opposed to other closer sources like Alaska.
- Unclassified salmon (i.e. not listed as farmed or wild) from:
    - AMS was wild. There were only two unclassified salmon products from AMS and they were Pacific species. All other Pacific salmon the AMS purchased was wild so I assumed this was also wild.
    - UBC was unclassified. There were a large number of salmon products with no information as to whether they were wild or farmed. Since this distinction is critical in determining the sustainability rating of salmon, I left these salmon as unclassified.

Appendix B: Additional Purchasing Guideline Recommendations

(Note: All information in this section was obtained from either the MBA or BOI websites)

For general seafood purchasing guidelines that the food service providers should consider, the results of this investigation indicate:

- Farmed shellfish are typically better choices than wild shellfish,
- Extra attention should be used when buying seafood labeled as snapper. Be sure of source and species. Reference the MBA website for detailed listings on what is an intermediate choice or a product to avoid.
- With scallops, farmed products are the best choice. If wild products are ordered however, obtain source and species information and reference the MBA website to find the most sustainable choices.
- Source snowcrab from Canada as opposed to the US if possible. Canadian populations are reported to be healthier than American ones.

Appendix C Table V. AMS Food and Beverage Seafood Sourcing Information

Product	*Supplier*	*Supplier Codes*	*Amount (Kg)*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
Imitation Crab	Nishimoto	92036, 92105, 92024	6040.9	wild	n/a	n/a	Best	
Pollock fillets	SYSCO	71926, 71916	195.4	wild	Alaska	seine	Best	
Kamaboko	SYSCO	71900, 21885	193.2	wild	USA (?)	n/a	Best	
POLLOCK TOTAL	SYSCO	19 months	6429.5				BEST	
		12 month estimate	4060.7					
Canned chunk light tuna	SYSCO	12468, 12526	1933.6	wild	Alaska	seine	intermediate	Yes
Canned light tuna	SYSCO	12460	11.3	wild	Western Pacific	seine	Intermediate - avoid	Yes
1/4 cut albacore tuna	Blundell	210875, 215952, 210870	2019.8	wild	Queen Charlotte Islands (BC)	troll	Best-Intermediate	Yes
Albacore tuna	Nishimoto	99799, 99796A	49.8	n/a	n/a	n/a	intermediate	
TUNA TOTAL	SYSCO	19 months	4014.4					
		12 month estimate	2535.4				VARIABLE	
Atlantic smoked salmon	Nishimoto	90124	10.0	farmed	n/a	n/a	Avoid	
Atlantic salmon 8/10	Blundell	300600, 300598, 301602, 301596, 300598	1067.5	farmed	Vancouver Island	n/a	Avoid	Yes
FARMED SALMON TOTAL			1077.5				Avoid	
coho salmon fillets or h/off	Blundell	325229, 325240, 480175, 325227	61.6	n/a	n/a	n/a	Variable	
spring salmon s/off or h/off	Blundell	315310, 360200	91.9	n/a	n/a	n/a	Variable	
sockeye salmon h/off	Blundell	335322, 435320	474.5	wild	S.E. Alaska	troll	Best	
sockeye salmon	Nishimoto	89096, 91106	31.7	wild	n/a	n/a	Intermediate (or Best?)	
Canned salmon	SYSCO	11572	60.2	wild	Alaska	seine	Best	
Smoked salmon tips (chum)	SYSCO	71680, 71681	290.9	wild	Canada Pacific	n/a	Intermediate	
Salmon burger (pink)	SYSCO	71504, 71505	54.6	wild	Alaska	net	Best	

Product	*Supplier*	*Supplier Codes*	*Amount (Kg)*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
Salmon burger (pink)	SYSCO	71504, 71505	54.6	wild	Alaska	net	Best	
WILD SALMON TOTAL			1065.4				Best-Intermediate	
SALMON TOTAL	SYSCO	19 months 12 month estimate	2142.9 1353.4				VARIABLE	
nobashi shrimp	Nishimoto	67040, 88035, 89035, 89037, 89038, 90059	174.5	farmed	imported?	n/a	Avoid?	
31/40 blue bt hlso prawns	Blundell	500487	5.5	n/a	Vietnam	n/a	Avoid	
Black tiger shrimp	SYSCO	71482	65.4	farmed	Vietnam	n/a	Avoid	
White shrimp	SYSCO	73562	10.9	farmed	China	n/a	Avoid	
Northern shrimp	SYSCO	71637, 71635, 71636, 71643	259.0	wild	Canada, Gulf of St. Lawrence	n/a	Best-Intermediate	
SHRIMP TOTAL	SYSCO	19 months 12 month estimate	515.3 325.4				VARIABLE	
Salmon/trout	Nishimoto	90691	60.0	farmed	n/a	n/a	Best	
Smoked steelhead/trout	SYSCO	71701, 71710	203.6	farmed	Chile, USA, Canada	n/a	Best	
Steelhead/trout TOTAL		19 months 12 month estimate	263.6 166.5				BEST	
UNAGI TOTAL	Nishimoto	88124 12 month estimate	125.0 78.9	n/a	n/a	n/a	n/a	
FRESH CRAB TOTAL	Nishimoto	91208 12 month estimate	54.5 34.4	n/a	n/a	n/a	Best-Intermediate (as long as not from Russia)	
TOBIKO TOTAL (flying fish roe)	Nishimoto	89853, 91208 12 month estimate	18.5 11.7	wild	n/a	n/a	n/a	

