



Misty Isles Economic Development Society

Haida Gwaii Agriculture Strategy

Background Document

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INTRODUCTION

Imported food for Haida Gwaii is transported from various national and international regions to Vancouver distribution centers then again transported over 1500 kms by truck to Prince Rupert followed by another 7 hours (or more) of ferry or barge transportation depending upon weather conditions affecting sailing times.

Approximately 90% of the food consumed by Haida Gwaii residents is imported and residents are aware that they are heavily dependent upon costly transportation systems for this food. There is increasing interest in learning about food production practices and in supporting local food producers. This support for local food indicates the time is agreeable to encourage agricultural growth on Haida Gwaii.

Current events supporting the economics of local food production include the following:

- The recent announcement (Feb 3, 2011) by BC Ferries President David Hahn reported that fare increases for the northern BC Ferry routes (Prince Rupert to Haida Gwaii) are expected to increase by 100% over the next 4 years (26% annually)¹.
- On February 3, 2011, the UN Food and Agriculture Organization (FAO) reported that the Food Price Index had broken all previous records since the FAO began measuring food prices in 1990.²
- Local grocery stores have reported cost increases of approximately 20% in basic groceries since 2009. As a result of increasing fuel prices, significant increases in BC Ferries transport, rising food and grain prices, these stores anticipate steady increases in the cost of food for Haida Gwaii over the next year (2011).

¹ <http://www.cbc.ca/canada/british-columbia/story/2011/02/04/bc-ferry-fares.html>

Haida Gwaii Observer, February 10, 2011 'Huge fare increase projected by Ferries' boss', p.1

² <http://uk.reuters.com/article/2011/02/03/us-food-fao-index-idUKTRE71226G20110203>

Support for a local agriculture industry arises from our dependence on costly transportation systems to import our food as well as our dependence on distant food producers to provide for us. A local agricultural industry will provide us with food for our families, employment opportunities and an improved economic base (ie: the re-circulation of dollars spent locally).

The primary objective of the Agriculture Strategy is to stimulate and develop local agricultural opportunities on Haida Gwaii. This Strategy and Implementation Plan may have particular interest for small-scale or new food producers on Haida Gwaii wishing to expand their current operations.

Current and historical agriculture practices on Haida Gwaii have been documented as has research into successful agriculture practices in areas with similar climate, latitude and economic base. This research was conducted as a means to provide greater awareness of existing opportunities for local agriculture.

A vision of agriculture, on Haida Gwaii, was defined at the Feb 19, 2011 action planning workshop ‘The Future of Food on Haida Gwaii’.

- Workshop participants expressed a vision of agriculture on Haida Gwaii as becoming sustainable and providing for a self-sufficient lifestyle for islanders.
- The future was seen as ‘local’.
- In addition, participants saw the future in terms of healthy people and working partnerships between people and the Island Community as a whole.

Participants developed action plans addressing areas of Production Support (train and hire an ‘Extension Agent’ (Agriculture Support Officer) to provide support and resources for local food producers, access to land, research plots), Education (a series of workshops addressing the needs for local food producers of all levels), Marketing (Haida Gwaii branding to promote ‘buying local’) and Business Opportunities (local soil

amendments, bulk buying club and freight sharing and agri-tours). More detail on these action plans can be found in the section titled 'Where do we go from here?' Other important goals which require follow up but do not have action plans developed at this time can be found in Appendix D.

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EXECUTIVE SUMMARY

Haida Gwaii, with a population of approximately 5,000, is a remote archipelago 90 nautical miles off the north coast of British Columbia. The total area of the archipelago is approximately 3,840 square miles and covers 156 miles (250 km) from north to south. Access to the islands is limited to ship or aircraft. Food, material goods and mail are transported via BC Ferries or barge.

The first Nations people of Haida Gwaii have a rich and diverse history of harvesting food from the sea and land. Harvesting and trading these resources has provided countless generations with food sustenance. The colonization of Haida Gwaii in the late 1800s and early 1900s led to significant changes in food production and consumption.

Over the past 120 years on Haida Gwaii, numerous examples can be found of individuals attempting to develop sustainable agricultural operations despite the challenges of climate, transportation and land clearing costs.

The Misty Isles Economic Development Society (MIEDS), the Graham Island East Coast Farmers Institute, Islands Food and other interested stakeholders met in November 2009 to discuss the potential for agricultural growth as well as the challenges and opportunities facing farmers and producers. The participants identified the need for an agriculture strategy to provide direction to and development of agriculture on Haida Gwaii.

Throughout the fall of 2010, a team of local researchers obtained information on historical agricultural operations on Haida Gwaii and conducted a review of current agricultural practices. In addition, research was provided on other farming communities in areas having similar latitude, climate and economic base. Potential opportunities were identified and presented with the research findings.

A Technical Advisory Committee, comprised of agricultural knowledge holders, was formed to review the findings, guide the research and provide feedback to ensure accuracy as much as possible.

Recommendations and feedback were provided by stakeholder groups throughout the document review process.

A series of public meetings in each island community (7) were held to present the findings, obtain feedback and identify topics and goals of primary concern.

Consistently, the meeting participants expressed concern about the effect of rising fuel prices upon the systems transporting their food, their dependency upon those systems and the effect of climate change upon local food production. Also of concern was access to affordable land for food production, support in production and marketing, education and the development of resources and partnerships. Participants identified priority areas pertaining to agriculture and goals to stimulate agriculture on Haida Gwaii.

A public working meeting ('The Future of Food on Haida Gwaii – Taking Action') was hosted Feb 19, 2011. Participants at the working meeting formed smaller groups and reached consensus in prioritizing the above-mentioned goals. Following this process, participants developed action plans for those goals having the highest rating of importance and urgency.

These goals and action plans form the basis of the Haida Gwaii Agriculture Strategy and Implementation Plan.

HISTORY OF AGRICULTURE ON HAIDA GWAI

Haida Gwaii has been a cornucopia of food resources from the sea and land for over 10,000+ years. These resources have provided food sustenance for countless generations. These resources were either actively or passively managed. The agricultural history of Haida Gwaii can currently be summarized into two categories, pre and, post European contact.

We hope, in the near future, to collaborate with the Haida Nation to broaden the scope of this document into a comprehensive local food security strategy.

Based on the information collected for this document it is currently unclear to what extent the Haida cultivated and managed their food sources. Plants were used for food, flavourings, beverages, chewing, and smoking. Agriculture may have taken place in the form of planting, transplanting, coppicing, pruning, burning, thinning, partial harvesting, digging, and soil amelioration (ie. Removal of sticks and stones from the soil)¹.

Some of the plants that have been referenced as having been intentionally grown on Haida Gwaii pre-contact include Rice Root, Highbush Cranberries, Springbank Clover, Pacific Ciquefoil, Fireweed, Crab-Apple, Salmonberries and potentially Cloud Berries¹.

“Garden Plots” may have been established in close proximity to villages, river estuaries, nutrient rich river banks, hillsides and shorelines. Clearing of land through burning and tree harvesting yielded a diversity of berry crops².

European contact in 1774 facilitated active trading between the Haida villages and European vessels and there is some documentation of the Haida practicing agriculture (Pojar 2008).

Early missionaries demonstrated management of their own gardens leading to the emergence of a new style of agriculture.

Haida populations began to plummet in the early to mid-19th century due the introduction of a number of illnesses including smallpox, typhoid and tuberculosis³.

Traditional harvesting practices began to decline as a result of the population drop and the introduction of legal limitations on traditional practices. Populations were decimated, villages were deserted and those that survived moved to Masset, Skidegate, Alaska, Victoria or elsewhere.

The early 1900s brought tales of Haida Gwaii's wealth of resources⁴. The first wave of homesteaders began to arrive in the late-19th century and began to explore Haida Gwaii for its rich natural wealth of land, timber, gold, coal, minerals, and fish³.

During this time a severe forest fire ravaged eastern Graham Island opening the land up for easier conversion to modern agriculture. To this day the origin of the fire has not been established.

Traffic associated with small coastal freighters and tug and barge services also increased³. The communities of Queen Charlotte City, Masset, Graham Centre, Port Clements, and Sandspit, formed around this time. Haida Gwaii was then surveyed, and forest licenses were developed. Haida Gwaii's current private land base was granted by the crown in 1909⁵.

Settlers began to clear land around Queen Charlotte, Sandspit, Port Clements, Masset, along the entire east coast of Graham Island, Kumdis Island, Mayer Lake, Sewall, and inland along North Beach / Tow Hill³. Clearing land and increasing soil arability took a great deal of hard work and dynamite. A variety of crops were cultivated, and traded with the mainland, villages, and miners, loggers, and fishing camps^{3,5}. Simple "corduroy roads" began to appear on the landscape.

Numerous stories exist from a variety of references regarding the development of agriculture, and homesteading around this time period^{3, 4, 5}.

Sitka deer were introduced to Haida Gwaii in 1902 on Moresby Island, with several subsequent introductions of animals following this^{3, 5}. The introduction of these animals was intended to offset the loss of game from the recent extinction of Dawson's Caribou (*Rangifer dawsonii*) on the island by providing new game to hunt.

Primitive telephone communications were brought to the island at this time. Long-piers began to be constructed, easing the loading and unloading of vessels³.

In 1912 the Graham Island East Coast Farmers Institute was formed in Lawnhill and was followed soon thereafter by the Tow Hill Farmers Institute^{3, 5}. An Experimental Farm was also established in the Lawnhill area along the North Road.

By 1915, fifty four recorded settlers were growing a variety of food for the islands. Local farmers (including Haida) in Masset were raising root vegetables and cattle for trade⁵. The beginning of the First World War took many young potential farmers from Haida Gwaii³. Very few returned. Interest in mining, fishing and forestry resources remained. A large forestry operation existed around Mosquito Lake during World War I³; however other areas were almost entirely abandoned.

By the 1920s there had been a slight resurgence in farming. Agriculture was now part of the school curriculum in Masset and the Department of Agriculture recommended reliance on local resources to increase self-sufficiency and to reduce the dependency on expensive and risky transportation⁵.

Reliable freighters began to service the B.C. coast in the 1920s and 30s^{3, 6}. This allowed for the increased importation of food.

The farmers that remained did not have a problem finding markets due to the appetites of workers in the mines, canneries and forestry camps, however farming on Haida Gwaii dwindled considerably by 1937.

Farms could still be found islands-wide, producing much of the same food products, but at a far smaller scale⁵. Gardens diminished in size. As early farms were abandoned, the first reports of “wild” cattle began to circulate⁵. The beginning of the Second World War took many islanders away once again.

Committed farmers persevered. A dairy farm operated from Sandspit, delivering milk products islands-wide from the mid 1940s until the milk regulations were implemented in 1970. The dairy farm was unable to sustain its operations as a result of the related regulatory costs and was converted into a golf course.

A modern airport was established in Sandspit, and a munitions depot was built and operated in Alliford Bay in the 1940s⁵, the primary purpose being for maritime patrol. Regular air service from Sandspit started in 1947^{5,6}.

The Masset monitoring installation was built at this time³. This complemented the sea-plane transportation that had already arrived on the islands a few years prior. Food goods could now be flown on, and off the island with relative ease⁶.

Growth slowed on Haida Gwaii in the late 1940s, 1950s, and early 1960s⁵. The few remaining farms were slowly deserted. Cattle were rounded up and butchered and old farm lots began trading hands.

By 1952 the B.C. Fields Crop Commissioner noted that there was very little farming on the islands, and that most of the former farms were abandoned^{4,5}. They also noted that agriculture on the Islands was difficult as compared to other regions due to the cool climate, cost of land clearing, cost of drainage, cost of soil amendments, and distance to market.

The 1950s brought reliable shipping by boat due to the introduction of the Northland Prince and the Skeena Prince into regular service to Haida Gwaii^{3,6}. Now regular shipments of groceries could be made. In 1958^{5,6} the construction of a road between Masset and Queen Charlotte allowed for the free movement of goods across Graham Island. Television and electricity also began arriving on Haida Gwaii around this time. By the mid 1960s the forest and fishing industries began to flourish. Masset began the construction of its military base, which led to further economic opportunities⁵.

With forestry and fishing proving to be far more profitable than farming, few farms were left operational in the 1960s. Land was being sold, and used for non-agriculture purposes^{3,5}.

Free-range grazing was an accepted practice islands-wide and it was common to see livestock and horses (owned by the remaining farmers) roaming / foraging freely along the highway. Eggs, beef and milk were still produced in some abundance however, more and more islanders were beginning to rely on foods imported by the Northland Prince and Skeena Prince.

In 1970 the District Agriculturalist was not hopeful about agricultural opportunities on Haida Gwaii, echoing the 1952 findings of the B.C. Field Crops Commissioner⁴.

The 1970s brought grocery stores and more imported goods as a result of increased air traffic^{5,6}. Agricultural prospects slowed even further, with only local beef and potatoes being sold on the island by 1976⁵.

In the mid-seventies free-range livestock was banned from Naikoon Provincial Park and discouraged from roaming along the highways⁵. Large-scale agricultural prospects were further hampered by the stark increase in land values across the Islands.

During this time the number of home gardens increased however very little produce was made available for sale⁵.

Land was being purchased by logging companies and speculators. The Agricultural Land Reserve (ALR) was established in 1973 to protect BC's dwindling farmland with approximately 40,825 hectares being allocated as ALR for Haida Gwaii.

The economic trends of the 1970s continued into the 1980s with a few notable exceptions. Both the Skeena Prince and the Northland Prince were retired and the newly established B.C. Ferries began offering regular service from Skidegate Landing to Prince Rupert.

The Queen of Prince Rupert and the Queen of the North began plying the waters of Hecate Strait. The Graham Island East Coast Farmers Institute was very active at this time, although they had only a small membership⁵. Still, agricultural prospects were limited by the availability and diversity of low cost imported foods and steadily climbing land values. Richardson's Ranch opened a veterinary clinic and feed store at this time. Prior to this, feed purchases were made via the local farmers co-operative.

By the 1990's a paradigm shift was apparent. Interest in the environment had begun to grow. The Haida population had increased substantially over the course of 50 years, and their political voice was growing stronger.

Islanders were becoming increasingly aware of the effects that pollution, chemical additives and industrial processing were having on their food. Interest in organic food increased and two local organic food stores were opened. Food producers from the southern mainland also began utilizing the ferry service to sell their products on Haida Gwaii.

Backyard gardens became increasingly popular at this time. Farmers began cultivating small portions of land for the production of vegetables. Small poultry and livestock operations became more prevalent. Local farmers again began supplying the islands with produce on a small scale. Most islanders still chose the convenience of shopping at grocery stores that imported much of their food⁵.

In the most recent decade backyard gardens, small farms and greenhouses are beginning to flourish again, offering small volumes of product for sale. Since 2008, 2 new farms have been established mid-Graham Island and 2 market gardens (one at each end of Graham Island).

Recent changes to the meat regulations have resulted in provincial approval of ten Class D licenses on Haida Gwaii, allowing local meat producers to sell their product at the farm gate and for retail sales within the regional district.

The GM Dawson Secondary School (Masset) offers an agriculture component as part of the Grade 11 science program. The instructors report that they are attempting to expand the agriculture component into an entire Grade 11 science course.

Membership in the Graham Island East Coast Farmers Institute and the newly formed Islands Food now boast a combined membership of approximately 200. The Skidegate Inlet Food, Fuelwood and Fitness Society (SKIFFFS) was formed in 2008 with the intention of motivating self-sufficiency, health and a reclamation of traditional low-carbon skills.

Production costs, labour costs, land costs, clearing costs, markets, and high transportation/freight costs continue to hinder agricultural development on Haida Gwaii. The climate also poses unique challenges.

In summary, the past 150 years have resulted in a new form of agriculture supplementing traditional methods of food production and gathering. Efforts made to develop an agricultural land-base have been challenged by wars, more lucrative prospects in the resource extraction industries, climate and high land and transportation costs.

Public interest in and support of local food production has increased as can be demonstrated by the development and continued growth of the Farmers Institute, Islands Food and SKIFFFS organizations.

Our dependency upon transportation systems for imported food will not be sustainable if fuel prices continue to increase or transportation systems (ie: BC Ferries, freight companies) cease to operate (ie: as a result of reduced profits). It is important that we reduce our dependency on such systems and increase our ability to develop and support local agricultural endeavours.

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CURRENT AGRICULTURAL PRACTICES / INFRASTRUCTURE AND PRODUCTION

The Province and Farming on Haida Gwaii

The 2010 BC Assessment Roll for Haida Gwaii lists 9 farm businesses on 21 parcels of land. These properties range in size from 4.73 acres to 170.96 acres. The 21 farm properties cover approximately 1,264 acres and 12 of them are within the Agricultural Land Reserve.

In 2002, the Council of the Haida Nation issued a statement of claim for Haida Gwaii. Since that time, a Sustainable Land Use Agreement has been signed between the Council of Haida Nations and the Province of British Columbia in 2007. This agreement and its Ecosystem Based Management objectives may pose further challenges and opportunities to agricultural development on Haida Gwaii, at least in terms of traditional agricultural practices. Public access to Crown Land for agricultural (and other) use(s) is dependent upon the development of a shared-decision making process between the Haida and the Provincial Government.

Applications for Crown Land may be initiated at the Ministry of Environment and Lands office in the Ministry of Forests and Range building in the Village of Queen Charlotte¹. Approval of the application for Crown Land is subject to a shared-decision making process between the Haida and the Provincial Government.

Agricultural Land Reserve

The Agricultural Land Reserve (ALR) was established in 1973 to protect BC's dwindling farmland. As a result of its establishment, the protected ALR land, in 2011, remains the same size as in 1973. The ALR is an important tool not only in the protection of farmland, but also in ensuring that there is a land base for future food security.

Pressures such as industrial development, urban sprawl, residential subdivisions and commercial interests have been slowly eroding farmland throughout the decades. Without the ALR, BC may have continued losing up to 6,000 hectares (ha) of farmland annually. Presently there are 40,825 ha (100,880 acres) of land designated as Agricultural Land Reserve on Haida Gwaii.

After the acknowledgement of Parks and Conservancies, the total ALR available on Haida Gwaii, is approximately 28,212 ha (69,700 acres)². The most accessible areas are found on the east coast of Graham Island and north Moresby Island and total about 10,000 ha (24,700 acres). A large tract (approximately 17,000 ha/42,000 acres.) follows the Yakoun River Valley to Port Clements (Central Graham Island). Much of the land in the Central Graham Island area that is inside the ALR is owned by an off-islands logging company.

The ALR is a listing of land with agricultural capability that requires special consideration before any irreversible development is carried out on it (ie: residential development is irreversible.)

The soil capability ranges from 1 through 7 and as such there is a disproportionate amount of land within ALR that is not farmed primarily because it is of a capability suitable to a limited range of crops. For example, Class 6 lands are suitable only for wild forage without any cultivation, while Class 5 lands can be tilled for improvement but are only suitable for grazing.

The Agriculture Land Commission publication 'The ALR and Community Planning Guidelines' notes that there is no minimum parcel size assigned by the Agriculture Land Commission (ALC)³. Local government zoning bylaws may determine the minimum parcel size.

Privately owned land within the ALR which has not achieved 'Farm Status' is eligible for a 50% reduction from the 'school' portion of the property taxes⁴.

Agricultural Land, Soil Capability and Food Production

As noted previously, the soil capability classification ranges from 1 through 7 (Appendix A) with the lower ranges having better agricultural capability than the upper ranges. Based on data provided by Haida Mapping, the total area available for agriculture islands-wide, in soil classes 2-4 (we do not have class 1 soil), is 79,342 acres (31,709 ha).

Of the 79,342 acres, 71,231 acres (26,826 ha) are rated as having class 4 soil capability. Class 4 soil has limitations that require special management practices, or severely restrict the range of crops, or both.

Approximately, 78,355 acres (31,709 ha) of the class 2-4 soil on Haida Gwaii, falls into the ALR (55,387 acres/22,414.61 ha) and CHN protected areas (22,968 acres/9,294).

These results indicate that approximately 2,422 acres of class 2-4 soil are available for agriculture outside the ALR and CHN protected areas.

The Ministry of Agriculture and Lands notes in its 2006 report, '*Can B.C.'s Farmers Feed Our Growing Population?*', that .52 ha (approximately 1.3 acre) is required to provide a healthy balanced diet for each person.

The Ministry of Agriculture and Land figure above translates to the need for approximately 5,850 acres of land under cultivation on Haida Gwaii (based on a population estimate of 5,000). This figure will include areas for vegetable and fruit production, grain, livestock, dairy, grazing and possibly buffer zones.

Other sources have noted that up to 1/3 acre per person is required for vegetable and fruit production. These figures vary and depend upon factors such as climate, the soil type, soil classification (see Appendix A), crop suitability and planting methodology (intensively grown verses standard rows).

As noted previously, BC Assessment (2010) reports that Haida Gwaii currently has 1,264 acres of land being actively farmed and much of that is being used for grazing.