Product	*Supplier*	*Supplier Codes*	*Amount (Kg)*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
Bay scallops Scallops	Nishimoto SYSCO	90128 1642	9.1 6.8	n/a wild	n/a North Atlantic	n/a n/a	Best (farmed) to Intermediate (wild) ? Intermediate	
SCALLOPS TOTAL		19 months 12 month estimate	15.9 10.0	n/a	n/a	n/a	Best-Intermediate	
Mussels, Live TOTAL	Blundell	140520	4.5	n/a	P.E.I.	n/a	Best (farmed)-Intermediate(wild)	

Appendix D

Table VI. UBC Food Services Seafood Sourcing Information

Species Category	*Supplier*	*Amount (kg) 3 years*	*Rank 3 years*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
Anchovies	Sysco	190	26	wild	n/a	n/a	**best**	
ARTIC CHAR TOTAL	Albion, Sysco	526	18	farmed	Yukon	n/a	**best**	
Catfish	Albion, Sysco	1	37	farmed	Idaho	n/a	**best**	
Caviar (lumpfish Black)	Albion	0	38	assume wild	n/a	n/a	**n/a**	
Caviar - sevruga	Albion	1	36	assume wild	n/a	n/a	**avoid**	
CLAMS TOTAL	Albion, Sysco	1813	9	wild (some farmed)	BC, Washington, SE Asia	drag, dig, rake	**intermediate (most wild), best (some maybe if farmed)**	yes (if wild)
Black Cod	Albion	895	14	wild	BC, Alaska	longline, trawl, trap	**best-intermediate**	
GREY COD FILLETS TOTAL	Albion	221	24	wild	Pacific North America	longline, pot trawl	**intermediate**	
COD? TOTAL	Albion, Sysco	2650	8	assume wild	n/a	n/a	**best-intermediate (likely)**	yes (if Atlantic)
LING COD TOTAL	Albion	715	15	wild	Pacific North America	longline, drag	**intermediate**	
CRAB- DUNGENESS TOTAL	Albion	572	17	wild	Pacific North America	trap	**best**	
CRABMEAT? TOTAL	Albion	196	25	assume wild	n/a	n/a	**best-intermediate (avoid king from Russia)**	
King Crab	Albion	49	34	assume wild	Alaska (Russia?)	n/a	**intermediate (likely if Alaska)**	
SNOWCRAB TOTAL	Albion	912	13	wild	n/a	n/a	**best (Can) - intermediate (US)**	
Eel	Albion	14	35	n/a	n/a	n/a	**n/a**	
HALIBUT TOTAL	Albion	9557	3	wild	Pacific North America	longline	**best-intermediate**	yes
Herring	Albion	353	22	wild	n/a	n/a	**best**	
LOBSTER TOTAL	Albion	155	28	n/a	n/a	n/a	**variable**	yes
Mackerel	Albion	51	33	assume wild	n/a	n/a	**best**	yes (some)
MAHI MAHI TOTAL	Albion	169	27	wild	worldwide	longline, troll	**best**	
Monk Fish	Albion	89	30	wild	n/a	n/a	**avoid**	

Species Category	*Supplier*	*Amount (kg) 3 years*	*Rank 3 years*	*Farmed/ Wild*	*Source Region*	*Catch Methods*	*Rating*	*Health Concerns*
MUSSELS TOTAL	Albion	80	31	farmed	Atlantic, Washington, BC	n/a	**best**	
OYSTERS TOTAL	Albion, Sysco	55	32	farmed (other?)	China, other?	n/a	**best (assume all farmed)**	
Pickerel	Albion	0	39	wild	Manitoba	net	**n/a**	
POLLOCK TOTAL	Albion, Neptune	672	16	wild	Bering Sea, West Coast US	trawl, other?	**best**	
PRAWNS/SHRIMP (IMPORTED) TOTAL	Albion, Neptune	2810	7	wild, farmed	Vietnam, India, Myan Mar, Indonesia, Mexico, Ecuador, other?	trap, other?	**avoid**	
SHRIMP (LOCAL) TOTAL	Albion	1694	10	wild	Quebec	bean trawl	**best-intermediate**	
WILD SALMON TOTAL	Albion, Sysco	10165	2	wild	BC, Alaska	troll, other (?)	**intermediate (some best?)**	
FARMED SALMON TOTAL	Albion	13833	1	farmed	n/a	n/a	**avoid**	yes
SALMON? TOTAL	Albion, Neptune	5528	5	n/a	n/a	n/a	**variable**	
STEELHEAD/TROUT TOTAL	Albion	395	21	farmed	Canada	n/a	**best**	
Sardine	Albion	470	19	wild	n/a	n/a	**best**	
SCALLOPS TOTAL	Albion	4181	6	n/a	n/a	n/a	**variable**	
Sea Bass	Albion	1517	11	assume wild	n/a	n/a	**variable**	
Skate	Albion	0	39	assume wild	n/a	n/a	**avoid**	
Smelt	Albion	307	23	assume wild	n/a	n/a	**n/a**	
SNAPPERS TOTAL	Albion	465	20	assume wild	n/a	n/a	**intermediate-avoid**	
SOLE TOTAL	Albion, Neptune	1317	12	assume wild	n/a	n/a	**intermediate (Pacific)-avoid (Atlantic)**	
SQUID TOTAL	Albion	114	29	wild	SW waters or South America	jig, other (?)	**best-intermediate**	
SWORDFISH TOTAL	Albion	0	39	wild	worldwide	longline	**intermediate-avoid**	yes
TUNA TOTAL	Albion, Sysco	8223	4	wild	worldwide and West Pacific	longline, handline, seine	**intermediate-avoid**	yes

Moving towards Sustainable Seafood at UBC - Phase I

Executive Summary

Full report available at http://www.sustain.ubc.ca/seeds.html

The University of British Columbia is making important and landmark decisions to ensure that all seafood consumed on campus is sustainably sourced. Most ocean fisheries are grossly depleted, with consequent grave conservation concerns for many marine species and habitats. In response, conservation based groups around the world have developed tools that allow consumers to select sustainable seafood while dining or shopping. As well, interdisciplinary stakeholder coalitions are working to unite interested groups in advancing seafood sustainability, and retail giants such as Wal-Mart are now selling only seafood certified as responsibly sourced.

With a population of perhaps 45,000 people on campus daily, UBC is determined to maintain a strong record in sustainability. Ecologically, socially and economically sustainable seafood purchasing and education at UBC is needed to support the University's *Trek 2010* vision of excellence in sustainability, research, and global citizenship. The current Sustainable Seafood Project represents a collaboration among five groups: Project Seahorse at the UBC Fisheries Centre, the Faculty of Land and Food Systems, the Sustainability Office's SEEDS program, and the two largest UBC food service providers, AMS Food and Beverage and UBC Food Services.

Phase I of the UBC Sustainable Seafood Project, completed in April 2006, involved four steps: (1) creating links and dialogue among food system actors involved in seafood purchasing and consumption at UBC, (2) documenting current seafood purchasing and consumption practices at AMS Food and Beverage and UBC Food Services, (3) assessing the ecological sustainability of UBC's seafood sourcing, mainly under Monterey Bay Aquarium's Seafood Watch guidelines, and (4) recommending improvements in seafood purchasing on campus (full report available at http://www.sustain.ubc.ca/seeds.html).

The programme has already seen measurable progress. First, on completion of the report, UBC Food Services immediately removed four highly unsustainable seafoods from its menu. Second, companies supplying seafood to the two main UBC food service providers have become involved in developing better records and labeling to help trace seafoods from "sea to table." Third, the project team has started to address information gaps in current seafood sustainability assessment systems and invited collegiate groups to do the same.

As it moves into phase two, the project team has great ambitions. UBC Food Services has asked for advice on adjusting consumption of all other seafood items on its menu, including salmon and shrimp. Such advice will emerge from new projects to be executed by student researchers, who will begin incorporating social and economic concerns into their assessments of ecological sustainability. The programme will also disseminate results and reports to the UBC community, and further its ties with the two other UBC food service providers, St. John's College and Green College, both of which share a similar vision of sustainable seafood accessing.

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