‘Farm’ Status

Having ‘Farm’ status provides the property owner with a reduced taxation rate. BC Assessment identifies 9 property classifications for taxation purposes, class 9 being ‘Farm’. ‘Farm’ status is granted annually based on gross annual income from primary agricultural production (ie: horticulture, livestock and produce). A minimum annual gross income of \$2,500 must be earned for land between 2-10 acres in size. Land less than 2 acres must produce a minimum annual gross income of \$10,000⁵.

Other benefits of having ‘farm’ status include having the ability to purchase lower priced ‘farm’ gasoline (coloured) for farm vehicles (1 highway vehicle per farm) and special insurance rates for those vehicles that are used primarily for transporting farm goods.

Food Production on Haida Gwaii – Survey Results

Current agricultural practices include growing produce for personal consumption, market sales and raising livestock for personal consumption, farm gate and retail sales (pork, beef, goat, lamb, mutton, chicken, duck, rabbit). In addition, there is increasing interest in raising poultry for eggs⁶ and meat as can be seen in Appendix B.

To assess the volume of food production on Haida Gwaii, approximately 30 food producers were asked to participate in a survey of volumes of various food produced locally¹. Of those, 8 were market gardeners. The majority of the remaining 22 producers were growing food in relatively large quantities primarily for personal consumption. Unfortunately, a number of the market gardeners were hesitant to participate in the surveys (various reasons) despite reassurances that all data would be reported as consolidated figures. As a result of

this challenge, food production for Haida Gwaii is estimated based on comparisons with farms that did report data.

The total volume of food produced locally was broken down into specific categories of produce, meat and dairy items and can be viewed in Appendix B. The food identified in the survey consisted only of items which grow well or are successfully produced on Haida Gwaii.

Local vendors (grocery stores) were surveyed with respect to the volume of these same food items that are imported to Haida Gwaii. The table (Appendix B) compares the volume of estimates of imported food against the volume of foods produced locally.

The 2010 Food Producer Survey (Appendix B) results demonstrate that vegetables grown in greatest volume locally (estimates), were: Potatoes (22,000 lbs), Lettuce (10,000 lbs), Carrots (7,000 lbs), Squash (4,000 lbs), Beets (4,000 lbs), Peas (3,000 lbs) and Rhubarb (2,700 lbs).

The overall consumption of these same vegetables (imported and locally produced) is estimated at: Potatoes 200,000 lbs (11% produced locally), Lettuce 47,000 (23% produced locally) , Carrots 52,000 lbs (14% produced locally), Squash 19,000 lbs (19% produced locally), Beets 7,000 (58% produced locally), Peas 7,000 (44% produced locally), and Rhubarb 3,000 lbs (90% produced locally).

The 2010 Food Producer surveys indicate that approximately 27,000 dozen eggs are produced locally on an annual basis.

The survey also documents that food producers estimate that approximately 57,000 litres of milk are produced locally from dairy animals for personal consumption.

Approximately 8 market gardens, including 3 commercial greenhouses, operate on Haida Gwaii. These producers sell an estimated 17,000 lbs of produce at local Farmers Markets and ‘farm gate’ sales⁶.

Local greenhouse production includes tomatoes, cucumbers and various salad greens. At this time we have been unable to obtain data on commercial greenhouse production on Haida Gwaii.

Meat

Recent changes (2010) to the Provincial Meat Regulations have enabled local meat producers in specified areas to sell directly to the public via ‘Farm Gate’ sales (Class E) or to the public and local retail markets (Class D). These changes to the meat regulations are restricted, at this time, to nine rural and remote regional districts (Haida Gwaii included as part of SQCRD)⁷.

Ten facilities on Haida Gwaii have received approval as licensed facilities. These facilities (located on private properties) have representation in Port Clements (3), Tlell (5), Queen Charlotte area (1) and Sandspit (1).

In support of the changes to regulations, workshops pertaining to ‘slaughter’ and licensing information were held in the fall of 2010. In addition, the Ministry of Health provided 5 public workshops in Haida Gwaii (2011) in areas of food safety, water system management, general agricultural practices and poultry operations.

Dairy

Jersey cows appear to have the highest representation for milk cows on Haida Gwaii while Alpines, Boers, Nubians and Saanens are the primary breeds of goats on Haida Gwaii. At least one farm (Tlell) is raising Friesen sheep, which demonstrate a potential for milk production.

These dairy animals provide a number of local food producers with a rich source of dairy. Based on producer reports, estimates of 57,000 litres of milk are produced locally from cows and goats for personal consumption.

‘Raw’ (unpasteurized) milk cannot be sold to the public. Cheese can be made from raw milk but must be aged for 60 days prior to being made available for consumption⁸.

A Specialty Quota is available to milk producers from isolated areas such as Haida Gwaii. The specialty quota assumes that the milk production will be for a ‘cottage industry’, that it meets organic certification requirements and that it cannot be transported by the Milk Marketing Board beyond the local area (Haida Gwaii). Approval must be provided for eligibility for the specialty quota prior to the process of obtaining a quota⁹. Regulations guide the operations of the processing facility¹⁰.

Poultry & Eggs

Backyard flocks are becoming a common site in ‘urban’ as well as rural settings on Haida Gwaii.

In a recent (November 2010) electronic survey of 51 Haida Gwaii residents, 74% of the respondents reported having chickens, 44% ducks, 22 % rabbits, 9% pigs, 26% goats and 9% cows. Of the respondents, 49% resided on a rural property while 51% resided in town.

A survey of the governing bodies determined that each of the communities permit poultry within an appropriate enclosure. A bylaw to this effect exists in the Village of Masset and for Moresby Island (SQC RD Area E), Skidegate (SQC RD Area D), Old Massett (SQC RD Area D) and Rural Graham Island (SQC RD Area D). The Village of Port Clements and The Village of Queen Charlotte have no bylaws preventing poultry flocks within the town limits. The Village of Queen Charlotte has noted that in response to past complaints of roosters, either a noise or zoning bylaw is possible at some point in the future.

At least three farms are raising heritage stock for breeding purposes. Chicks can be ordered via the local feed store as well.

If a significant number of 'urban' residents are indeed raising poultry within the town limits as indicated by the November 2010 Electronic Survey, we should acknowledge the commendable effort from both the poultry raisers and the governing bodies that support these efforts. Food production on Haida Gwaii is not limited to rural settings.

With respect to the sale of eggs, the *Guideline for the Sale of Foods at Temporary Food Markets* (<http://www.bccdc.ca/search.htm?query=temporary+markets&domain=www.bccdc.ca>) Appendix III notes that:

Shell eggs may be sold at temporary food markets subject to the following:

- Shells are sound and not cracked/leaking
- Shells are clean and free of any fecal material or feathers
- Eggs are maintained at an internal temperature of 4°C during transportation and storage/display at the market
- Crates used to contain the eggs are clean and maintained in a sanitary manner.
- The minimum information on crates should indicate the name of
The farm/producer and the packaging or sale date

Processing Facilities

Island Meat and Sausage Company and the Haida Gwaii Culinary Co-operative are developing local value-added products (meat, produce, agro-forestry products). In addition, the 3 fish processing facilities also offer opportunities for freezing and packaging.

Local processing facilities (Island Meat, Haida Gwaii Culinary Co-operative, Omega, CBI and Albion Fish Processing Plants) include temperature-controlled coolers, processing equipment, dehydrating equipment, packaging products, established markets and knowledgeable staff. Some of these facilities have indicated a willingness to work with primary food producers in the interest of extending their operating seasons. The opportunities for creative entrepreneurial partnerships are myriad and could also include local restaurant kitchens, which are often underutilized in use during the winter months.

Farmers Markets and Retail Sales

The Queen Charlotte farmers market was established in 1994 beginning with only 2 vendors, slowly increasing over the first 3 years of operation. In 1998, the Community Club built a kiosk on Community Club land (downtown Queen Charlotte) and made it available to the farmers market vendors when not in use for other sporting events. The Village of Queen Charlotte Farmer's Market has grown exponentially ever since, with sales doubling each year since 2008. There are presently 7 regular vendors with representation from market gardens, cottage industries, various processing facilities and mariculture operations.

The Tow Hill community established a farmers market at the north end of the island in 2009. The market did not operate in 2010 although one food producer (a vendor from the 2009 farmers market) increased production in 2010 but sold as 'farm gate'.

A farmers market in Masset was attempted in 2010. The market site was identified as along the Hwy 16 in front of the former Singing Surf building. This is an ideal site as it is easily accessible for vehicles and can comfortably host multiple vendors.

A number of farms from Masset and Port Clements area are offering produce at sidewalk markets in Masset, door-to-door in Port Clements and through special orders. These markets are offered fairly regularly.

A farmers market in Sandspit is being organized to open for the 2011 season, as a result of increasing interest from Sandspit's local residents.

A Community Supported Agriculture (CSA) program began in the Queen Charlotte area in 1998. Consumers pre-paid for weekly boxes of produce. This box-a-week program was popular and allowed the farm to secure funds at the beginning of the season.

The CSA model (which has many forms) may serve as an opportunity for food producers (urban or rural) interested in obtaining start up capital for their agricultural aspirations and operations and is a good economic opportunity for various communities on the islands.

Fruit and vegetables produced on Haida Gwaii are primarily grown for private consumption and farmers markets. Approximately 17,000 lbs of produce are sold annually at local farmers markets. An estimated \$50,000 is attributed to farmers markets and farm gate sales annually⁶.

'Low-risk' food can be sold directly to the public at farmers markets. These foods include fresh fruits and vegetables. The local Health Authority may approve the sale of food from higher risk categories if it is prepared in an approved food safe facility (ie: eggs, meat, fish etc)¹⁴.

In addition to Farmers Markets, food producers may choose to have their products sold at retail outlets. In order to do this the producer must receive approval from the local Health Authority. Expectations are that the food be prepared in a food safe manner and that the producer has set procedures for preventing contamination of the food. This process is less onerous than the inspections necessary for restaurants and public facilities.

Assistance throughout the process is available through our Local Health Authority (Northern Health) – (250-631-4222) or www.northernhealth.ca

More on the Food Premises Regulations can be found at:

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/11_210_99

Another good resource is the Food Safety Systems Implementation Program, delivered by the Ardcorp (for producers) http://www.ardcorp.ca/index.php?page_id=43 and the BC Small Scale Food Processors Association <http://www.ssfpa.net/foodsafety>

Currently, the primary markets for local produce are limited to Farmers Markets (Village of Queen Charlotte and potentially the Village of Masset and/or Tow Hill Road) and farm gate sales. The community of Sandspit is organizing a Farmers Market to commence operations in 2011.

One of the local fishing lodges has established partnerships with local farmers/food producers for 2011, to provide as much local produce to their clientele as possible. Another of the lodges has built and operates a large greenhouse to ensure a source of local produce.

The Farm to School program has established partnerships for 2011, between local farmers/food producers and schools (4) between Old Massett and Port Clements, The Northern Haida Gwaii Hospital and the Culinary Arts Program in Old Massett.

The 2010 Vendor Survey (Appendix B) found that a number of grocery stores reported having purchased local produce in small quantities and had expressed interest in increasing their ability to do so. An agreeable price and steady supply were the primary considerations.

With respect to providing a steady supply of produce, most food producers reported not having adequate storage at this time⁶. A number of farms were considering storage options and indeed, some are experimenting with root cellar designs in addressing challenges such as humidity and soil condition.

The Graham Island East Coast Farmers Institute was approved for funding (2010) enabling them to purchase a 40' temperature controlled and insulated storage unit available for public use. With the availability of the storage facility, opportunities exist for local food producers to store their goods for longer periods of time, increasing the ability to provide local produce on a year round basis.

Imported Food Survey Results

Despite the volume of local food produced, the survey results demonstrate that Haida Gwaii imports approximately 90% of its food. Over 1 million pounds of produce, meat and dairy are imported to Haida Gwaii annually.

In attempting to determine the volume of produce imported to Haida Gwaii, 30 restaurants and 20 grocery stores were asked to participate in the survey¹. Consumption volume data was gathered and compared to the per capita data from Canada Food Statistics 2008 as a means of striving for accuracy.

Appendix B depicts the volume of imported food in comparison to that produced locally.

As can be seen in the Food Producer Survey Results (above), the greatest volume of vegetables produced on Haida Gwaii are: Potatoes, Lettuce, Carrots, Squash, Beets, Peas and Rhubarb. Survey items consisted of produce items that grow well or are successfully produced on Haida Gwaii.

<u>Description</u>	<u>Total Consumed</u>	<u>% of Total Produced Locally</u>
• Rhubarb	3,060 lbs	90%
• Beets	7,000 lbs	58%
• Raspberries	302 lbs	49%
• Peas	7,000 lbs	44%
• Squash	19,000 lbs	19%
• Potatoes	200,000 lbs	11%
• Pork	103,000 lbs	8%
• Dairy	243,000	19%
• Eggs	104,000 doz	26%

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Livestock and Feed

The cost of maintaining livestock is significantly greater on Haida Gwaii than off islands and is directly related to the high cost of transportation/freight. As a result, farmers attempt to reduce those costs by using methods such as bulk buying of grain, feed and hay imported from off-islands. Transportation costs are also reduced using ‘back hauls’ of independent transport companies (local and off-islands).

An estimated 350 tons of feed is imported by local farms annually for livestock operations.

An increasing number of food producers, are experimenting with growing their own feed for livestock. Mangels and Fava beans have been grown with some success on a smaller scale.

Currently farmers use the following locally grown feed in livestock operations:

- Pasture grazing – from spring through early winter
- Hay – grass mixes that are cut, dried and stored for winter use
- Silage – grass mixes that are cut and ‘fermented’ for long-term storage
- Browsing
- Feeding vegetables such as mangels and potatoes

Mangels as Winter Cattle Feed

Bill Mackay notes, in his 2011 special report to MIEDS, that an essential part of farming is livestock production, both to feed people and to feed the soil as part of a fully diversified agricultural operation.

On a diversified farm, where sustainability is a high concern, carefully selected cattle can feed daily on natural grasses and browse throughout the three warmer seasons. In the winter they will still browse but their diet must be supplemented, especially when the ground is snow covered.

Cattle first evolved as grass eaters and browsers of natural growth. They have difficulty digesting a diet heavy with grains but do very well on grass and brush. However, the grains are cost effective nutrition and grasses are not in many cases, so cattle are finished on grains in factories ¹.

But on a diversified farm, where sustainability is a high concern, there are no feedlots. Carefully selected cattle can feed daily on natural grasses and browse throughout the three warmer seasons. In the winter they will still browse but their diet must be supplemented, especially when the ground is snow covered.

The best dry feed for the winter is good grass-based hay. Each animal needs about 37 pounds of feed a day so half of a big bale is about right, every day ². Each cow would need 50 to 75 bales of hay to take them through the winter. This is difficult under coastal conditions where hay-making is unpredictable and cleared fields are scarcer than in more open country. The simplest and most beneficial solution is to supplement the hay with grain, in order to ensure adequate nutrition and to stretch the hay a bit.

In early pioneer days on Haida Gwaii settlers moved first into areas with natural grasslands. As those lands were taken up later pioneers had a difficult time first clearing fields and then putting up enough hay for a winter. Hence, many settlers did not keep cattle, barely being able to keep enough feed for the family horse ³.

Some pioneers, with good growing land, could feed their cattle with vegetables, both grown specifically as feed and those left-over vegetables less than easily marketable. In the mid-1700s farmers in Britain faced similar conditions as populations grew and adapted vegetables specifically for livestock feed. Information available on the Internet is sparse and often contradictory but the consensus seems to be that mangels were first developed from beets in Northern Europe, Germany and Poland, and adapted in Britain in the late 1700s.

John Seymour, the English author of "The Smallholder" and many other wonderful books about self-sufficient living says "Fodder beets are very similar to mangels, but smaller and far more nutritious....high in protein....personally I think they are a better crop". "Sow and thin exactly like mangels but thin to 8 inches".

Some writers equate fodder beets and mangels but most agree sugar beets were developed later from mangels.

To quote from a biologist ⁴:

Fodder beets are *Beta vulgaris* subsp. *vulgaris* var. *crassa*

Sugar beets are *Beta vulgaris* subsp. *vulgaris* var. *altissima*

Mangels are *Beta vulgaris* subsp. *vulgaris* var. *vulgaris*, with two forms: convar. *flavescens* or convar. *vulgaris*.

Regardless of the science, mangels are great cattle feed and much appreciated by chickens in the winter as well.

In one recent trial in Tlell the farmer bought seed of two varieties of mangels from Johnny's Seeds in Maine and planted 13 200 foot rows in mid-June. They are a slow growing crop so should be planted a few weeks before your last frost date (mid-April in this location) so they can germinate as early as possible. This will give them maximum time to develop their amazing size. The yield of this planting was surprising for such a late start and fed two pregnant cattle for three months.

They need to be one year of a four year rotation to thrive as they need such rich soil. When mature they can be pulled and stored in "clamps" or in a root cellar, protected from freezing. Before pulling the roots be sure to take advantage of the nutrition in the leafy tops by feeding them to chickens and cattle. Both the tops and roots of mangels are good people food as well but opinions vary on how "good" they are. Some sources say they are a back-up emergency food in case of crop failures.

In the early days of the Richardson Ranch tons of mangels were stored in a wooden grain silo through the winter. ⁵

As the science of silage production was refined early in the 20th century silage became a valued feed source in areas where hay production was risky, mostly due to unreliable weather. Therefore, highly mechanized silage

production easily replaced mangels as winter feed ⁶. As changing times move us all towards placing a higher value on the security of local food production there is a place again for small, diversified farms to use vegetables, rather than or as well as hay or silage, as winter livestock feed.

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ANALYSIS OF GRAINS AND FORAGE ON HAIDA GWAII

Introduction

Forage is plant material (mainly plant leaves and stems) eaten by grazing livestock. Historically the term forage has meant only plants eaten by the animals directly as pasture, crop residue, or immature cereal crops, but it is also used more loosely to include similar plants cut for fodder and carried to the animals, especially as hay or silage.¹

Forage has been grown for animal feed on Haida Gwaii since European settlers first arrived with their livestock at the turn of the last century. When the early settlers came, they arrived with cattle, horses, pigs, chickens and other small livestock. Although land was expensive and labour intensive to clear, the original settlers had access to large quantities of grassland that had grown in the rich ash after a major fire swept the entire eastern portion of Graham Island in the 1800's.

Old timers who are still alive today recall being able to see great distances of grassy expanse from either side of the plank road between Tlell and Port. Now those grassy areas are covered in brush and salal. There was plenty of range-land open for homesteaders' cattle. Eric Ross tells of herding his families' cattle and those of the other local farmers, out to the pontoons for summer grazing. He also mentions vast grazing lands in the Oeanda River area, which now lie within the Naikoon Park boundaries.²

It appears that many of the original settlers put hay up for winter feed. Although hay was made in the old days at Richardson Ranch in Tlell, now they only make silage.

Lynda Dixon, in her 2010 special report to MIEDS, '*Growing Forage on Haida Gwaii*', notes that a benefit of our mild climate allows for an extended grazing season. In providing for winter feed, haying and sileage-making have been successful with silage having proven to be more reliable with respect to processing in our climate.

Silage

Silage is feed that has been preserved by acidification – the result of fermentation in the absence of oxygen. Any green crop with adequate water-soluble carbohydrates (sugars) and the correct moisture content can be cut, chopped and ensiled.

The green crop is cut and chopped, placed in a silo, packed and covered or sealed as quickly as possible. Then, biochemical processes transform the crop into silage.

Within the first few hours, an aerobic reaction begins which consumes all of the oxygen in the silage. The duration of this reaction may range from a few hours to several days. Heat is created and valuable nutrients are consumed during the reaction. It is important to manage the forage properly beforehand to minimize the length of this process.

Once all the oxygen has been consumed, fermentation begins, producing lactic acid and thereby lowering the pH (acidity) level in the feed. When the pH drops to a certain level, usually within three or four weeks, fermentation stops. The silage is ready.

Advantages

- Silage can be harvested in almost any weather conditions.
- Lower dry matter loss during harvesting means higher outputs of nutrients per acre.
- Permits the use of a wider range of crops than other forage systems.
- Can salvage crops damaged by hail, frost and high weed content.
- Large quantities of uniform quality feed can be stored.
- Palatability can sometimes be improved in crops such as sweet clover.
- Handling is mechanized from the field to feed trough.

Disadvantages

- Requires more labour and time than hay.
- Has an odour that may be offensive if stored near populated areas.
- Capital investment required for storage facilities, forage harvester.
- Has limited market potential. Long distance transportation is inefficient because silage is heavy and deteriorates with exposure to air.

Silage on Haida Gwaii

The Richardsons in Tlell used to put hay up but have switched over to making silage for winter feed; wet weather and field conditions make silage the most dependable choice. Currently, they have a large silage building where they haul and pack the cuttings from their fields, cover it in plastic and allow the fermentation process to take place with as little air as possible in the pile.

Dan and Tammy Abbott have made silage on a smaller scale than the Richardsons. If weather conditions are right they tend to put up hay.

Haying

Cutting and drying hay is the most traditional and common way to store feed for animals for winter consumption. Natural grass pastures may be cut, dried and baled but usually a field is planted with a grass and legume mix to produce a more nutritious product. The field will produce more tons of dry matter if it is limed and fertilized. Different types of livestock have different nutritional needs. For instance, dairy cows require a much richer feed than horses, which may become ill if the feed is too rich.

Advantages

- Can be done with little equipment on a small scale. Or can be done on a large scale.
- Less labour intensive than silage.
- Hay is easy to transport.
- Hay is expensive on islands (\$18.00 - \$25.00/bale) therefore haying can be cost effective.

Disadvantages

- Harvesting is weather dependent.
- Loss of some nutrients in drying process.
- Requires dry storage.
- Island grasses are not high in nutrients.
- Requires large fields.



This poster is a reproduction of a watercolour painting by Nova Scotia Museum artist Azor Vienneau which depicts saltmarsh haying on an Acadian farm in the early 1700s. Details of the painting are closely based on both archaeological and historical evidence. Archaeologists recently discovered evidence of two farm houses with out-buildings like the ones in the background of this scene on the upper Belleisle marsh in Annapolis County, Nova Scotia³.

Haying on Haida Gwaii

Bob Prudhomme of Sandspit has been haying about 30 acres in Sandspit for the past 10 years. He used to lease the land at the airport and would cut the Mathers' hay as well. He has cut up to 1,400 bales of hay. He states that he always gets a cutting every year. He added that the high winds dry the hay extremely quickly,

often drying it enough to bale in a couple of days. Although he admits that the hay is not the most nutritious, it does well for his horses. Basically, he says, you get out of a field what you put into it. If the field is fertilized the feed will be better⁴.

Tammy and Dan Abbott have been haying fields in Tlell for about 10 years. Tammy says that they need about 2 weeks of good weather in July/August to get the hay in successfully. They also have to work around high tides that flood the field⁵.

Forage Crops on Haida Gwaii

Don Richardson states that: 'My only experience with cereals is for green feed and silage. I have successfully grown annual crops such as oats, barley, rye, peas and vetch in various combinations as "nurse" or "cover crops" for perennial forage crops. Orchard grass, rye grass, timothy, red and white clover, low growing clover, white Dutch clover all do well on the sandy soils.

We also can grow brome, trefoil, fescues and wheatgrass. Reed Canary grows well on the wet heavy soils. Most of the time I recommend pasture plantings of a mix of seeds aimed at the coastal climate, our rainfall and the soil type.

These mixtures allow for plants to grow at different rates, going to seed at different times and providing a much better seasonal usefulness to the pasture. We do make recommendations which are different if the land is to be just pasture, pasture and hayed, or just hayed. Different species are also recommended for different animals, some species, like Alsike clover, are poisonous to horses.

No modern forage seed grows well below the high water mark on the estuaries. Nature does better with her own selections but these grasses and sedges can be enhanced with fertilizers and rotational grassing. We do not have enough heat units to grow silage corn and the soil is too acidic to grow alfalfa.'⁶

Forage Trials in the 1980's

The 1916 report from the Lawn Hill Experimental plots indicated that fairly good success was had with the following:

- Grasses – Cocksfoot, Creeping Bent and Timothy
- Clovers – Alsike (fair), Red (inferior)

All plantings required ash or lime and fertilizer for success.⁷

In 1982 experimental forage plots were planted at the Bellis Lower campground in Tlell, Ray and Charlotte Fournier's at Lawn Hill, Bill and Wendy McKay's, Adolf Bitterlich's, and the Richardson Ranch in Tlell. Mixes containing Bromegrass, Orchardgrass (2 varieties), Red Clover (2 varieties), Alsike Clover, Timothy, ryegrass, and Reed Canary grass were tested on a wide variety of plots and soil types.

There does not seem to be any conclusive data with the forage notes sent to the project, but Jim Tingle made the following observations:

“We had excellent seeding establishment of both coastal and interior forage varieties on the four replicate areas that Don Richardson had rotovated out of the native vegetation adjacent to the Tlell River. I believe that the red clover yielded in excess of 4 tons of dry matter per acre in the year of seeding. However the field flooded in November of 1982 and the high salt content killed most of the cultivated forage except some Reed Canary grass.

The trial area took years to re-establish a forage stand. I believe that Don (Richardson) subsequently decided that it was best to fertilize the native salt-tolerant grasses to enhance forage production.”⁸

Grain Reserve on Haida Gwaii?

Grain reserves have been instrumental in the development of our present civilization. The domestication and storage of a surplus of wild grains for the winter, led to a radical change in the majority of human cultures from hunter gatherer societies to agriculturalists.

In the 1970's, the UN responded to a global grain shortage with an attempt to organize an international strategic grain reserve.⁹ This has not been successful. When grain prices surged in 2007, most countries had reduced their public grain reserves to almost zero, and so lacked the means to stabilize the grain market.

A few countries that did have substantial reserves maintained them in an effort to protect domestic consumers. This led to price surges in the global market that could have been avoided had even a few million tons been made available to the global market by those with reserves to spare.

This situation grew worse when governments in exporting countries adopted various measures to restrict exports, including high taxes on exports and even export bans, in order to stabilize their own domestic prices.^{11 12}

Currently, World Bank data shows that global grain reserves are very low¹⁰:

Grain Reserves in Days		
	U.S.	Global
2008-09	75	79
2009-10	82	85
2010-11	53	75

Source: <http://www.fas.usda.gov/psdonline/psdHome.aspx>
All Grain Summary Comparison

Statistics Canada reported that with respect to Canadian grain, ‘as of December 31st, total stocks of most principal field crops were down compared with the same date a year earlier. Total stocks (including commercial and on-farm inventories) generally fell as a result of reduced crop production in 2010’.

(<http://www.statcan.gc.ca/pub/22-002-x/2011001/aftertoc-aprestdm1-eng.htm>)

On February 3, 2011, the UN Food and Agriculture Organization (FAO) reported that the Food Price Index had broken all previous records since the FAO began measuring food prices in 1990. The FAO noted that “World food prices surged to a new historic peak in January for the seventh consecutive month”.

The FAO reported that price increases were reported on Cereals (wheat and maize - at their highest since July 2008), Oils/Fats (nearing the June 2008 record), Dairy (an increase of 6.2% since Dec 2010) and Sugar (up 5.4% from December 2010).

Local stores report increases of approximately 20% for basic groceries since 2009. As a result of increasing fuel prices, significant increases in BC Ferries transport and rising food and grain prices, we can likely anticipate steady increases in the cost of food for Haida Gwaii over the next year (2011).

Grain prices in Haida Gwaii are likely to remain high and be subject to spikes for reasons such as:

- The high baseline cost of shipping to Haida Gwaii.
- Global grain shortages driving prices up.
- Weaknesses in the ability to organize an international system of grain reserves or fair distribution of the world’s grain.
- Commodity markets increasingly attracting the type of speculators who brought down the financial markets in 2007-8.
- In ‘normal’ times, grain production is very vulnerable to weather – this is now complicated by climate change predictions. Scientists believe that the climate will become hotter and dryer in the inland areas where grain typically is grown, and subject to more extreme weather events. Harvests will be more unreliable and the odds will increase that several of the world’s grain breadbaskets will fail in a single year.

- Although Canada is a grain growing nation, that grain is sold to Canadians at the going international rate.
- Peak Oil. World oil production may have peaked in 2005 to 2010.¹³ The implication is that production will shortly begin to decline as producers struggle to extract increasingly difficult oil deposits. When fuel costs rise, so will the price of grain because grain production is so heavily mechanized.
- Population growth. There are millions more mouths to feed every year.

Haida Gwaii has access to a major grain terminal only 100 miles away by water. Presently there are rail connections to the Prairie Provinces and political forces will most likely maintain that connection as long as possible because of the significance of rail in international trade.

Partnerships with the Prince Rupert Port Authority could be established to ensure that the grain terminal will always sell to locals by the dump truck load at least.

In addition, the communities of Haida Gwaii could build communal granaries for bulk storage and purchase an industrial sized flour mill. Other options could include personal storage facilities for livestock feed and various cereals.

Conclusion

Haida Gwaii has a mild winter climate allowing for an extended grazing season. Although there is limited snow coverage in the winter months the grass nonetheless does not have enough nutrition to sustain animals.

It is necessary to either put up hay or make silage for overwintering livestock. Both methods require a certain amount of equipment and land. Anecdotal evidence indicates that haying in the wet climate of Haida Gwaii is possible. With satellite weather predictions available today, the risks of haying can be mitigated substantially.

Research and testing of coastal grain varieties on Haida Gwaii is recommended and may indicate opportunities for Haida Gwaii.

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⁶ Dr. Don Richardson, Richardson Ranch. E-mail November 1, 2010.

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¹¹

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,contentMDK:21936922~pagePK:64165401~piPK:64165026~theSitePK:469372,00.html>

¹² <http://hgworld.blogspot.com/2008/06/oil-vs-grain-what-future-holds.html>

¹³ <http://www.oilposter.org/index.html>

<http://www.theoil drum.com/files/World%20Oil%20Production%20and%20Average%20Price.png>

¹⁴ David Schroeder, 2011 Special Report to MIEDS, ‘*Grain Reserves*’

AGROFORESTRY ANALYSIS

A wide range of plant species have been identified as having economic value and agroforestry potential^{1,2}. In recent years the interest in the development of marketable products from these species through economically viable and environmentally sustainable agroforestry practices has gained increasing support³. Unfortunately the true value of agroforestry may not be known due to disagreements in definitions, poor overall reporting, and a lack of recent studies.

For the purpose of this report, agroforestry is defined as the intentional, intensive, integrated management of a forested area. Agroforestry is meant to be an interactive endeavour, designed to maximize positive interaction between the environment, trees, crops, livestock (wildlife), and humans.

Agroforestry primarily refers to the production of food. Through the careful management of forested land, alternative commodities can be developed so as to have either a positive or no effect on timber production potential. Agroforestry management can include alley cropping, silvopasture, forest farming, timberbelts, windbreaks and integrated riparian management. It is important to note that agroforestry is not the conversion of forested land to agricultural land or vice-versa. An example of a method used in agroforestry (alley cropping) can be found on Figure 1.0.

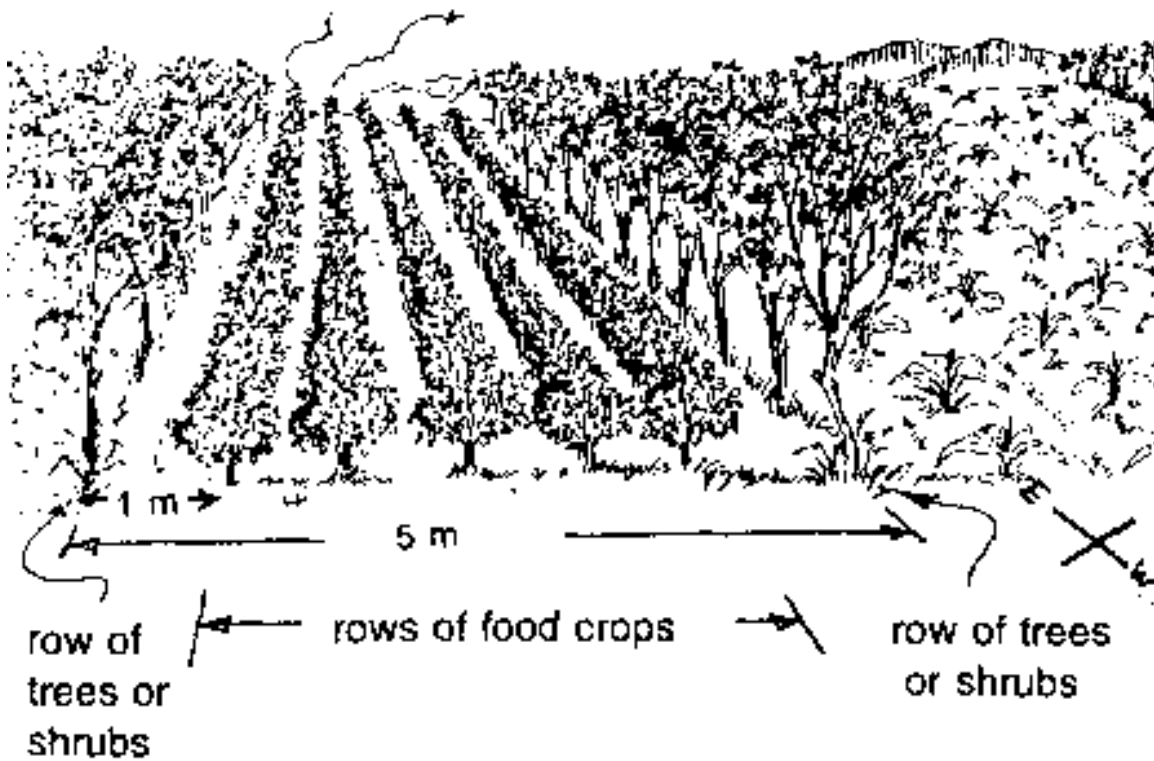


Figure 1.0. Example of Alley-Cropping⁴

The Haida have been thought to have occupied Haida Gwaii for over 10,500 years^{5,6}, with populations of 15,000 – 20,000⁵. Plants were an important supplement to the traditional Haida diet, and were used especially when starvation threatened³.

Plants were used for food, flavourings, beverages, chewing, and smoking³. Documentation of plants, their names, use, storage, and methods of preparation prove that food plants were a significant facet of life prior to contact⁴.

It has been suggested that plant resources were owned, managed, and controlled according to clan / family territories⁵. It has been documented that harvesting mainland NW Coast Aboriginal peoples adapted hereditary title to specific lands and resources⁷. The chiefs of these lands were given the responsibility of monitoring and sustaining them⁸.

Since extensive trade existed between the Haida and other mainland Aboriginal peoples (Tlingit, Tsimshian) it may be safe to state that management structures and agroforestry practices may have been applied here³. Pojar (2008) states that “evidently, the Haida practiced a form of agriculture, and not just with native species”⁹, suggesting that exotics may have been introduced to be used as food items (ie. Potato).

Instructions were taught by elders to children on caring for and maintaining the land, specific strategies for use, and obligations associated with use⁷. The lack of documentation of practices has meant that a large amount of knowledge gained by generations of local groups may have been lost⁴.

Traditional practices may have taken the form of burning, planting / transplanting, coppicing, pruning, thinning, partial harvesting, digging, and soil amelioration (ie. Removal of sticks and stones from the soil)^{9, 10, 11, 12}.

Some of the plants that have been referenced as intentionally grown on Haida Gwaii, pre-contact, include; Rice Root, Highbush Cranberries, Springbank Clover, Pacific Ciquefoil, Fireweed, Crab-Apple, Salmonberries, and potentially Cloud Berries³. “Garden Plots” occurred around villages, river estuaries, nutrient rich river-banks, hillsides, and shorelines⁷.

Clearing of land through burning / tree harvesting may have intentionally or unintentionally yielded a vast diversity of berry crops.

The Council of the Haida Nation (CHN) has employed and designed numerous surveys over many years to capture culturally important archaeological records in order to preserve important knowledge of Haida use and occupation on lands and waters.

These reports are confidential to the Haida Nation and are not accessible for this report. Some of the publicly accessible tools used both here and in BC include permitting surveys of the Archaeology Branch of BC to gauge historical usage (Archaeological Impact Assessments, Archaeological Inventory Studies and Traditional Use Studies).

It is important to note that similar documents have been published on material that can be applied to or, associated with agroforestry potential on Haida Gwaii^{13,14, 15, 16, 17, 18, 19, 20, 11, 21, 22}. These documents deal with potential development, stewardship, sustainability, management, subsistence, economic return, harvesting management, sociological importance, and dietary information.

Agroforestry and agricultural development was historically based on disturbance. One example, is the Tlell Fire of the 1880s that ravaged thousands of hectares from Tlell, past Masset Inlet, covering major parts of North Beach, East Coast and Mayer. In more recent years, small farm development has followed post-harvest logging sites.

There are also specific examples that illustrate the difficulties of farming certain species with unsuitable management techniques. Some examples that have been attempted historically include; cranberry farms, free range livestock on managed pastures and small garden plots. Other animals including horses, European boar, rabbits, and pheasants have also been un/intentionally allowed to roam freely through forested land.

A slow revival of wildcrafting and local food processing (Haida Gwaii Culinary Co-operative, Islands Meat, Fish Processing Plants), a desire to build more sustainable and locally managed resources (Land Use

Organizations, Community Forest Associations), and the growing interest in and market for healthy local food choices, all suggest that there is potential for local agroforestry opportunities.

Projections for the local potential of agroforestry are primarily conjecture at this point, as Haida Gwaii has never ‘turned her eyes’ to maximizing large-scale restoration propagation on existing clearcuts nor on implementing partial timber harvests like shelterwood trials to actively manage for species like wild berries, mushrooms and deer.

Unfortunately for would be agroforesters holistic economic models are rarely employed by land-use management professionals. Foresters and farmers rarely plan together. Planting potatoes and berries at the same time as caring for trees are not often part of development plans. As we can see from other regions in BC, these practices can all occur together by developing more holistic guidelines and better understandings.

An important factor to consider is the desire of local people to pursue agroforestry. The desire for food sustainability and security, regardless of the land-use management style used, must exist at all levels of government, within the people of the community and be embedded within the culture of the land itself.

Historical research on agroforestry management on Haida Gwaii has thus far been inconclusive, though it seems possible that certain agroforestry management systems were practiced²³.

Contemporary agroforestry projects have been limited and have been subject to significant barriers. Agroforestry can provide positive environmental, economic, and social benefits for multiple interests. This can be done by increasing food crop diversity, increasing production stability, providing alternative sources of income, and the development of best-practices. Providing an outdoor classroom like that posited by SKIFFFS where agroforestry models could be developed and learned from would also be of tremendous benefit. It is hoped that in the near future greater resources will be dedicated to the research and development of Haida Gwaii’s agroforestry potential.

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MARICULTURE ANALYSIS

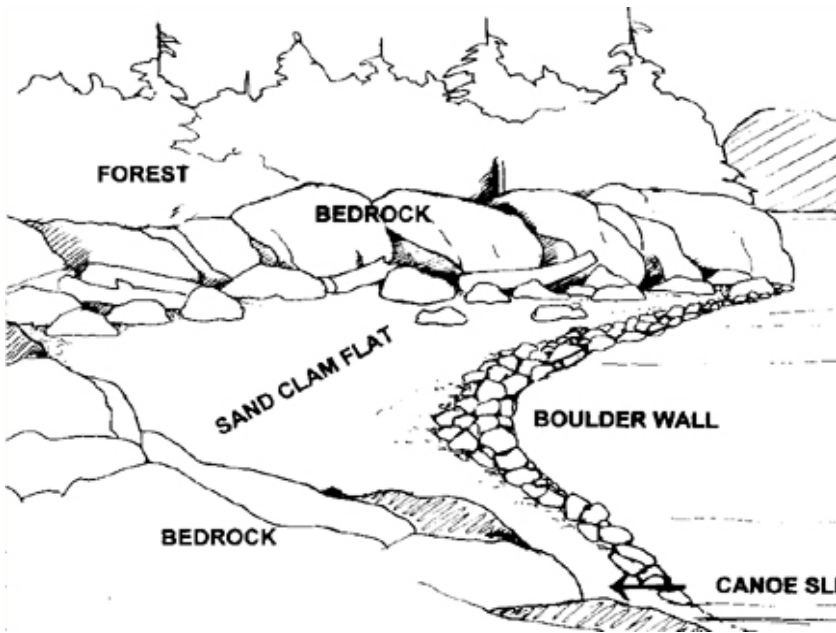
Introduction

Aquaculture is defined as “the general term given to the cultivation of any aquatic (fresh and marine) species (plant or animal)”¹ while Mariculture has been defined as “a specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, an enclosed section of the ocean, or in tanks, ponds or raceways which are filled with seawater.”² This branch of aquaculture includes farming operations of marine fish and shellfish.

This study will focus on the field of shellfish farming as it is the only mariculture operation being pursued on Haida Gwaii at this time.

A Brief History of Shellfish on Haida Gwaii (and BC)

Pre-contact West Coast indigenous peoples are commonly known as “Hunter Gatherers”. Rock walls were erected for the purpose of cultivating bivalves in stone-walled foreshore structures called “clam gardens”. These native mariculture structures have been located along coastal sections of Puget Sound to Haida Gwaii¹. The clam gardens are centuries old.



In the 1960's there were about six or seven seine boats originating from Haida Gwaii. These boats fished for salmon on the south coast of Vancouver Island. When the season ended, the skippers would fill up their boats with wild oysters from Baynes Sound. Oysters were brought to Haida Gwaii by the ton. The oysters were placed along the beaches of Haida Gwaii for food consumption but were also subject to predators including starfish and raccoons.

In the 1980s a 'Weathervane' scallop commercial fishery existed on the north coast of BC including the northeast coast of Haida Gwaii. This fishery was discontinued due to the declining numbers of scallops.³

In 1997, experimental trials with Japanese scallops and Pacific oysters were conducted at 20 sites on Haida Gwaii and in the vicinity of Prince Rupert. The reviews were mixed. Performance indicated that both scallop and oyster culture were biologically feasible in some areas, but not advisable in others.³

In 1998, the first license for aquaculture was issued on Haida Gwaii to QCI Shellfish.

Shellfish Farming on Haida Gwaii

There are 2 operations currently producing and harvesting local oysters and scallops.

QCI Shellfish has operated a small shellfish farm since 1998. It employs 3-4 people as a family run operation.

The farm cultivates both scallops and oysters which are sold locally and off-island on a year round basis.

In 2003, Coastal First Nations/Turning Point Initiative developed a pilot project consisting of 22 sites of which one farm (site) will be established on Haida Gwaii. Operations have not yet commenced, however, it is estimated that in the upcoming months (2010), each farm will employ 25 to 30 people in total and will hold five million scallop seeds initially. Following the establishment of these farms, it is anticipated that an estimated 50 people per site will be employed throughout the harvesting stage.⁴

A joint venture between the Skidegate Band Council and Old Masset Economic Development Society established a shellfish farming operation as part of the Coastal First Nations pilot project (2003) and began harvesting in 2009. In 2010 the two bands formed a partnership and continue in the operation of the site. The majority of sales are anticipated as off-islands sales although some product will remain for local sales.

Four separate individuals have applied for shellfish aquaculture licenses² and are, at the time of this report, going through the approval process.

The water base for the 2 operating sites is 105 hectares and the water base for the 4 proposed sites (pending application process) is 140 hectares.

With respect to current local demand for the product, this is satisfied by roughly 1.2 hectares and the local demand based on a 3-year growth cycle is approximately 2 hectares.

²

<http://arfd.gov.bc.ca/ApplicationPosting/index.jsp?FileNumber=&SubPurpose=&Client=&PrimaryStatus=any&keyword=&Purpose=AQUACULTURE&Submit=Submit&Region=&cp=2>

Shellfish farming holds potential with respect to year round food production on Haida Gwaii, however the local demand for the product has yet to be developed. Similar to the challenges of local agriculture producers, imported food continues to challenge the pricing of local producers whose operational costs are significantly higher than their off-islands counterparts.

Although the costs of cultivating shellfish are estimated to be higher than that of the 'wild' fisheries, there is no commercial fishery on Haida Gwaii for the harvesting of scallops or oysters.⁴ Shellfish farming provides an environmentally responsible means of producing shellfish on a year round basis while not depleting the wild stock.

Environmental impacts from marine farms include wastes from cage cultures; farm escapees and invasives; genetic pollution, disease and parasite transfer, and habitat modification³. Shellfish and finfish farm operators follow stringent safety and reporting procedures to minimize these risks.

With respect to environmental impacts, mariculture practices have been likened to agriculture practices in that risks are linked to the size of the operation, the cultured species, density of stock, feed, exposure to risk factors (ie: winds) and husbandry methods.³

Dr. Myron Roth, Aquaculture Analyst for the Province of BC, notes that 'an order in Council issued in March 2008 suspends the issuances of new Crown land tenures and aquaculture licenses for the North Coast (including most of Haida Gwaii) but this order only applies to marine finfish operations and not shellfish or freshwater (non-tidal waters) aquaculture operations'.

Cultivated Species on Haida Gwaii

The primary species of shellfish being cultured on Haida Gwaii are the Pacific Oyster and the Japanese Scallop (Pacific Weathervane Scallops). Pacific Oysters and Pacific Scallops are non- indigenous species intentionally introduced.

The Pacific Oyster (*Crassostrea gigas*) was first introduced into the Pacific Northwest between 1900 and World War II. As the waters of British Columbia are generally cooler than the species' natural breeding range, they only breed with regularity in three small areas. Pacific Oyster larvae or spat must be hatchery reared. Most of the oyster seed is imported from the United States.

The Japanese Weathervane Scallop (*Patinopecten yessoensis*) was introduced from Japan by the Department of Fisheries and Oceans and the British Columbia Provincial government, during the 1980's. Imported brood stocks were held in quarantine until spawning was promoted. Successful viability of genetic offspring has been utilized to initiate a scallop culture industry in the province of British Columbia.⁵

Island Scallops Ltd, a private hatchery, located on Vancouver Island, is the sole producer of Pacific Scallop seed in Canada. It supports itself and a few small independent aquaculture farms. With the current technology, seed sources are limited.⁶

Dr. Roth, reports that 'With respect to importing seed, it should be noted that a coastal collective of First Nations, including the Haida, are planning to build a shellfish hatchery in Prince Rupert which could support shellfish aquaculture development efforts on Haida Gwaii'.

Quality Assurance of Cultivated Shellfish

Safe growing waters, harvesting, processing and shipping of shellfish is highly regulated. Shellfish growers in Canada are committed to ensuring quality. Canadian shellfish must come from monitored and approved water sources.

Environment Canada takes water samples from aquaculture sites and surrounding areas every 3 years through the Canadian Shellfish Sanitation Program (CSSP). This program consists of 3 governing bodies, the Canadian Food Inspection Agency (CFIA), the Department of Fisheries and Oceans and Environment Canada.

Monitoring for Paralytic Shellfish Poisoning (PSP), Ammesiac Shellfish Poisoning (ASP), Diarrhetic Shellfish Poisoning (DSP), *Vibrio Parahaemolyticus* (VP) occurs on a weekly basis during the summer months. During the winter months testing for the above is conducted on a bi-weekly basis by CFIA. These samples are taken by the proprietors of QCI Shellfish as a means to ensure safety regulations are met.

Thorough cooking can destroy most disease organisms that accumulate in filter-feeding animals. Bivalve shellfish may only be sold to, or processed in a federally and provincially certified and registered facility⁷. The plant must be in good standing with CFIA and have an acceptable Quality Management Program in operation.

The following is a list of shellfish species on Haida Gwaii. Commercial ‘wild’ fisheries exist for these species, however opportunities also exist for shellfish farming outside of the ‘wild’ commercial fisheries.

Shellfish Species on Haida Gwaii

Crab

Dungeness crab (*Cancer Magister*) are the most important species of crab being harvested in British Columbia. Crab can be found from the intertidal zone to depths of 180 metres. First recorded landings of the commercial crab fishery occurred before the turn of the century in 1885. The history of the sports fishery is equally long and aboriginal harvesting precedes the discovery of North America by Europeans.³

Geoducks

The majority of the geoducks Total Allowable Catch is approximately seventy percent. This harvest takes place on the north coast. Geoducks are harvested commercially using high pressure water delivered through a nozzle (known as a “stinger”) which loosens the substrate around the clam and allows the diver to lift the clams out alive. Geoducks are quickly taken to processing facilities and are delivered live to Asian markets.

The recreational fishery is limited to hand digging methods. Commercial gear cannot be used for recreational harvest. The commercial fishery is managed by limiting harvest by means of quotas, individual licences and a catch verification program. A three-year area rotational process is in effect.³

Geoducks are in the experimental stages of being cultivated on aquaculture sites in British Columbia.

Abalone

The entire coast of British Columbia is closed to the harvest of the northern or pinto abalone due to serious conservation concerns (Federal Species at Risk Act). The Northern Abalone Fishery has been closed since 1990 to protect the remaining population.⁷ Abalone are in the experimental stages of being cultivated on aquaculture sites in British Columbia.

Sea Cucumbers

Approximately 80 percent of the sea cucumbers found in the Total Allowable Catch are in the North Coast area. This fishery is open for eight weeks beginning in October. From 1998 to 2007, the fishery was restricted to 25% on the British Columbia coast in order to compile data. There is a plan to reopen portions of the coast in order to eventually facilitate a rotational style fishery.

The California sea cucumber is in the experimental stages of being cultivated on aquaculture sites in British Columbia.

Red Sea Urchins

The red sea urchin Total Allowable Catch is approximately eighty percent in the North Coast area. In recent years, the red sea urchin fishery has been declining due to an illegal, unreported and unregulated fishery from Russia.

Sea Urchins being sold by the unregulated fishery in Russia are less expensive than the British Columbia product and have flooded the Japanese market therefore shutting out the higher priced urchins from British Columbia.

The green sea urchin is in the experimental stages of being cultivated on aquaculture sites in British Columbia.

Razor Clams (intertidal clam fishery)

In 1963, shifting market dynamics resulted in a decline in the North Coast clam fishery and moved harvest interest to the South Coast. With this decline, biotoxin and water quality testing was discontinued and resulted in a closure of the fishery. An exception to the closure is along the north coast of Graham Island where a razor clam fishery still occurs.

Razor clams are dug individually using a short-handle thin bladed shovel. Harvesters are encouraged to fill in the holes to reduce predation on the exposed juvenile clams. Harvesting of undersized clams is prohibited. Razor clams must be at least 90 mm through the greatest breadth of the shell, though there is not a size limit in the recreational fishery.

Razor clams have supported a commercial fishery since 1922 as well as a recreational fishery. This is an aboriginal fishery co-managed by the Council of the Haida Nation and the Department of Fisheries and Oceans. The fishery is open from March until June and from September to December or until an annual catch ceiling has been reached.

Shellfish Volumes Sold on Haida Gwaii

A small percentage of crab processed on island is sold on the retail market on Haida Gwaii. There is also a small percentage of the catch ceiling of razor clams kept on Haida Gwaii for retail.

During commercial fishing season of crab, prawns and finfish, one can purchase these products from a boat that holds a valid vendor's licence.

Shellfish Volumes Exported From Haida Gwaii

Crab	4,304,821 lbs	2009
Razor Clams	294,120 lbs	2009

Crab

The processing facilities on Haida Gwaii only purchase crab for the cooked market. The volume reported for crab in 2009 (see above), pertain to Area A which include the waters on and around Haida Gwaii. However, all were not processed on the island.

Due to the live market, license holders received more money for live sales (in Prince Rupert) of crab vs. the cooked market. This has had a negative effect on local processing plants and related employment in 2010. After 5 weeks of operation in 2010, one processing facility was forced to close down its operations leaving their employees ineligible for employment insurance.

Haida Gwaii would benefit from expanding its current operations to include the live market; however export transportation costs affect the ability to provide competitive pricing with off-islands markets.

Razor Clams

The majority of razor clams are sold off island and utilized for bait for commercial fisheries.

Scallops and Oysters

In recent years, live sales have been prominent. At this time, the majority of sales of scallops and oysters are local due to the popularity of the '100 Mile-Diet', shipping logistics and production costs.

Prawns

Prawns are currently not being purchased by processing facilities on Haida Gwaii. Processing facilities will however provide custom offloads for prawn freezer boats. This product is sold directly from the boat to the buyer.

Volume of Shellfish Imported to Haida Gwaii

Presently, imported shellfish to Haida Gwaii are destined for local restaurants, grocery stores and lodges.

Species and Volumes for 2010⁸

Clams	0
Scallops	1310 lbs
Oysters	90 lbs
Crab	105 lbs
Mussels	72 lbs
Shrimp	165 lbs
Prawns	750 lbs

Conclusion

Dr. Myron Roth, Aquaculture Analyst for the Province of BC, noted that ‘in general, Haida Gwaii and in particular Skidegate Inlet, present good opportunities for shellfish aquaculture development... (the) main species under consideration include oysters, scallops and manila clams. In deeper water areas possibilities might include oysters, scallops, mussels, geoduck and sea cucumbers.’

He also commented on the potential for opportunities in harvesting and marketing seaweed. He noted that a significant low tech, harvest industry exists in BC.

Frozen Asian markets compete with fresh west coast products, however there are branding opportunities in marketing the higher quality local product based on consumer appeal for Haida Gwaii’s mystique and pristine waters in which the product is grown.

Widespread economic uncertainty has also had an impact on shellfish demand with restaurant sales. However, people are seeking an “ocean wise” sustainable product that is produced in close proximity to their own community. This aspect of branding is also worth investigating.

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ASSESSMENT OF POTENTIAL LOCAL SOIL AMENDMENTS

Soil amendments and fertilizers are used to increase the productivity of farmland. For the purposes of this report soil amendments will be defined as: lime, worm casings, chemical fertilizer, sand, peat, seaweed, sawdust, seashells, offal, mulch, compost, and ash. Several local businesses were contacted to determine product availability and sales⁴.

It is estimated that no more than 20 tonnes of soil amendments were imported to Haida Gwaii in 2010¹. With respect to importing these soil amendments, shipping / transportation costs can have a large effect on final purchase costs. Very little chemical fertilizer is included in these figures because of regulations regarding transportation and distribution.

In considering accessing the soil amendments through local sources, costs will include extraction and transportation (approximately \$100/hr and \$100/hr respectively²).

Anecdotal information from private users of soil amendments indicates that several farms and food producers use locally available amendments or purchase amendments from off-island without going through local retailers¹.

Sand

Sand can be found readily throughout the island. Numerous private sand and soil pits were identified on both Graham and Moresby Island. Approximate volumes were not available. Beach sand is not appropriate as a soil amendment due to the salt content. Sand is also readily available from a number of pits located on crown land. BC Ministry of Forests and Land Tenure staff would have to be contacted to determine the appropriate application processes and costs².

Peat, Mulch & Ash

No private deposits of peat, mulch, or ash could be identified on the island. In the past, a peat moss plant existed in the Nadu road area, however its current volume potential and status is unknown. Some have extracted smaller volumes of peat from alongside the highways in Tlell, however the peat is heavy with water and extraction of large volumes is not practical.

Peat, mulch, and ash could be extracted and processed in many areas across Graham and Moresby Islands. Waste wood from clear-cuts could be converted into mulch or ash using appropriate processing equipment. O'Briens Road and Bridge appears to have the only chipper on islands. Wood chips are also available at sites designated by the communities when alder and other trees are topped in the communities; however, the effectiveness of using wood chips in compost is a controversial issue.

BC Ministry of Forests and Land Tenure staff would need to be contacted to determine appropriate application processes, and costs, if located on Crown Land.

Limestone

Many landforms associated with limestone have been identified on Moresby Island. These landform areas may already contain existing quarries or pits that have been historically used for road construction. Limestone landforms may be subject to Karst Cave protection policies and environmental assessments².

No active limestone pits were identified on Haida Gwaii. Should limestone pits be identified on crown land, the BC Ministry of Forests and Land Tenure staff would need to be contacted to determine appropriate application processes.

The most promising location is an outcrop located on Sandilands Island where previous logging has occurred and the road cut has exposed a portion of this outcrop making it easily accessible by barge from Queen Charlotte or Alliford Bay.

Compost

No large-scale compost distribution areas were identified as part of this study. The Village of Queen Charlotte and Masset offer free wood chips, however in no appreciable volume. It is thought that a community compost system could be located on land adjacent to the communities including industrial and agricultural land.

Opportunities in compost production should be researched with respect to the viable production of value-added domestic products (ie: potting soil) from waste products (ie: fish offal).

Shells

Oyster shells and other seashells are composed of primarily calcium carbonate and when ground, have 'liming' effect on soil. QCI Shellfish reports having approximately 2 tons of oyster shells available for soil amendments at most times. The source is currently insecure as the oyster farm's base in the Village of Queen Charlotte has been required to relocate. The family owned business is, however, supportive of the opportunity to provide crushed shell.

Fish Offal

The Seafood Processors Solid Waste Management Options Analysis, Haida Gwaii (Golder Associates, 2009) reported that, based on typical production data of the four seafood processing plants, located in Masset and Queen Charlotte, approximately 402,000 kg of fish offal has been produced annually³ though annual differences in production should be expected.

In 2009, the local seafood processing plants were requested to comply with the federal Fisheries Act with respect to fish offal disposal. Historically, offal was released back into the same ocean from whence it came. The study cited various methods of acceptable disposal of the offal including composting, by-product recovery and waste disposal. Some farms on Haida Gwaii have indicated an interest in using the offal for fertilizer². This provides a mutually agreeable and cost effective means for offal disposal. It also provides a valuable local source of nitrogen, and minerals for soils.

Seaweed

Seaweed can be found at various locations along the beaches of Graham Island and Moresby Islands. Hecate Strait, Queen Charlotte Sound and associated bays and inlets also provide opportunities for seaweed harvesting.

Seaweed extracted from crown land and surrounding waters will require applications to Land Tenure staff, BC Ministry of Forests, Department of Fisheries and Oceans, and Council of Haida Nation. The size and volume, and costs associated with the harvesting of seaweed resources available on Haida Gwaii have not been identified due to lack of available information and research².

As noted in David Schroeder's 2011 special report to MIEDS, 'Research into Similar Areas', residents of the Aran Islands off the west coast of Ireland, in the 17th Century, adapted themselves to the raw climatic conditions, developing a survival system of total self-sufficiency based upon building soil from sand and seaweed. Their methods included mixing layers of sand and seaweed on top of rocks to create fertile soil, a technique used to grow potatoes and other vegetables.

Soil building is an important practice for the sustainability of agriculture on Haida Gwaii. Workshops and educational resources will be of particular value in developing the local knowledge base of food producers

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CLIMATIC CONSIDERATIONS

Climatic conditions have varied considerably on Haida Gwaii over the past centuries⁴. Haida Gwaii was almost completely covered by glaciers from the period of 15,000 BC to 10,000 BC. At approximately 10,000 BC the climate of Haida Gwaii warmed considerably and the glaciers retreated¹. Chang et al. (2003) have suggested that there was stabilization from a warm – dry climate from 8000BC to 5000BC, to a warm – moist climate from 5000BC to 2000BC and to a moderate – moist climate from 2000 BC to the present day.

Some scientists have suggested that the earth was affected by a 100 year warming period (Medieval Warming Period) around 1000 AD, and a 200 year cooling period (Little Ice Age) between 1700 and 1900. No empirical data exists for these periods⁴. More recently a number of scientists have stated that the climate on the earth is either warming, or changing in a more rapid fashion than previously empirically observed.

Empirical weather data for Haida Gwaii has been primarily collected by Environment Canada, the British Columbia Ministry of Transportation, a discontinued Weather Watchers program, and interested citizens since the late nineteenth / early twentieth century. The majority of the data collected by non-governmental bodies has not been transcribed to electronic spreadsheets nor been made available to the public via the internet. Environment Canada has recently developed a web-site allowing access to weather data for Haida Gwaii.

The Weather Network has recently offered a 30 year statistical assessment for Sandspit and Masset, however it does not reference the years for which the stats were calculated, and by what method the stats were collected. It is assumed that The Weather Network has used raw data from the airports and their data does not appear to be significantly different than that reported below.

It has been hypothesized that agriculture on Haida Gwaii dates back to pre-Haida / European contact (pre-1774). Climatic variables have significant effects on agriculture. These climatic variables include light (type and intensity), air (CO₂ concentrations, chemistry, particulate, and salinity), rainfall (amount, chemistry), temperature, and wind speed.

Temperatures appear to be virtually identical for all communities for summer months (1C variation). However, a high degree of inter-annual variation (5C) exists in all communities. Winter temperatures are affected by proximity to marine areas. Port Clements has slightly cooler temperatures in the winter months (3C). Frosts may occur up until late May, and begin in late October for all communities. Inter-annual differences are evident in frost forecasting as well.

Precipitation appears to increase as one moves north over Graham Island. Summers tend to be dry for all communities with heavy precipitation (mainly in the form of rain) from October to January. A high degree of inter-annual variation in precipitation was noted (exceeding 500mm). Certain years have produced summers with almost the same precipitation amounts as average late fall / early winter periods.

Figure 1.0 Environment Canada Mean Annual Temperatures for Sandpit, B.C.

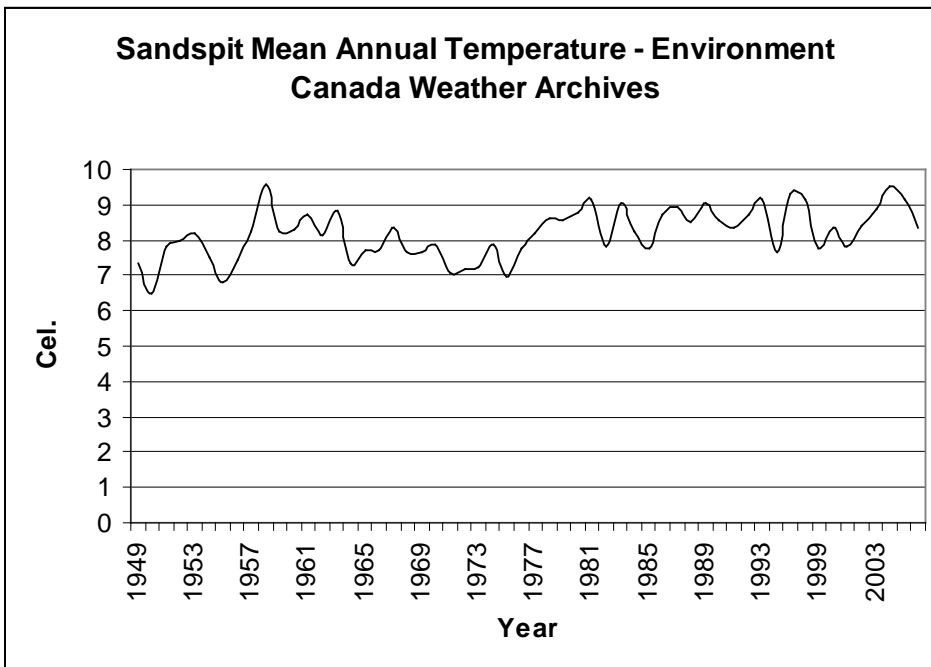


Figure 1.1 Environment Canada Total Annual Precipitation for Sandspit, B.C.

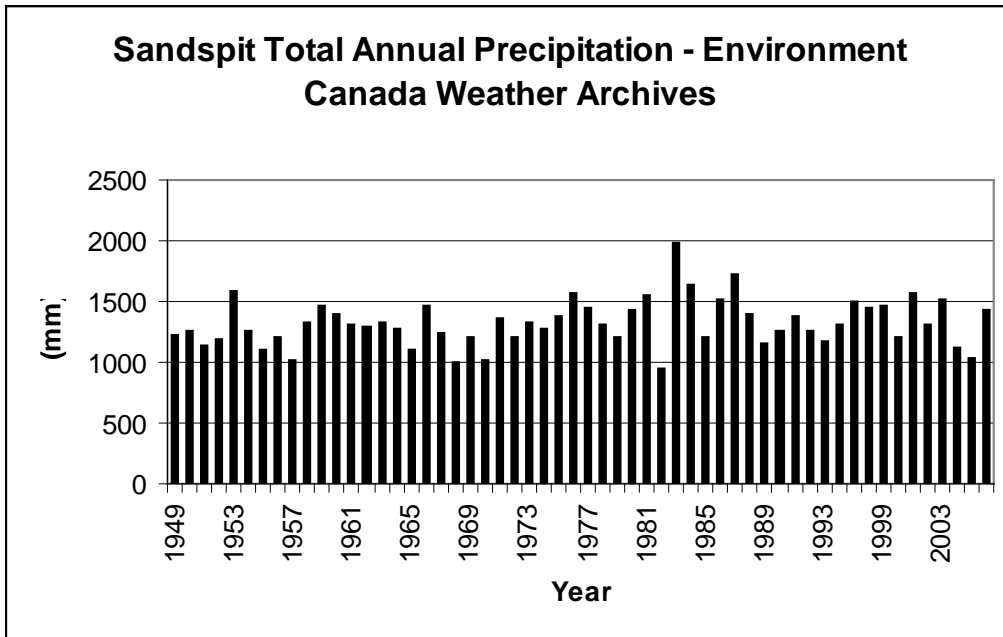


Table 1.0 Environment Canada Weather Archive Temperature Statistics For Selected Locations on Graham Island, Haida Gwaii, British Columbia. *Sandspit: 1897 – 2006, Tlell: 1950 – 1998, Port Clements: 1967 – 1988, Masset: 1897 – 1970, Sewall: 1974 – 2007.

Sandspit	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Avg. Air Temp (Cel.)	2.8	3.7	4.3	6.3	9.1	11.9	14.2	14.9	13.0	9.2	5.5	3.8	8.2
S.E. (+/-)	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Max.	6.9	6.8	6.6	8.1	11.3	15.2	17.5	16.9	15.4	11.9	8.2	7.3	11.0
Min.	-4.6	0.4	1.5	3.8	6.9	10.0	12.5	12.8	11.6	6.9	0.3	-0.6	5.1
Tlell	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Avg. Air Temp. (Cel.)	2.1	3.3	4.1	6.0	8.8	11.6	13.9	14.4	12.3	8.4	4.6	2.8	7.7
S.E. (+/-)	0.3	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2
Max.	6.5	6.8	6.2	7.6	11.4	15.1	16.5	16.3	14.3	11.2	6.8	6.4	10.4
Min.	-5.0	-0.6	2.0	3.4	6.9	9.6	12.3	12.0	11.1	6.4	-0.9	-1.0	4.7

Port Clements	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Avg. Air													
Temp. (Cel.)	-0.5	2.3	3.4	5.3	8.6	12	14	14	12	8.2	4.6	2	7.2
S.E. (+/-)	0.72	0.6	0.4	0.3	0.3	0.5	0.3	0.4	0.3	0.3	0.6	0.7	0.4
Max.	2.7	5.3	5.4	6.8	9.9	15	16	16	14	9.9	7.1	4.7	9.4
Min.	-5.6	-1	1.8	3.3	7.3	11	13	13	11	6.9	0.4	-1.4	4.9
Masset	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Avg. Air													
Temp. (Cel.)	2.1	3.0	3.9	5.9	8.8	11.6	13.8	14.5	12.2	8.6	5.1	3.3	7.7
S.E. (+/-)	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2
Max.	6.1	6.9	7.2	9.0	12.2	15.2	18.7	18.2	14.3	11.9	8.4	7.4	11.3
Min.	-5.3	-2.6	0.2	2.7	4.5	7.6	10.4	11.7	9.8	6.5	1.1	-2.3	3.7
Sewall	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Avg. Air													
Temp. (Cel.)	3.3	3.5	4.2	6.2	8.3	12.5	14.4	15.1	12.9	8.8	4.8	3.3	8.1
S.E. (+/-)	0.4	0.3	0.3	0.3	0.6	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.3
Max.	6.8	6.0	6.5	8.0	12.0	14.7	16.5	17.7	16.1	11.9	7.0	6.6	10.8
Min.	0.3	0.3	0.9	0.9	0.3	10.1	10.1	13.6	11.0	7.2	-1.3	-0.7	4.4

Table 1.1 Environment Canada Weather Archive Precipitation Statistics For Selected Locations on Graham Island, Haida Gwaii, British Columbia. *Sandspit: 1897 – 2006, Tlell: 1950 – 1998, Port Clements: 1967 – 1988, Masset: 1897 – 2006, Sewall: 1974 – 2007.

Sandspit	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Total													
Precip.													
(mm)	161.0	119.7	107.9	89.2	59.3	52.9	46.2	56.1	86.6	184.1	184.5	185.7	1333.4
S.E. (+/-)	9.1	7.9	6.1	5.5	3.2	3.3	3.8	3.8	5.1	7.7	7.0	8.1	70.5
Max.	313.7	281.6	214.9	205.5	131.0	105.4	141.2	146.9	191.5	305.2	296.3	372.6	
Min.	14.5	8.6	19.1	24.6	17.0	6.6	8.4	7.9	17.4	72.4	84.3	85.2	
Tlell	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total													
Precip.													
(mm)	128.5	103.6	87.9	76.7	59.2	56.6	52.6	67.3	95.7	172.8	156.3	155.3	1212.3
S.E.	6.9	6.0	5.2	4.8	3.4	3.9	4.6	4.2	5.7	7.2	7.0	7.4	66.2
Max.	216.9	203.2	177.0	148.6	121.9	125.5	189.2	135.1	185.4	302.9	296.5	298.4	
Min.	28.4	23.9	25.1	23.1	12.7	8.4	8.0	8.1	18.5	58.9	51.3	53.8	
Port Clements	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total													
Precip.													
(mm)	162	105	127	102	67	64.6	54.2	74.1	120	203	189	205	1471.9
S.E.	11.1	16.9	19.4	13.3	9.75	8.33	8.1	11.3	10.4	28.6	18.6	12.5	168.3
Max.	222	199	259	165	125	112	83.8	121	176	393	273	257	
Min.	118	45	56.1	41.4	28.7	29.7	4.3	7.6	61.7	91.9	81.3	138	

Masset	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total													
Precip.													
(mm)	140.9	110.0	108.4	102.9	82.8	64.1	67.9	72.0	109.3	180.8	182.9	179.7	1401.7
S.E. (+/-)	6.6	5.2	5.2	5.8	6.6	4.1	4.7	4.9	6.0	6.9	8.4	7.7	71.9
Max.	254.8	209.6	213.1	339.1	415.3	162.6	205.7	214.6	270.5	367.8	495.6	345.7	
Min.	10.2	19.6	5.1	31.5	20.1	0.0	5.1	3.8	8.4	59.7	34.3	40.6	
Sewall	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total													
Precip.													
(mm)	153.0	116.1	92.8	100.3	75.3	69.5	59.8	86.0	104.8	205.4	197.0	182.5	1442.4
S.E.	11.6	9.4	9.3	9.2	10.6	4.8	6.9	7.2	11.2	18.4	16.8	18.6	133.8
Max.	253.9	193.2	229.8	229.8	229.8	115.6	156.2	172.0	235.0	410.7	410.7	410.7	
Min.	39.5	28.7	5.6	5.6	5.6	26.6	18.0	18.4	4.6	4.6	4.6	4.6	

Data for sunshine was only released for Sandspit. The majority of the days have some degree of measurable bright sunshine in the summer. Since precipitation events and measurable bright sunshine are negatively correlated it is assumed that a high degree of inter-annual variation exists as well.

Wind speed was only measured for Sandspit. Sandspit appears to be calmest during the summer months. Windy days (> 40km/h) compose between a third to half of the days between October and April.

The Province of British Columbia (2008) describes the climate as wet – hypermaritime. Temperatures, precipitation, sunshine, frost-free periods and wind speed are all affected by marine water temperatures, ocean currents, wind patterns and their fluctuations.

Temperatures and precipitation can vary considerably from year to year (5C, 500mm), with wet windy periods typically occurring from October to April. Inner portions of Graham Island may experience a more “continental” climate with cooler winters, and perceivable warmer summers. Micro-climates may have significantly warmer temperatures associated with them. Growing seasons typically range from April to November, however May and October frosts have been seen to occur.

It is thought that the climate of Haida Gwaii is strongly affected by El Nino and La Nina events. El Nino and La Nina events are quasi-periodical and occur approximately every five years (two to seven years) and last from six months to two years, however more research is needed.

El Nino events can affect weather patterns across the entire western Pacific Ocean. El Nino events are typically associated with increases in barometric pressure and temperature, and decreases in precipitation. La Nina events can also affect weather patterns across the entire western Pacific Ocean. La Nina events are typically associated with lower barometric pressure and temperature and increases in precipitation.

The challenge of forecasting inter-annual differences can be difficult because of the uncertainty associated with the quasi-periodic climate pattern of El Nino and La Nina.

Surface water temperatures in the equatorial regions of the Pacific Ocean may have significant effects on agricultural products that may be grown here. Cool, rainy growing seasons, and warm, dry growing seasons both pose their challenges to farmers.

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ANALYSIS OF FREIGHT BARRIERS AND OPPORTUNITIES

Haida Gwaii is an isolated archipelago approximately 90 nautical miles west of Prince Rupert, BC. Access to the islands is by water or air.

Prior to European contact, the Haida traded goods with other coastal tribes using the seaworthy canoes they were known for crafting. Movement of goods and freight was conducted from further distances with the introduction of the trading ships in the late 1700s¹.

Due to the remoteness of the islands and the difficulties of transporting agricultural supplies, farming endeavours have, from the early 1900s been challenged by transportation costs. In the early 1900s, the European homesteaders arrived on the islands with their livestock and personal possessions via small coastal freighters and tug and barge services¹.

Transportation in the 1920's was acknowledged by the Department of Agriculture as 'expensive and risky' and they recommended 'reliance on local resources and community co-operation for larger ventures such as procuring local lime'².

Reliable freighters began to service the BC coast in the 1920s and 30s. This allowed for the increased importation of food². The first vehicle road (plank and gravel) was built in 1928 providing access between the communities of Skidegate and Port Clements.

Regular air service from Sandspit began in 1947. A modern airport was established in Sandspit and a munitions depot/maritime patrol base was built and operated in Alliford Bay. The Masset monitoring installation was built at this time. This complemented the sea-plane transportation that had commenced operations on the islands a few years prior. Food and other goods could now be flown on and off the islands with relative ease.

The 1950s brought with it freighter service from Prince Rupert. The Northland Prince and Skeena Prince provided regular shipments of groceries and other supplies for Haida Gwaii. The introduction of a road between Masset and Queen Charlotte City in 1958 allowed for the free movement of goods across Graham Island².

Increased air service in the 1970s provided the means for an increase of imported goods and related to this, the introduction of 'modern' grocery stores.

Resource Management Group's 2010 special report to MIEDS, described transportation endeavours throughout the period of 1970s to the present. The following are excerpts from their 2010 Freight Barriers Analysis¹.

During the boom years from the early 70's into the 80's Haida Gwaii was serviced by twice daily regular flights from Vancouver with Pacific Western / Canadian Airlines Boeing 737 200 & 300 ER jets. These workhorses of the coast carried 139 plus passengers and baggage as well as a minimum additional 2000 lbs of freight (much more when the plane was not full). As well we had thrice daily seaplane flights into and from Masset, Queen Charlotte, Sandspit, with daily (and sometimes more) flights to logging camps on Moresby Island (Sewell Inlet and Tasu), Lyell Island, Louise Island) and Graham Island (Dinan & McClinton, Eden Lake, Naden Harbour, Rennell Sound, & Tartu). These flights used DeHavilland Beavers, Otters, and Grumman Mallard & Goose airplanes pending passenger and freight requirements.

These generous cargo limits allowed the seasonal live crab industry as well as the wild mushroom industry to flourish and kept our incoming and outgoing mail in sync with the rest of the world. Occasionally even fresh produce was flown in rather than waiting for the Northland Prince to deliver it.

Many other small business ventures were launched when we had the cargo capacity of the 737 fleet available to us. Sadly this did not last, as the forest industry declined so did our connections to the "outside world". Now we have an

Air Canada Dash 8 -100 with a seating capacity of 50 persons and a possible 2-400 lbs available freight space pending passenger load. This plane is operated twice daily during the summer months and once daily during the off season¹.

A federal/provincial subsidy agreement (1977 Coastal Ferry Services Contract) was established for the provision of ferry services (for BC) with respect to annual payments from the federal government and through which BC Ferries continues to obtain federal subsidy funds³.

With the advent of the connection to the BC Ferries Network in 1980, the face of the Islands changed dramatically. Freight was moved on and off islands three or more times a week. Passengers and their vehicles could be transported to the mainland to stock up on “cheap” groceries for the first time¹.

The Queen of Prince Rupert began providing services to Haida Gwaii in the fall of 1980 joined shortly thereafter by the Queen of the North (winter of 1980). Both continued to serve Haida Gwaii until the sinking of the Queen of the North at Gil Island on the Inside Passage in 2006.

In the early 1980s, BC Ferries took over the barged freight service (drop trailer business) resulting in the loss of the RivTow barge service for the islands. As a means of compensating Haida Gwaii residents for the loss of the barge service, a BC Ferries general freight rebate was introduced at this time for “commercial vehicles transporting food, dry goods and other consumable products destined for the communities north of Tlell”⁴. Initially this subsidy (in the form of a rebate) was 15%, then was reduced to 10% and then eliminated altogether about the time of the cancellation of the Crow Rate in 1993.

By the 1990s food producers from the southern mainland began utilizing the ferry service to sell their products on Haida Gwaii⁵.

BC Ferries purchased the Northern Adventure in 2006 to replace the Queen of the North. This vessel was put into service in April 2007. The Northern Expedition was built in 2009 to service the Inside Passage in the summer and fill in for the Northern Adventure during refits on the Haida Gwaii runs.

Currently (2010), islanders continue to rely upon air and ferry service for their food, supplies and mail. Islanders are importing 90% of the foods they eat from warehouses over 1,500 km away. Given the remote location of Haida Gwaii as an isolated archipelago of islands in the northern Pacific Ocean, reliance on imported foods makes islanders extremely vulnerable.

Agriculture & Transportation on Haida Gwaii

At the time of this report, freight services for Haida Gwaii are primarily provided by 5 local and 5 off-islands trucking businesses, 3 off-islands barge companies, 3 off-islands airlines and various off-islands cargo charters¹.

Rates charged for importing a tonne (2,200 lbs) of grain from off-islands vary from \$200 per pallet to \$1 per pound depending upon the freight company. The smaller independent companies seemingly provide the lowest rates but are limited in being able to provide regular service.

Rising fuel and resultant increases to transportation costs continue to prove challenging to local agricultural operations – The cost of livestock feed, agricultural supplies, food and other supplies is significantly higher than off islands as a result of the freight costs. These freight costs result in higher cost of imported food as well as contributing to the high cost of food production on Haida Gwaii.

The current cost of transporting freight (via ferry or barge) to the islands is discouraging for farms wishing to bring in grain, feed or livestock. These food producers find it difficult to recoup the cost of shipping. Food

producers are hesitant to invest in agricultural endeavours requiring transportation of supplies and amendments (ie: livestock).

An example of the freight dilemma - A 1,400 lb bale of hay (necessary for most animals) from a farmer in Vanderhoof costs \$90. Freight on this bale is about \$250 per bale (local independent trucking business). A pickup truck going off islands would cost about \$250 return (ferry) and could carry that bale back (not including fuel) and with room for few extra supplies. This works out to the equivalent of \$14.57 per 60 lb bale.

A 60lb bale purchased from the various local sources (feed store, individual farms) costs approximately \$18-\$25 per bale. A 60 lb bale, when purchased off islands, costs between \$3-\$5 per bale. As can be seen, off-islands livestock producers have an advantage in food production and related costs.

Cost savings can be made when purchasing in greater volumes or as cooperative efforts.

The local feed store serves the islands, however, farms requiring livestock feed and hay in larger volumes often purchase their supplies off-islands⁸. A number of local farms provide their own transport of livestock feed and agricultural supplies. Others combine their orders and arrange to share the transportation costs to bring their supplies on islands. No formally organized agricultural bulk buying endeavours exists at this time, however as a result of this study; the potential is being explored as a business opportunity.

Summary

In summary, the high costs of soil amendments and of raising livestock are directly related to the high costs of transportation/freight. As a result, farmers attempt to reduce those costs by using methods such as bulk buying of grain, feed and hay imported from off-islands.

Transportation costs are reduced using ‘back hauls’ of transport companies (local and off-islands). An estimated 700,000 lbs of feed is imported by local farms for livestock operations, approximately 40,000 lbs of soil amendments and approximately 1,400,000 lbs of food are imported to local grocery stores and restaurants annually⁹.

The current amount of freight that is being hauled to Haida Gwaii (all sources) over the past 3 to 4 years has remained consistent at approximately 6.6 million lbs annually (reduced by approximately 50% from the period prior to 2007¹).

Clearly, our imported food and agricultural supplies account for a significant volume of the freight brought to Haida Gwaii.

The Haida Gwaii Observer (November 18, 2010) reported that as a result of declining revenues for BC Ferries and unchanging subsidies from the Ministry of Transportation, there is potential for fare increases of 30-40% over the next 5 years.

That projection was recently amended as BC Ferries President David Hahn announced on Feb 3, 2011 (only 3 months later) that fare increases for the northern routes (Prince Rupert to Haida Gwaii) are now expected to increase by 100% over the next 4 years (26% annually).

Our dependency upon present transportation systems for imported food will not be sustainable if fuel prices continue to increase or transportation systems (ie: BC Ferries, air carriers, freight companies) cease to operate as a result of profit loss.

Partnerships for freight sharing and bulk purchases appear to be the solution to many of the challenges with respect to the high cost of transportation and importing necessary supplies. It is our responsibility to work together to develop a secure food production system on Haida Gwaii.

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WHERE DO WE GO FROM HERE?

Research into Agricultural Practices in Similar Areas

Research was conducted into the agricultural practices of similar areas including Alaska, the Maritime Provinces, Norway, Patagonia Scotland, Ireland, Orkney Islands, Falkland Islands and the Isle of Mann. Commonalities included government support and subsidies, cultural traditions in agriculture (more so than on Haida Gwaii), sheep production, potato production, less than ideal climates and soils, and remoteness.

In many of these regions, statistics indicated that horticulture is the fastest growing sector of the agricultural industry.

There is potential to learn from other areas having similar climate, latitude and economic base. One might consider the agricultural practices of Alaska as this area has much in common with Haida Gwaii (remote, similar climate, soils and culture).

In Alaska, greenhouse and nursery crops are the fastest growing segment in agriculture, with summer days of nearly constant daylight, it allows some crops to be nurtured to enormous size. Alaska greenhouse crops accounted for 14% of the overall agricultural output and aquaculture (the largest segment of the industry) accounted for 22% of the total output¹.

Alaskans rely on the sale of cattle, pigs, sheep, reindeer, milk, wool, antlers and velvet, bison, yak and elk⁵.

Alaska is home to 2 experimental farms. The Matanuska Experiment Farm produces and conducts research on grain and forage crops, soils, vegetables crops, livestock and organic fertilizers¹⁴.

Fairbanks Experiment Farm conducts research on cereal grain nutrition for livestock, soil and crop management, developing and selecting varieties of field crops and forages and alternatives to pesticides. Other research at Fairbank Experiment Farm includes the development of efficient management systems for crop cultivation, research on light quality and temperature for greenhouse production and marketing techniques for farmers markets and roadside stands¹⁵.

The development of an experimental farm or plots on Haida Gwaii has been identified as a priority by participants in the *Future of Food on Haida Gwaii*, 2011 Agriculture Strategy workshop.

Diversified farming is taking the forefront in New Brunswick, Nova Scotia, Alaska and Scotland allowing farmers to lower their risk and improve the financial return^{2,3,4}.

In the mid-17th century, residents of the numerous islands off the west coast of Ireland adapted themselves to the raw climatic conditions, developing a survival system of total self-sufficiency¹⁶.

Their methods included mixing layers of sand and seaweed on top of rocks to create fertile soil, a technique used to grow potatoes and other vegetables. The same seaweed method also provided grazing grass within stone-wall enclosures for cattle and sheep, which in turn provided wool and yarn to make hand woven trousers, skirts and jackets, hand-knitted sweaters, shawls, caps, and hide shoes. The islanders also constructed unique boats for fishing, building their thatched cottages from the materials available or trading with the mainland.

Though Norway is still a major fishing nation, some livestock and dairy farms operate in the western region. Because of the small size of the holdings, many farm families pursue additional occupations, mainly in forestry, fishing, and handicrafts⁶. Notably, all of these areas have well developed hunting, fishing and aquaculture industries.

In all the northern regions studied, agriculture and fishing industries in these areas are heavily subsidised⁷.

Organic farming and the marketing of organic products were identified by both the ministry of agriculture in Nova Scotia and in Scotland as an important potential opportunity for economic success^{12, 13}. Both of the experimental farms in Alaska are conducting research into organic fertilizers.

Newfoundland and New Brunswick have seen development of the cranberry industry as a potential opportunity. The combination of extensive natural peat bogs, mounted peat bogs, sand, and water resources provide a climate that industry specialists have identified as a good fit for cranberry production⁸.

Factors that led to the selection of New Brunswick over Newfoundland included slightly warmer temperatures that lead to increased overall size of the berry crop, shipping considerations for American distribution (NL being an island with little infrastructure in place), and restrictions on the origins of seedlings⁹. In Newfoundland where cranberries are an indigenous species, regulations dictate that seedlings must be grown in local greenhouses. This translates to less disease, but means higher costs to develop as the seedlings are planted in plugs as opposed to bales, which can be spread by machine¹⁰.

Cranberries are viewed as a high-risk, high-potential commodity. Development costs as much as \$35, 000 per acre, and market volatility can have an important impact on financial yields¹¹. However once the initial development has been undertaken, the land will bear fruit for 50-100 years.

Summary

In reviewing similar areas, some agriculture practices hold potential for expanding upon the current agriculture industry on Haida Gwaii. Opportunities include sheep production (meat, wool and dairy products), commercial greenhouse production, soil building techniques using seaweed and establishing experimental farms/plots to research and develop grains for livestock and cereals.

In addition, cranberry production may deserve more consideration. In 1926, a local entrepreneur, Carl Kumis, planted 1.5 acres of cranberries (a cross between a wild and domestic variety) in proximity to the Sangan River. In her 2010 special report to MIEDS, 'A Brief History of Agriculture on Haida Gwaii', Elizabeth Condrotte reported that the cranberry operation was successful but was challenged by a shortage of labour, an abundance of geese and deer and irregular transportation to the mainland for export purposes.

A local market for berries that grow well on Haida Gwaii may benefit from further research.

Agricultural Priorities for Haida Gwaii

Guiding Principles

Throughout the 7 public meetings in December 2010 and January 2011, the following were identified by the public as guiding principles to stimulate agriculture/food production on Haida Gwaii:

- Significantly increase the production and consumption of locally grown food and reduce our dependency on outside transportation systems
- Promote education (various components of food production – for consumers and producers)
- Promote business opportunities for food producers
- Develop partnerships to support local food production endeavours
- Develop and improve infrastructure, including access to land, to increase production of local food
- Develop policies and work with policy makers to ensure a secure source of local food

Participants at these community meetings identified six priority areas to stimulate the development of an agriculture industry on Haida Gwaii.

These areas are Education, Production Support, Marketing, Business Opportunities, Policy and Resources/Partnerships.

These priority areas and goals were brought to an islands-wide public workshop – The Future of Food on Haida Gwaii (Feb 2011) - attended by approximately 70 participants. Participants provided feedback on the importance of these goals and chose those deemed most important for the development of action plans.

Priority goals identified at these meetings are listed in detail in Appendix D.

Small groups were initially formed at the workshop and these groups began the process of developing action plans. The Action Plans form the basis of the Haida Gwaii Agriculture Strategy Implementation Plan.

Action Plans for Priority Goals

The following Action Plans were developed by sub-committees formed at (and following) The Future of Food on Haida Gwaii workshop, as part of the Haida Gwaii Agriculture Strategy and Implementation Planning process.

These action plans were identified as having priority status for implementation.

Education

Responsible: Education Committee and Graham Island East Coast Farmer's Institute

Goal: To Provide Learning Opportunities for Food Production on Haida Gwaii

Goal: To Provide Learning Opportunities for Food Production on Haida Gwaii

Activity	Timeline	Resources needed
1. Provide an Educational Series of Workshops for Agriculture and General Food Production in 2011		
1.1 Survey the Educational Needs of Food Producers on Haida Gwaii	April 30, 2011	Emails and Phone calls to Farmers Institute, Islands Food members, Food Producers, General Public
1.2 Identify Workshops Required, Facilitators Available and Costs	May 31, 2011	Feedback
1.3 Identify Funding Sources to Cover the Costs of the Series	May 31, 2011	Farmers Institute, GTS
1.4 Advertise	September 1, 2011	Emails to Farmers Institute & Islands Food members, Observer and Haida Gwaii Trader Ads
2. Offer Introduction to Organic Gardening on Haida Gwaii (North and South Island) in 2011		

Production Support

GOAL: To Increase Agricultural Food production on Haida Gwaii

Activity	Timeline	Resources Needed	Responsible
<p>#1) Local Agricultural Extension (Support) Agent:</p> <p>Paid resource person for farmers and gardeners re:</p> <ul style="list-style-type: none"> -taking soil samples and interpreting results -recommending amendments for maximum yield -identifying pests and diseases -recommend solutions for pests and disease problems -recommend appropriate crops and varieties -assist with regulatory standards -organize education sessions -coordinate an all-islands production plan 	<p>-Training May 2011 – April 2012</p> <p>-Position will be on-going from March 2012.</p>	<p>-Funding to educate an individual to be capable of providing technical assistance to farmers and gardeners on Haida Gwaii.</p> <p>-Funding for a one-year pilot project employing the trained individual to provide technical assistance to food producers on-island.</p>	<p>Production Support committee, Farmers Institute, MIEDS</p> <p>Training to be funded through the Coast Sustainability Trust, Gwaii Trust Society and/ or Investment Agriculture Foundation.</p> <p>The position could be funded by fee for services after a one-year position paid by Gwaii Trust as a Pilot Project to Support Local Agriculture.</p>

Activity	Timeline	Resources Needed	Responsible
<p>#2) Research Farm(s):</p> <p>Identification of appropriate land in areas that could be cleared and cultivated in order to test the growing potential of Class II land.</p> <p>Crops that may do well in a hotter interior climate with good soil are tree fruits, grapes, tomatoes, grains and forage.</p>	<p>- Monitor climate data to assist with identification of appropriate areas</p> <p>-Application for agricultural crown land by Regional District Rural Graham Island Area 'D' in 2012.</p> <p>-Development of Crown Land in spring of 2013</p>	<p>-Application for Crown Land by Area D Rural Graham Island Regional District (20 acres).</p> <p>-Funding for development of the experimental farm could come from a number of sources: Universities, GTS, IAF, Ministry of Agriculture, and individuals interested in clearing and leasing land for future opportunity to buy.</p>	<p>Production Support committee, Farmer's Institute and post secondary institutions</p>
<p>#3) Research Plots:</p> <p>Development of small plots and on-farm plots for experimentation.</p> <p>Experimentation includes, grain trials, produce variety trials, soil amendment testing, seed saving, weed control, crop rotation, cover cropping, soil building techniques, composting etc.</p> <p>The support will take the form of test seeds supplied, University student support for gathering data and reporting, student help with soil preparation and planting, technical support to learn: seed saving, composting techniques</p>	<p>-May 2011 – Nov.2013</p> <p>(some trials and seed saving will need at least 2 years)</p>	<p>-Ministry of Agriculture for technical support</p> <p>-IAF for funding</p> <p>-GTS funding</p>	<p>-Individual Farmers will be responsible for on-farm plots with technical support through University students and or Min. of Agriculture</p> <p>-Funding bodies will be responsible for the cost of seed, amendments, courses etc.</p>

Activity	Timeline	Resources Needed	Responsible
<p>#4) Community Farms:</p> <p>Islands communities will be asked to identify 200 acres of appropriate agricultural land (having agricultural capability) adjacent to their community to be placed in the Agricultural Land Reserve and protected for food production.</p>	<p>-This priority should be in the OCP and pursued ASAP.</p>	<p>-Support from the Municipal Councils, Band Councils and Regional Districts</p>	<p>Municipal Councils, Band Councils and Regional Districts</p>
<p>#5) Protection of the ALR:</p> <p>Guiding Principles for the ALR</p> <p>A productive, secure and economically viable agricultural land base in B C requires that:</p> <ol style="list-style-type: none"> 1. There is no net loss of Agricultural Land Reserve land to urban encroachment or other non-farm uses; 2. Agriculture is recognized as the priority use in the ALR; 3. Urban growth occurs through intensification, in-fill and re-development of existing urban lands rather than through expansion onto agricultural lands; 	<p>-As part of each community OCP</p>	<p>-Adoption of Principles by all local governments.</p>	<p>-Local Governments</p>

<p>4. Regional Growth Strategies are developed that direct growth into existing urban areas and away from the Agricultural Land Reserve;</p> <p>5. The Agricultural Land Reserve designation reduces in perpetuity the economic pressure of urban land speculation on agriculture and thus provides farmers with the certainty that is needed for continued investment and prosperity;</p> <p>6. The Agricultural Land Reserve boundary receives special planning treatment to reduce urban/rural conflict while maximizing the potential of the agricultural lands adjacent to the interface;</p> <p>7. Communities formally recognize agricultural working lands as an economic engine rather than a land bank to provide for further urban expansion; and</p> <p>8. Local citizens and community groups recognize the fundamental importance of agriculture in their community and actively advocate for its long-term protection.</p>			
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Activity	Timeline	Resources Needed	Responsible
#6) Access to Land			
1. Work with local governing bodies to obtain support for access to large areas of agricultural land in proximity to all communities	May – Sept 2011	Agriculture Strategy Data	MIEDS, Protocol Meetings
2. Work with local governing bodies to obtain support for reduced cost of agricultural land and long term leases of land within the municipal boundaries	May-Sept 2011	Agriculture Strategy Data	MIEDS, Protocol Meetings
3. Enter into discussion with the CHN with respect to support of applications for crown land for agriculture purposes	Sept –Dec 2011	Agriculture Strategy Data	MIEDS, Protocol Meetings

Business Opportunities

Goal: To Encourage Agricultural Business Opportunities on Haida Gwaii

Responsible: Business Opportunity Committee

Activity	Timeline	Resources
1. Develop Local Soil Amendment Products		
1.1 Conduct Research on Fertilizers Used Locally	April 2011	Farmers Institute 2010 Report on Fertilizer
1.2 Contact Food Producers, Islands Food, Farmers Institute re Use of Soil Amendments	April 15, 2011	Vehicle, Survey
1.3 Identify Products for Soil Amendments	May 15, 2011	Reference Books, Haida Gwaii Trader, Haida Gwaii Agriculture Strategy Documents
1.4 Conduct Research on Possible Recipes for Local Soil Amendments and the Resources Needed	June 15, 2011	Internet Reference Books Local Farmers

Activity	Timeline	Resources
2. Develop a Formal Bulk Buying Club and Shared Transportation System		
2.1 Conduct Research on Existing Local Food Buying Groups	May 1, 2011	Farmers Institute, Islands Food, Ads in the Observer and HG Trader
2.2 Conduct Research Into Local Interest for Agricultural Products and Other Bulk Buying Possibilities	May 1, 2011	Farmers Institute, Islands Food, Ads in the Observer and HG Trader
2.3 Conduct Research on Agriculture Supply Stores on route to Vancouver	May 15, 2011	Farmers Institute, Islands Food, 'Yellow Book'
2.4 Advertise Truck Freight Sharing To and From Vancouver	June 1, 2011	Advertisements-Observer, HG Trader, Emails notices via Islands Food and Farmers Institute

Activity	Timeline	Resources
3.0 Organize Regular Tours of Local Food Producers' Organizations		
3.1 Contact Local Food Producers and Farms to Determine Interest	April 1, 2011	Farmers Institute, Islands Food
3.2 Organize Regular Routes	April 1-30, 2011	Farmers Institute, Islands Food, Ads in the Observer and HG Trader
3.3 Organize Lunch or Dinner Partnerships at Local Farms	April 1-30, 2011	Farmers Institute, Islands Food
3.4 Advertise Tours	May-Oct 2011	Observer, HG Trader, Visitor Info Centres

Other business opportunities (ie: berry production, greenhouse construction, greenhouse production, sheep, CSAs etc) require follow up and can be found in the 'Opportunities' section which follows.

Marketing - Responsible: Marketing Committee

Goal: To Increase Consumer Knowledge of and Interest in Local Agriculture

	Timeline	Resources needed
1. Branding & Marketing Local Food		
1.1 Hold brainstorming meeting with group -meet at Seedy Saturday- collect more feedback from local foods community	Feb. 26	Table Fee/Signage/Feedback Forms
1.2 Website overview-survey monkey-including name of group	10-Mar	Email Lists
1.3 Approve group's partnered web and printed program with HG Trader	Mar.15	Input from Group/ Written Proposal
1.4 ...Submit proposal/secure funding for group's partnered web and printed program with HG Trader	Mar. 25	Define Costs and Source Funding
1.5 ...Implement Group's partnered web and printed program with HG Trader	April.30	Input from Group if Clarification Points Arise During Implementation Phase
2. Agri-Tourism Initiative		
2.1 Hold two 'Local Food Tours' (North and South Island) featuring visits to local food producers, processors, and finishing with a local meal.	May 1st & May 8th	Personnel (Guides and Hosts)
3. Marketing Plan Preparation		
3.1 SWOT Analysis 'Benefits of Eating Locally'	Mar. 15	Internet, Input from Group
4. Develop a Resource List of Food Producers and Food Produced		
4.1 Collect information from food producers	Mar. 15	Survey Forms and Reseachers
4.2 Compile the information into a database	Mar. 31	Excel or Access Software

Opportunities for Food Producers

Economic opportunities are anticipated in the form of increased revenue for farmers from farm gate, wholesale to grocers and farmers market sales. We anticipate that local food production will begin to displace our imported food and result in the creation of employment opportunities.

Following is a table illustrating opportunities available for local food producers based upon the difference between current consumption and production shortfall.

Examples of a few foodstuffs successfully produced on Haida Gwaii:

Total Amount Consumed (2010 Food Producer Surveys)	Present Production Shortfall	Economic Opportunity (based on local market sales)
Potatoes – 200,000 lb.	-178,000 lb.	@ 1.00/lb - \$178,000
Lettuce – 47,000 lb.	-Winter and spring lettuce needed – 37,000 lb.	@\$2.00/lb- \$ 74,000
Carrots – 52,000 lb.	-45,000 lb.	@\$2.00/lb- \$ 90,000
Squash - 19,000 lb.	-15,000 lb.	@\$1.50/lb.- \$ 22,500
Beets- 7,000 lb.	-3,000 lb.	@ 2.00/lb. - \$ 6,000
Eggs- 104,000 dozen	-67,000 dozen	@\$5.00/dozen- \$335,000

Agricultural land will need to be made available for food production if we are to significantly increase our local production. Such land will need to be made available at a reduced cost to encourage people to start producing food.

As a means to initiate discussion with respect to potential agricultural land in proximity to communities, a number of plots were identified for ground-truthing purposes (based on CLI data and public information).

Data pertaining to these plots can be found in Appendix E.

With support from the governing bodies, larger scale food production in close proximity to communities is possible through zoning for agricultural land, animals in appropriate enclosures, community gardens and community farms.

Opportunities for Producers are directly related to those of the consumers as part of the supply/demand relationship. As interest for greater local food production is demonstrated (as is currently the case), local food producers will be encouraged to expand or commence operations. Opportunities include:

- An increasing demand for local food
- Community Supported Agriculture (CSA) opportunities such as box a week programs (produce, cheese, meat, eggs etc)
- The development of unique local products using local food processing facilities
- Having greater local government support in accessing agricultural land for the purpose of food production
- The development of infrastructure to meet the needs of consumers (ie: storage and processing facilities)
- The development of amendments to federal and provincial laws to assist in the revitalization of agriculture on Haida Gwaii (ie: changes to the meat regulations, egg marketing)
- Increasing local interest in production opportunities for greenhouse and unheated plastic covered tunnels (extended season for growers in coastal climates
<http://www.fourseasonfarm.com/books/index.html>)
- Further research assessing other models of agriculture, agricultural prospects, climate, plant hardiness zones, diseases, production costs and efficiency on Haida Gwaii
- The development of an Experimental Farm or Community Farms for the purpose of research, training and mentoring, increasing food diversity, providing employment and benefiting the communities by creating a culture of “healthy living”

- Developing partnerships and funding opportunities (see Appendix C) which could be utilized as resources for small scale and commercial operations
- Work with local, provincial and federal governments to amend and develop regulations and tax incentives to enhance agricultural prospects for Haida Gwaii

Opportunities for Consumers

Opportunities for local consumers include:

- Access to sources of locally produced fruit, vegetables, meat and dairy products
- Increasing public awareness of local produce (ie: Buy Haida Gwaii campaign or marketing)
- Increased interest in establishing and supporting farmers markets (seasonal and year round)
- Availability of Community Supported Agriculture (CSA) opportunities such as box a week programs
- Partnerships with the Prince Rupert Port Authority could be established to ensure that the grain terminal will always sell to locals by the dump truck load at least
- The development of a ‘shared harvest’ (local farmer / product directory) web-site as a means to create and maintain communication regarding product availability
- Development of a local farmer / product directory

Opportunities for Climate

Opportunities exist for the development of a local agricultural industry and can be taken advantage of with an understanding of our local climate conditions. These include:

- Developing an understanding of our local weather conditions to better apply to our agricultural practices
- Developing an understanding of other agriculture models, endeavours, successes and challenges in other communities with similar climates, latitudes, economic base
- Monitoring water temperature trends in the mid-Pacific to help plan for upcoming growing seasons
- The development of a low-cost meteorological station network
- Assigning a climate monitor for the islands or volunteers in each community

Opportunities for Storage

- The construction of communal granaries and other bulk storage facilities
- Shared use of existing temperature controlled facilities
- The development of seed saving facilities (private or communal)

Opportunities for Freight Cost Reductions

The reduction of freight costs would greatly assist the development of a sustainable agricultural industry on Haida Gwaii. Some opportunities include:

- The development of partnerships between food producers and independent freight companies
- The formation of partnerships between food producers to allow for bulk purchases and shared cost of freight
- Establish a co-operative for purchasing bulk goods at wholesale prices
- Consider the development of a central freight facility with the intent to improve communication to maximize efficiencies for imported and exported freight

Opportunities for AgroForestry

Opportunities for the development of an agro-forestry industry on Haida Gwaii include:

- Developing a successful agro-forestry model of our own
- Identifying products which can be grown, harvested and marketed sustainably
- Support for projects currently underway (ie SKIFFFS)
- Further research into successful agro-forestry models, including the Big Leaf Maple Sap project, the Quesnel Economic Development Commission, Birch Agroforestry project, the Doig First Nation Alleycropping Initiative, the Intercropping Demonstration in Abbotsford

Opportunities for Mariculture

Mariculture opportunities for local mariculture operations include:

- Cultivation of clams, oysters, scallops, mussels, geoduck and sea cucumbers
- Local demand for the fresh shellfish product at Farmers Markets and Fishing Lodges
- Demand for the shellfish product at restaurants (local and off-islands pending price)
- Increasing interest in seaweed products
- Local demand for waste products as soil amendments
- Value added opportunities from waste products such as compost/potting soil
- Value-added opportunities such as smoked fish
- Lobbying provincial and federal officials to amend processing regulations allowing for open air fish / shellfish markets
- Exploring seaweed production potential
- Researching uses for bi-catch; research potential products and markets
- Researching marine product derived fertilizer formulations.

Opportunities for the Development of Soil Amendments

Many opportunities for the development of soil amendments exist on Haida Gwaii. These include:

- A demand for locally derived peat, limestone, seaweed mulch and ash
- Increasing interest in the development of a community based composting system
- The development of our own unique offal / seaweed fertilizer product
- Complete an economic feasibility assessment for peat, lime, seaweed, mulch, ash extraction and production as soil amendments
- Research potential seaweed / offal fertilizer formulations.

Conclusion

Action Plans and follow up on other goals identified by the public (Appendix D), will be addressed throughout 2011. A number of the initiatives are currently being followed up on as a result of the momentum generated at the Future of Food on Haida Gwaii workshop.

The key to successfully developing the local agriculture industry will be to provide food producers with the educational and technical supports they require and to assist them in accessing affordable land for the purpose of food production. It will also be important to educate the public on the merits of buying local.

With the hard work of food producers and the support of the Council of Haida Nation, local governments, Government of Canada, Province of British Columbia, local community groups, academic institutions and local businesses, there is good potential for growing and strengthening the agricultural industry on Haida Gwaii.

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Appendix A – Land Capability Classes for Mineral Soils

(http://www.alc.gov.bc.ca/alr/Ag_Cap_Details.htm)

The seven land capability classes for mineral soils are defined and described as follows:

CLASS 1 LAND IN THIS CLASS EITHER HAS NO OR ONLY VERY SLIGHT LIMITATIONS THAT RESTRICT ITS USE FOR THE PRODUCTION OF COMMON AGRICULTURAL CROPS.

Land in Class 1 is level or nearly level. The soils are deep, well to imperfectly drained under natural conditions, or have good artificial water table control, and hold moisture well. They can be managed and cropped without difficulty. Productivity is easily maintained for a wide range of field crops.

CLASS 2 LAND IN THIS CLASS HAS MINOR LIMITATIONS THAT REQUIRE GOOD ONGOING MANAGEMENT PRACTISES OR SLIGHTLY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in class 2 has limitations which constitute a continuous minor management problem or may cause lower crop yields compared to Class 1 land but which does not pose a threat of crop loss under good management. The soils in Class 2 are deep, hold moisture well and can be managed and cropped with little difficulty.

CLASS 3 LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE MODERATELY INTENSIVE MANAGEMENT PRACTISES OR MODERATELY RESTRICT THE RANGE OF CROPS, OR BOTH.

The limitations are more severe than for Class 2 land and management practices are more difficult to apply and maintain. The limitations may restrict the choice of suitable crops or affect one or more of the following practices: timing and ease of tillage, planting and harvesting, and methods of soil conservation.

CLASS 4 LAND IN THIS CLASS HAS LIMITATIONS THAT REQUIRE SPECIAL MANAGEMENT PRACTISES OR SEVERELY RESTRICT THE RANGE OF CROPS, OR BOTH.

Land in Class 4 has limitations which make it suitable for only a few crops, or the yield for a wide range of crops is low, or the risk of crop failure is high, or soil conditions are such that special development and management practices are required. The limitations may seriously affect one or more of the following practices: timing and ease of tillage, planting and harvesting, and methods of soil conservation.

CLASS 5 LAND IN THIS CLASS HAS LIMITATIONS THAT RESTRICT ITS CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS OR OTHER SPECIALLY ADAPTED CROPS.

Land in Class 5 is generally limited to the production of perennial crops or other specially adapted crops. Productivity of these suited crops may be high. Class 5 lands can be cultivated and some may be used for cultivated field crops provided unusually intensive management is employed and/or the crop is particularly adapted to the conditions peculiar to these lands. Cultivated field crops may be grown on some Class 5 land where adverse climate is the main limitation, but crop failure can be expected under average conditions. Note that in areas which are climatically suitable for growing tree fruits and grapes the limitations of stoniness and/or topography on some Class 5 lands are not significant limitations to these crops.

CLASS 6 LAND IN THIS CLASS IS NONARABLE BUT IS CAPABLE OF PRODUCING NATIVE AND OR UNCULTIVATED PERENNIAL FORAGE CROPS.

Land in Class 6 provides sustained natural grazing for domestic livestock and is not arable in its present condition. Land is placed in this class because of severe climate, or the terrain is unsuitable for cultivation or use of farm machinery, or the soils do not respond to intensive improvement practices. Some unimproved Class 6 lands can be improved by draining and/or dikes.

CLASS 7 LAND IN THIS CLASS HAS NO CAPABILITY FOR ARABLE OR SUSTAINED NATURAL GRAZING.

All classified areas not included in Classes 1 to 6 inclusive are placed in this class. Class 7 land may have limitations equivalent to Class 6 land but they do not provide natural sustained grazing by domestic livestock due to climate and resulting unsuitable natural vegetation. Also included are rockland, other nonsoil areas, and small water-bodies not shown on maps. Some unimproved Class 7 land can be improved by draining or dikes.

Appendix B (Volume in pounds unless stated otherwise)

Total Food Produced	Estimated Volume Consumed	Estimated Volume Produced	Percent Produced Locally
Apples	66,254	280	0%
Beets	7,142	4110	58%
Blueberries	9,810	40	0%
Broccoli	11,015	360	3%
Carrots	52,200	7200	14%
Cukes	23,884	340	1%
Garlic		1225	
Lettuce (#heads)	47,281	10968	23%
Mushrooms	19,820	19000	96%
Onions	66,654	324	0%
Parsnips	3,102	704	23%
Peas	6,870	3000	44%
Plums	10,968	50	0%
Potatoes	200,280	21560	11%
Raspberries	302	148	49%
Rhubarb	3,060	2760	90%
Rutabaga	13,694	0	0%
Spinach	3,874	180	5%
Squash	19,495	3721	19%
Strawberries	11,616	756	7%
Tomatoes	49,517	1868	4%
Chicken	113,082	6000	5%
Geese	-	750	
Ducks	-	370	
Pigs (lbs Pork)	103,279	8480	8%
Beef	117,880	0	0%
Turkey	41,996	0	0%
Lamb	260	0	0%
Eggs (doz)	103,947	27415	26%
Milk (L)	300,000	57000	19%
Cheese	45,044	0	0%
Yoghurt	12,084	0	0%
Oysters (Lbs)	1,370	0	0%
Scallops	1,360	0	0%
Other Shellfish	1,500	0	0%

Appendix C - Potential partnerships and avenues for funding

- B.C. Investment Agriculture Foundation
- BC Ministry of Agriculture
- B.C. Agricultural Development and Research Organization
- B.C. Blueberry Council, B.C. Pork Producers Association
- B.C. Potato and Vegetable Growers Association
- B.C. Vegetable Marketing Commission
- B.C. Sheep Federation, B.C. Fruit Growers Association
- B.C. Milk Producers
- BC Ministry of Natural Resource Operations
- BC Ministry of Environment
- Fisheries and Oceans Canada
- Transport Canada
- Canadian Aquaculture Industry Alliance
- BC Shellfish Growers Association
- Aboriginal Aquaculture Association
- Western Economic Diversification
- West Coast Community Adjustment Fund
- Coast Economic Development Society/Coast Opportunity Funds
- CivicInfo B.C. (www.civicinfo.bc.ca)
- Certified Organic Association of B.C.
- B.C. Greenhouse Growers Association
- B.C. Ministry of Small Business, Technology, and Economic Development
- Federation of B.C. Woodlot Associations
- Canadian Model Forest Network
- Agroforestry Industry Development Initiative

- B.C. Ministry of Forests
- B.C. Timber Sales
- B.C. Wild, Agriculture and Agri-Food Canada
- Natural Resources Canada, Canadian Revenue Agency
- National Research Council
- Foreign Affairs and International Trade Canada
- Environment Canada
- Canadian Environmental Assessment Agency
- Sustainable Development Technology Canada
- Transport Canada
- Canadian Transport Research Forum
- Aquaculture Association of Canada
- Small Scale Food Processors Association
- Cattle Industry Development Council
- United States National Oceans and Atmospheric Administration
- World Fisheries Trust
- Farm Folk/City Folk
- Universities and academic institutions (Haida Gwaii Higher Education Society, Northwest Community College, University of British Columbia, Simon Fraser University, University of Northern British Columbia, Royal Roads etc.)
- Villages of Masset, Old Masset, Port Clements, Skidegate, Queen Charlotte and Sandspit, Skeena District Area D and E
- East Coast Farmers Institute, Island Foods, Skidegate Inlet Fuelwood and Fitness Society and School District 50, to name a few.

Appendix D Priorities for Action Plans

Production Support

Urgent

Access to Land

- Identify
- Acquire/Secure for the Future

Support the ALR

Infrastructure for Land

- Ensure New Land is Cleared
- Ensure Fencing is Completed

Important

Incentive Programs for Supporting Agriculture

- Tax Incentives from Local Government
- Subsidies
- Support and Acknowledgement from Local Government

Technical Support

- Extension Agent (Government Resource for Farmers)

- Experimental Farms/Plots/Trials
 - Coastal Grain Trials
 - Soil Amendment Research
 - Seed Saving Research

Long-Term Sustainable Use of the Land

Continue to Develop Infrastructure

- Greenhouses
- Storage Facilities
- Sheds etc

Business Opportunities

Urgent

Community Supported Agriculture (CSAs)

Small Plot Intensive Opportunities (SPIN)

Transportation/Delivery

Soil Amendments

Important

Farmers Markets

Agroforestry

Compost

Land Agreements

Agro-Tourism

Policy

Urgent

Conduct an inventory of currently cleared/farmable land
Conduct an assessment of how much land is required to produce each 'growable' crop locally (based on our annual consumption data)
Amending Regulations Regarding Food Inspection (ie: Dairy/Eggs)
Amending Regulations Regarding Local Residents and Deer Limits
Controlling Introduced Species

Important

Have Access to a Local Food Production Agency/Inspector
Amending Regulations to Enable Harvesting and Marketing Local Game (ie: Deer)
Government Support at all Levels for Access to Land for Food Production
Non-Native Food Fishery
Gwaii Trust Society Establish a Funding Program to Support Agriculture/Food Production on Haida Gwaii

Future Follow Up

Lobbying
Lower Land Prices for Agriculture
Seaweed Potential
Protection of the Land under the ALR

Marketing

Urgent

Develop Branding and Support for

- Farmers Markets
- Community Supported Agriculture – CSA - (ie: Box a Week Program)

Develop Local Interest and Support

Important

E-communications
Develop a Resource List of Growers and Food Produced
Develop a Local Bartering System

Resources/Partnerships

Urgent

Link the Food Producers (Growers) with the Market (ie: Farm to School Program)
Develop a Shared Harvest Page on Haida Gwaii Trader
Identify Resource Needs and Assess Availability for Food Producers

Formalize 2011 Growing Season Commitments Between Food Producers and Markets

- Farm to School Program
- Fishing Lodges
- Grocery Stores
- Box a Week Program

Important

Gwaii Trust Society Establish a Funding Program to Support Agriculture/Food Production on Haida Gwaii
Public Information on Available Storage

Education

Urgent

Sharing Information and Conducting Research on

- Suitable Crops
- Varieties, Indigenous Species, Invasive Tendencies
- Past Agricultural Experience on Haida Gwaii

Developing Sustainable Agriculture Skills

- Organic Techniques (including Soil Building and Composting)
- Permaculture Techniques
- Animal Husbandry
- Processing
- Farm Infrastructure (tools, implements, storage)
- Fruit Tree Pruning
- Workshops on Berry Growing

Important

Ongoing, Consistent Media Coverage re: Issues in Agriculture and Current Activities

Develop Awareness of Agricultural Learning and Business Opportunities for Young People

- 4-H
- SPIN
- CSAs

Producer/Farmer Co-Ops

Connect the Agriculture Strategy to a larger, more inclusive discussion of food on Haida Gwaii (ie: Hunting, Fishing, Gathering)


Appendix E – Site Assessments³

Agricultural Land in Proximity to Haida Gwaii Communities

Old Massett/Masset



Agricultural Site Assessment Map for Masset / Old Masset

Potential Sites 

Site 1: Old Masset North – (382 Acres / 6,740m Perimeter)

Site 1 is a relatively flat, exposed forest on the northeast side of Old Masset. The organic soil layer is shallow (~10cm) throughout the area. The soil is predominantly composed of sand and some small pebbles. Some small (possibly seasonal) streams and standing water were observed. Salinity due to proximity to the ocean may be a factor. Soil productivity is deemed to be 4 to 5, unless additions of organic matter, fertilizer, and lime are made. The forest tends to be mixed (PI,

³ Site approximations are subject to further study to determine actual numbers and specific protected area boundaries.

Hw, Dr, Ss, Cw)⁴ - with primarily low quality and volume timber (~150m³/ha). Several non-maintained roads appear to exist in the area, but were not mapped.

Site 2: North Masset – (208 Acres / 4,740m Perimeter)

Site 2 is a relatively flat, exposed forest on the north side of Masset, and S of Old Masset. The organic soil layer is shallow (~10cm) throughout the area. The soil is predominantly composed of sand and small pebbles, and courser fragments. Some small, possibly seasonal, streams, and standing water were observed. Salinity due to proximity to the ocean may be a factor. Soil productivity is deemed to be 4 to 5, unless additions of organic matter, fertilizer and lime are made. Extensive removal of course fragments will also have to be done. The forest tends to be mixed (Pl, Hw, Dr, Ss, Cw) with primarily low quality timber (~200m³/ha). The area is bounded by non-motorized trails and several foot paths were observed entering the area.

Site 3: Masset Lots (< 1 Acres / 110m Perimeter)

Site 3 is relatively flat empty village lots/areas located within Masset. The organic soil layer is shallow (~10 - 15cm) throughout the area. The soil is predominantly composed of sand and small pebbles. The municipal water system can be used for water. Soil productivity is deemed to be 4, unless additions of organic matter, fertilizer and lime are made. Lots are forested or cleared depending on location. Felled trees could be sold as firewood. The lots are typically found on paved two lane roads/streets.

Site 4: CFB Masset (4.5 Acres / 570m Perimeter)

Site 4 is the Canadian Forces Base in Masset. The organic soil layer is shallow (~10cm) throughout the area. The soil was predominantly composed of sand and small pebbles. Municipal water systems can be used for water. Soil productivity is deemed to be 4, unless additions of organic matter, fertilizer and lime are made. The area is virtually bare of trees. The entire area was bordered by paved two lane roads.

Site 5: Masset East (155 Acres / 3,750m Perimeter)

Site 5 is a relatively flat, forested wetland about 2km east of Masset. The organic soil layer was not tested because the area was flooded. It is assumed that the soil was predominantly composed of organic matter, sand and small pebbles. It was undetermined whether the forest exists in a brackish/saline environment. Soil productivity is deemed to be 5, unless extensive ditching/tiling is used. Extensive removal of course fragments may also have to be done. The forest tends to be

⁴ BC Tree Code List: Cw = Western Red Cedar; Yc = Yellow Cedar; Hw = Western Hemlock; Pl = Lodgepole Pine (sub-species: *Pinus contorta* var. *contorta*); Dr = Red Alder; Ss = Sitka Spruce

low grade Alder, and with mixed pulp wood (~50-100m³/ha). The area is located on a two lane highway.

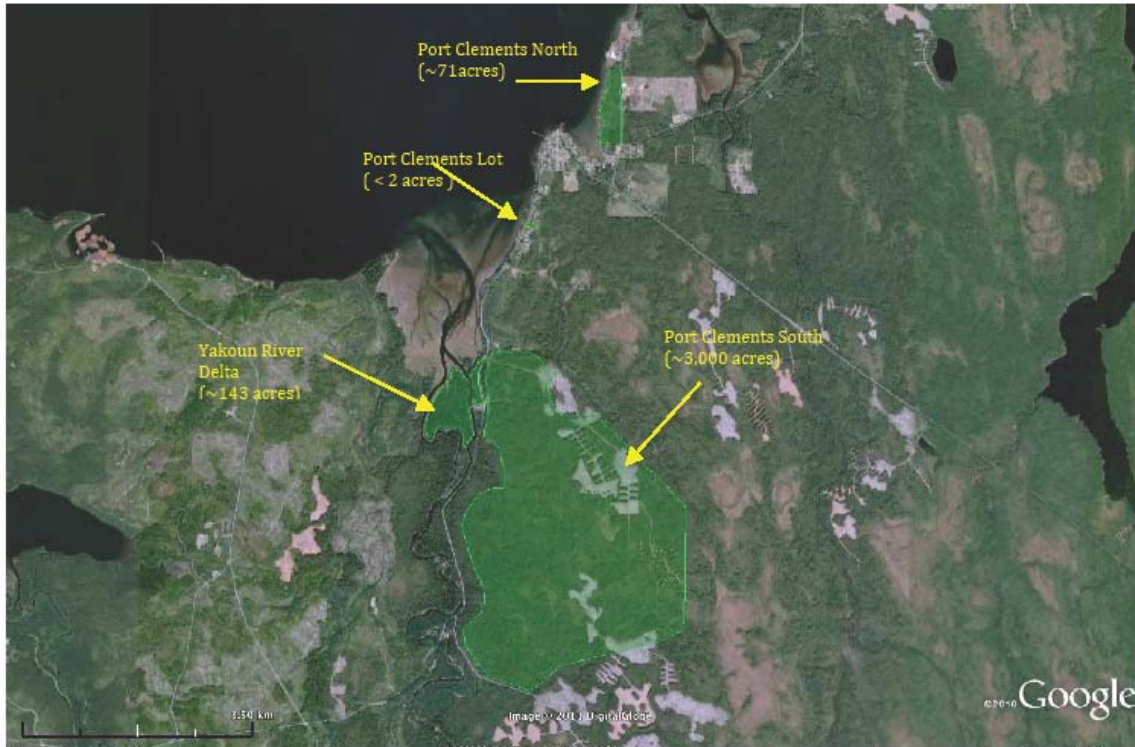
Site 6: Masset Far East (137 Acres / 3,720 Perimeter)

Site 6 is a relatively flat, forested area about 3 km east of Masset around the industrial area. The organic soil layer is fairly shallow (20cm) in the undisturbed areas. The soil is predominantly composed of sand, small pebbles, and some coarse fragments. Stand water was observed in some areas. It was undetermined at the time of this report whether the area was serviced with municipal water. Soil productivity was deemed to be 4 to 5, unless additions of organic matter, lime, and removal of coarse fragments are done. The forest tends to be mixed (Pl, Hw, Ss) with low quality timber (~150-200m³/ha). The area is located on a two lane highway.

Site 7: Old Massett Lots

Site 7 is relatively flat empty village lots/areas located within Old Massett. The organic soil layer is shallow (~10 - 15cm) throughout the area. The soil is predominantly composed of sand and small pebbles. The municipal water system can be used for water. Soil productivity is deemed to be 4 to 5, unless additions of organic matter, fertilizer and lime are made. Lots are forested or cleared depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane roads/streets.

Port Clements



Agricultural Site Assessment Map for Port Clements

Potential Sites ■

Site 1: Port Clements North (71 Acres / 2,760m Perimeter)

Site 1 is flat, exposed forest 1 km north of Port Clements. The organic soil layer was not tested because the area was flooded / inaccessible. It was undetermined whether the forest exists in a brackish / saline environment. Soil productivity is deemed to be 5, unless extensive ditching / tiling is used. The forest tends to be immature mixed (Pl, Ss, Hw) with primarily low quality and low volume timber (~100-150m³/ha). The area is bounded by Masset Inlet and a gravel road.

Site 2: Port Clements Lots (<2 Acres / 460m Perimeter)

Site 2 is relatively flat empty village lots/areas located within Port Clements. The organic soil layer is quite variable throughout the area. The soil is predominantly organic with a variety of underlays (pebbles, coarse rock, silt/clay). Municipal water systems can be used for water. Soil productivity is deemed to be variable (3 to 5). The most fertile sites appear (maybe as high as 3) to be on the south side of Port Clements. Soil management will have to be done on a site-specific

basis. Lots are forested or clear depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane roads/streets.

Site 3: Port Clements South (3,000 Acres / 15,200 Perimeter)

Site 3 is a relatively flat area found 2 km south of Port Clements. A thick organic soil layer, with many roots and extensive microtopography exists throughout the area. Some small, possibly seasonal, streams were noted. Soil productivity is deemed to be 4, unless removal of coarse organic fragments and microtopography, and the addition of lime are done. The forest tends to be cedar leading mixed (Cw, Pl, Ss, Hw), with quality ranging from poles and saw logs to pulp grade (~250m³/ha). The area is bounded gravel forest service roads.

Site 4: Yakoun River Delta (143 Acres / 4,300m Perimeter)

Site 4 is a relatively flat area found 3 km south of Port Clements. A relatively thick (20cm) (in Masset Far East site you called this fairly shallow) organic soil layer, underlain with pebbles and numerous roots throughout the area. Some small, possibly seasonal, streams were noted. Soil productivity is deemed to be 4, unless removal of coarse organic fragments (did not mentioned coarse fragments above), and the addition of lime were made. Pebbles in the mineral soil may pose a future problem with tilling. The forest tends to be cedar leading mixed (Cw, Ss, Hw) with quality ranging from quality saw logs and poles to pulp grade (~350m³/ha). The area is bounded by the Yakoun River, and gravel forest service roads.

Tlell



Agricultural Site Assessment for Tlell

Potential Sites ■

Site 1: Tlell North (Naikoon Provincial Park) (9 Acres / 754m Perimeter)

Site 1 is a sheltered flat gully 2.5 km north of Tlell along the banks of the Geikie Creek (1 or 2?). The organic soil layer is relatively thick (~20cm) throughout the area, with extensive roots and microtopography. The area appears to be shaded as a result of its location. Soil productivity is deemed to be 4, unless microtopography is removed and additions of lime are made. The forest tends to be mixed with primarily low quality timber (~200m³/ha). The area is located along a two lane paved highway.

Site 2: Tlell Fairgrounds (6.4 Acres / 668m Perimeter)

Site 2 is a relatively flat, exposed area north of Tlell. The organic soil layer is shallow (~10cm) throughout the area. The soil is predominantly composed of sand and small pebbles, with some coarse fragments. The area is found along the Tlell River, although it is uncertain as to what affect salinity has on the area. Soil productivity was deemed to be 4, unless additions of organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments would also have to

be made. The forest in this area tends to be Pine leading with primarily low quality timber (~200m³/ha). The area is serviced by a two lane highway.

Site 3: Tlell Fire Hall (7 Acres / 855m Perimeter)

Site 3 is a relatively flat, exposed area located near the soccer field about 2 km south of Tlell. The organic soil layer is very shallow (~5-10cm) throughout the area. The soil is predominantly composed of sand and small pebbles, with some coarse fragments. No streams were observed in the area. Soil productivity is deemed to be 4, unless additions of organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments will also need to be completed. The forest in this area tends to be Pine leading (Pl, Hw, Ss, Dr) with primarily low quality timber (~200m³/ha). The area is serviced by a two lane highway.

Site 4: Tlell Private Land (2.5 Acres / 460m Perimeter)

Site 4 can be described as parcels of private land found throughout Tlell. The organic soil layer tends to be very shallow - shallow (~5-15cm) throughout the area. The soil tends to be predominantly composed of sand and small pebbles, with some coarse fragments. Very few streams were observed in the area. Soil productivity is deemed to be 4, unless additions of organic matter, fertilizer, and lime are made. Microtopography may also have to be removed on some sites. Extensive removal of coarse fragments will also have to be done. The forest in this area tends to be Pine (Pl, Hw, Ss, Dr) leading with primarily low quality timber (~200m³ / ha). The area is serviced by a two lane highway.

Skidegate



Agricultural Site Assessment for Skidegate

Potential Sites ■

Site 1: Skidegate North (<1 Acres / 150m Perimeter)

Site 1 is relatively flat, exposed village lots on at the north end of Skidegate. The organic soil layer is very shallow (~5-10cm) throughout the area. The mineral soil is predominantly composed of coarse fragments and small pebbles. The area is serviced by municipal water. Soil productivity is deemed to be 5, unless significant, organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments will also have to be done. Lots are forested or cleared depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane roads.

Site 2: Skidegate (<1 Acres / 300m Perimeter)

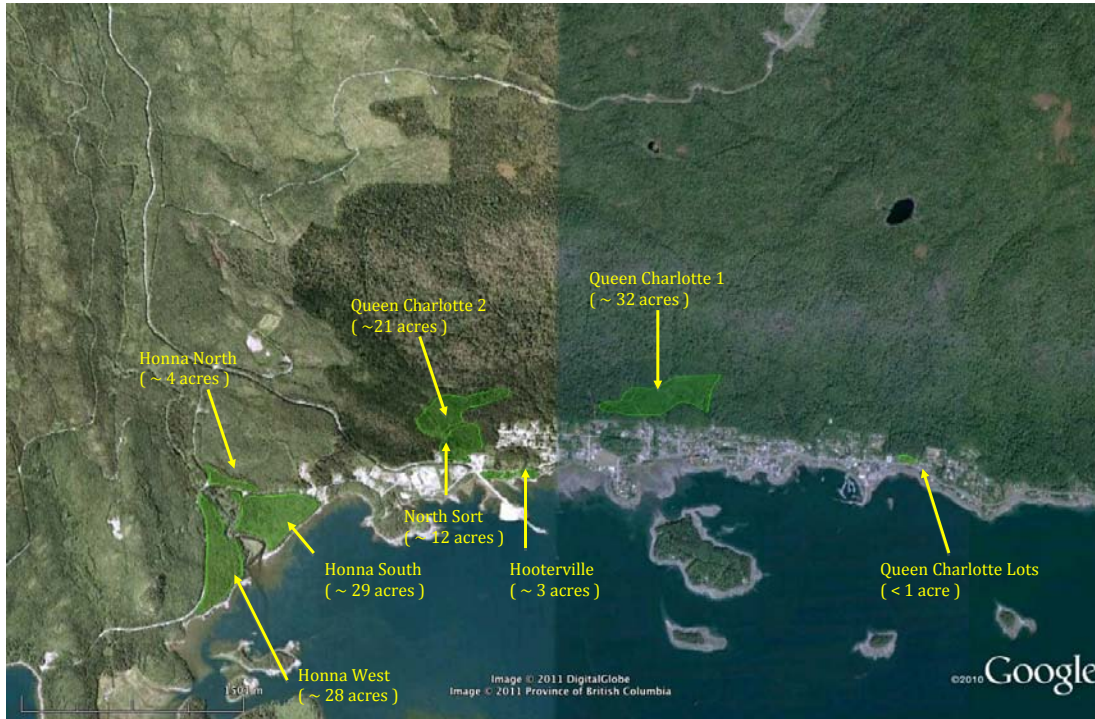
Site 2 is relatively flat, exposed village lots on at the south end of Skidegate. The organic soil layer is very shallow (~5-10cm) throughout the area. The mineral soil was predominantly composed of coarse fragments and small pebbles. The area is serviced by municipal water. Soil productivity is deemed to be 5, unless significant additions of organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments will also have to be done. Lots are forested or

cleared depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane roads.

Site 3: Spirit Lake Trail Entrance (<1 Acres / 200m Perimeter)

Site 3 is the entrance to the Spirit Lake Trail. The organic soil layer is very shallow (~5cm) throughout the area. The mineral soil is predominantly composed of coarse fragments and small pebbles. A small creek runs along the southern perimeter. The area is affected by limited late afternoon light due to its aspect. Soil productivity is deemed to be 5, unless significant additions of organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments will also have to be done. The area is serviced by a two lane highway. Felled trees may be sold as firewood.

Queen Charlotte



Agricultural Site Assessment for the Village of Queen Charlotte

Potential Sites ■

Site 1 Honna West (28 Acres / 1,917m Perimeter)

Site 1 is a relatively flat area found 3 km west of Village of Queen Charlotte. A relatively thick (20cm) organic soil layer is underlain with pebbles, many roots, and coarse fragments. A high degree of microtopography exists throughout the area. Some small, possibly seasonal, streams and wet areas were noted. The Honna River is located on the northern boundary. Soil productivity is deemed to be 4, unless removal of coarse fragments, large woody debris, and the addition of lime are made. Pebbles in the mineral soil may pose a future problem with tilling. The forest tends to be mixed (Ss, Hw, Dr, Pl) with quality ranging from saw logs to pulp grade (~150-200m³/ha). The area is accessible by a gravel road.

Site 2 Honna South (29 Acres / 1,652m Perimeter)

Site 2 is a relatively flat area found 2 km west of Village of Queen Charlotte, which is possibly private property. A relatively thick (20cm) organic soil layer is underlain with pebbles, many roots, and coarse fragments throughout the area. A high degree of microtopography also exists. Some small, possibly seasonal streams and wet areas were noted. The Honna River is located on the southern boundary. Soil productivity is deemed to be 4, unless removal of coarse fragments,

large woody debris, and the addition of lime are made. Pebbles in the mineral soil may pose a future problem with tilling. The forest tends to be mixed (Ss, Hw, Dr, Pl) with quality ranging from saw logs to pulp grade (~150-200m³/ha). The area is accessible by a gravel road.

Site 3 Honna North (4 Acres / 879m Perimeter)

Site 3 is a relatively flat area found 2 km west of Village of Queen Charlotte. A shallow (10-15cm) organic soil layer is underlain with pebbles, many roots and coarse fragments throughout the area. A high degree of microtopography exists. The area may also be affected by low levels of late afternoon sunlight. Some small, possibly seasonal streams were noted. Soil productivity is deemed to be 5, unless removal of coarse fragments, large woody debris, and the addition of lime are made. The forest tends to be mixed with quality ranging from saw logs to pulp grade (~150-200m³/ha). The area is accessible by a gravel road.

Site 4 Hooterville (3 Acres / 810m Perimeter)

Site 4 is a relatively flat area found within the Village of Queen Charlotte, but on Crown land. The area is covered with a very shallow (10cm) organic soil layer that is underlain with clay and some rocky outcrops. Microtopography is somewhat prevalent with some large woody debris. The area may be serviced by the municipal water system. Soil productivity is classed as 4. Removal of large woody debris and the addition of lime will further increase productivity. The forest tends to be marginal mixed alder and spruce (~100-150m³/ha). The area is accessible by a two lane road. Industrial pollutants may have compromised this area, so soil testing is recommended.

Site 5 North Sort (12 Acres / 954m Perimeter)

Site 5 is a relatively flat area found north of the industrial log sort (old M&B shop yard) in the Village of Queen Charlotte. The area is covered with a thick organic layer (30cm+), with large woody debris and roots. Microtopography is prevalent. The Crabapple Creek forms the western boundary of this site. Soil productivity is determined as 4. Removal of microtopography of large woody debris and the addition of lime will further increase productivity. The forest tends to be mixed (Ss, Dr, Hw) with quality ranging from pulp grade to saw log (~250m³/ha). The area is accessible by a two lane road. Industrial pollutants may have impacted the southern boundaries of this area, so soil testing is recommended.

Site 6 Village of Queen Charlotte (<1 Acres / 200m Perimeter)

Site 6 is relatively flat empty village lots/areas located within the Village of Queen Charlotte. The organic soil layer is quite variable throughout the area. The soil is predominantly organic with a variety of underlays (pebbles, coarse fragments, and bedrock). The municipal water system can be used for water. Soil productivity is deemed to be variable, from 3 to 5. The most fertile sites appeared to be located adjacent to streams and areas historically used as gardens. Soil management will have to be done on a site specific basis. Lots are forested or cleared depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane streets.

Site 7 Queen Charlotte 1 (31.5 Acres/ 1,980m Perimeter) and 2 - North Sort (21 Acres/1,579m Perimeter)

Site 7 is a relatively flat area found north of the Village of Queen Charlotte. The area is located on a natural terrace / bench that forms a natural toe at the bottom of a steep hill. The area is covered with a thick organic layer (20-30cm+), with coarse organic matter and roots. Microtopography was prevalent. Several small creeks were located, including Crabapple Creek, Gore Brook, Hartie Creek and Templeton Creek. Mineral soil was composed of mainly small pebbles, and silt. Removal of microtopography of coarse organic fragments, and the addition of lime were made could further increase productivity. Some areas were saturated with water and may have to be ditched / tiles. Although most areas were relatively flat (not including microtopography), slopes between 5% and 25% were found. The forest tended to be mixed (Ss, Hw, Dr) with quality ranging from pulp wood to quality saw log (~250m³ / ha). The area is accessible by roads and foot paths.

Sandspit



Agricultural Site Assessment for Sandspit

Potential Sites ■

Site 1: Onward Point (14 Acres / 938m Perimeter)

Site 1 is an exposed area, with a north facing aspect about 4 km west of Sandspit. The organic soil layer was found to be shallow (~10cm) throughout the area. The soil was predominantly composed of organics (okay, if the organic layer is shallow, how can the soil be predominately organics?) and coarse fragments and roots. A stream borders the eastern edge of the area. Soil productivity is deemed to be 4 to 5 due to shading, and unless additions of organic matter, fertilizer, and lime are made. Extensive removal of coarse fragments will also have to be done. The forest in this area tends to be Spruce leading (Ss, Hw, Dr) with primarily low grade timber with potential for some saw logs. (~250m³ / ha). The area is serviced by a two lane highway.

Site 2: Sandspit North (46 Acres / 1,804m Perimeter)

Site 2 is a relatively flat, exposed forest located in the Sandspit. The organic soil layer was found to be shallow (~10cm) throughout the area. The soil was predominantly composed of sand and small pebbles, with some coarse fragments. No streams were found in the area. Soil productivity is deemed to be 4, unless additions of organic matter, fertilizer, and lime are made. Pebbles may affect success of future tilling. The forest in this area tends to be mixed (Ss, Hw) with primarily low grade timber (~150-200m³ / ha). The area is serviced by two lane roads.

Site 3: Sandspit Lots (<1 Acres / 200m Perimeter)

Site 3 is relatively exposed flat empty village lots/areas located within Sandspit. The organic soil layer is very shallow (~5 - 15cm) throughout the area. The mineral soil is predominantly composed of sand and small pebbles. The community water system can be used for water. Soil productivity is deemed to be 3 to 5, unless additions of organic matter, fertilizer, and lime are made. Lots are forested or cleared depending on location. Felled trees may be sold as firewood. The lots are typically found on paved two lane roads.

Site 4: Sandspit South (83 Acres / 2,300m Perimeter)

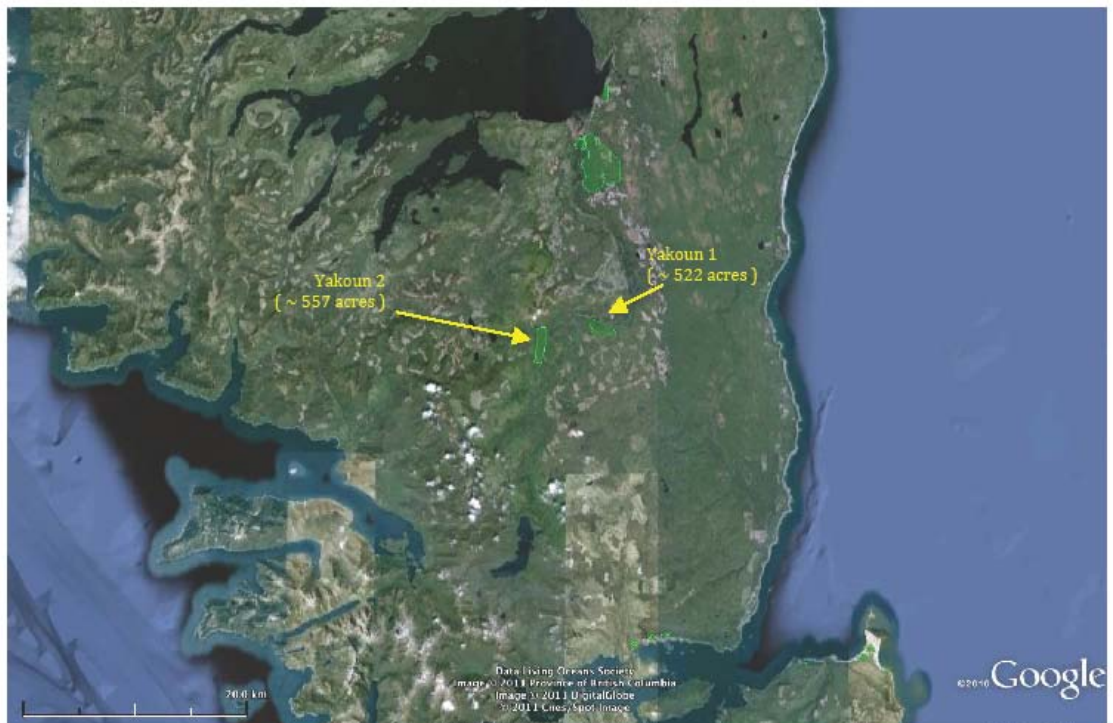
Site 4 is a relatively flat, exposed forest located in the Sandspit. The organic soil layer is shallow (~10cm) throughout the area. The soil is predominantly composed of sand and small pebbles, with some coarse fragments. No streams are located in the area. Soil productivity is deemed to be 4 to 5, unless additions of organic matter, fertilizer, and lime are made. Pebbles may affect success of future tilling. The forest in this area tends to be mixed (Ss, Hw) with primarily low quality timber (~150-200m³ / ha). The area is serviced by two lane roads.

Site 5: Hecate Shores (12 Acres / 978m Perimeter)


Site 5 is relatively flat private lots located south of Sandspit. The organic soil layer was found to be shallow (~10cm) throughout the area. The soil was predominantly composed of sand and small pebbles, with some coarse fragments. No streams were in the area, although some standing water was visible in certain areas. Soil productivity is deemed to be 4, unless amendments of organic matter, fertilizer, and lime were made. Pebbles may affect success of future tilling. Areas that were forested tended to be alder leading mixed (Dr, Ss, Hw, Pl), with low quality and volume timber (~100-150m³/ha). The area is serviced by two lane roads.

Special Consideration Sites

These sites have been reviewed under special consideration as they are considered to have potentially better micro climate conditions as compared to other coastal influence areas reviewed.



Agricultural Site Assessment for Yakoun River Valley

Potential Sites 

Yakoun 1 - (522 Acres/7,089m Perimeter)

Yakoun 1 is a large, relatively flat valley found in the Yakoun River basin area approximately 45 km north of Queen Charlotte at the 5 km marker on the Canyon Mainline. Organic layers exceeded 30cm in all areas. Numerous roots and large woody debris are associated with the organic matter. The area was saturated with water at the time of the site visit. Soil productivity is deemed to be 4. The addition of ditches, drainage tiles, and lime will assist in increasing the productivity significantly. Large woody debris will also have to be removed. The forest tends to be old growth cedar leading mixed (Cw, Ss, Hw) with quality ranging from high grade to pulp grade (~350-500m³/ha). It is anticipated that several protected Monumental Cedar exist in this area that had indentified in the available MapView data. The area is bounded by Special Protected Areas, the Yakoun River and a gravel logging road.

Yakoun 2 - (557 Acres/7,837m Perimeter)

Yakoun 2 is a large, relatively flat area found in the Yakoun River basin area approximately 35 km north of Queen Charlotte on the Queen Charlotte Mainline. Organic layers exceeded 30cm in all areas. Numerous roots and large woody debris are associated with the organic matter. The area was saturated with water at the time of the field visit. Soil productivity is deemed to be 4. The addition of ditches, drainage tiles, and lime will assist in increasing the productivity. Large woody debris will also have to be removed. The forest tends to be old growth spruce leading mixed (Ss, Hw, Dr) with quality ranging from saw logs to pulp grade (~200-400m³ / ha). The area is bounded by Special (Haida?) Protected Areas, the Yakoun River and a bisected by a gravel logging road.

Cost Estimates

Stumping	-	approx. \$1,500 - \$3,500 / hectare ⁵
Tiling	-	\$2 - \$6 / metre, or \$1,000 to \$1,500 / hectare ⁶
Fencing 6'	-	\$2,500 - \$7,500 / 1000metres ⁷

⁵ 2009 Coast Appraisal Manual - \$1,114/ha

<http://www.for.gov.bc.ca/rco/revenue/Documents/ADOBE%20Documents/Destumping%20Submission%20Requirment%20Question.pdf>

2000 Extension Note - \$2.29 / m³ or about double the 2009 CAM quote

<http://www.for.gov.bc.ca/rsi/research/nextnotes/En049.htm>

⁶ 2011 OMAFRA - \$1,320 / ha (variable according to land)

http://www.omafra.gov.on.ca/english/crops/facts/info_tiledrains.htm

<http://www.drainage.org/planning.htm>

⁷ Fencing Cost Calculator

http://www.bae.uky.edu/ext/livestock/Calculators/LivestockCalculator_FenceWovenBarbed.htm

Fencing Cost Calculator

<http://www.gatewayalpacas.com/alpaca-farming/farm-fencing/fence-calculator.htm>

Modern Poly-Tarp Greenhouse Construction – Approx. \$20 / ft² or \$1M / acre.⁸

Ultra-Modern Glass Greenhouse Construction – Approx. \$5 - \$10M / acre⁹

Fencing Cost Calculator

http://ufa.basecorp.com/ufileuploads/document/Fencing_Calculator.htm

⁸ 2011- Manitoba, \$12 to \$17 / sq. ft.

<http://www.gov.mb.ca/agriculture/crops/fruit/blm01s00.html>

2011- Alberta, \$15 to \$25 / sq. ft.

[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/opp11207](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/opp11207)

2011- Saskatchewan, \$5 / sq. ft. (materials only)

<http://www.agriculture.gov.sk.ca/Default.aspx?DN=0fc33e38-1e1f-4628-b1d3-43e07f13f6bb>

⁹ Capital Greenhouse - \$5M - \$10M / acre (project dependent)

<http://www.capitalgreenhouse.ca/index.php?page=some-projects>